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OGC EO Dataset Metadata  
GeoJSON(-LD) Encoding Standard

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1. Abstract

JavaScript Object Notation (JSON) [NR1] has been gaining in popularity for encoding data in Web-based applications. JSON consists of sets of objects described by name/value pairs. This OGC standard describes a GeoJSON [NR2] and JSON-LD [NR3] encoding for Earth Observation (EO) metadata for datasets (granules). This standard can be applied to encode metadata based on the Earth Observation Metadata Profile of Observations and Measurements (O&M) OGC 10-157r4 [OR1], or as an encoding of the Unified Metadata Model for Granules (UMM-G) conceptual model [OR2].

The GeoJSON encoding defined in this document is defined as a compaction[[1]](#footnote-1) through a normative context, of the proposed JSON-LD encoding, with some extensions as presented in section 8 of this document. Therefore, the JSON-LD encoding can also be applied to other RDF [OR8] encodings including RDF XML [OR11] and RDF Turtle [OR12].

This document makes no assumptions as to the “service” interfaces through which the metadata are accessed and applies equally well to a Service Oriented Architecture as well as a Resource Oriented or RESTful Architecture. The documented approach can be applied in combination with the following technologies:

* OGC OpenSearch extensions [OR19], [OR20], [OR25],
* W3C Linked Data Platform [OR21], [OR22],
* OASIS searchRetrieve [OR23],
* OASIS Odata [OR24].

GeoJSON is a format for encoding collections of simple geographical features along with their non-spatial attributes using JSON. GeoJSON objects may represent a geometry, a feature, or a collection of features. GeoJSON supports the following geometry types derived from the OGC Simple Features specification: *Point*, *LineString*, *Polygon*, *MultiPoint*, *MultiLineString*, *MultiPolygon* and *GeometryCollection*. Features in GeoJSON contain a geometry object and additional properties, and a feature collection represents a list of features.

JSON is human readable and easily parseable. However, JSON is schemaless. JSON and GeoJSON documents do not include an explicit definition of the structure of the JSON objects contained in them. Therefore, this standard is based on a normative JSON-LD context which allows each property to be explicitly defined as a URI. Furthermore, the JSON encoding is defined using JSON Schema [OR18] which allows validation of instances against these schemas.

1. Keywords

The following are keywords to be used by search engines and document catalogues

ogcdoc, ogc documents, Earth Observation, EO, Linked Data, Datasets, GeoJSON, JSON, JSON-LD, Metadata

1. Preface

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1. Submitting organizations

The following organizations will submit the original document or its revisions to the Open Geospatial Consortium (OGC):

* **CEOS – Committee on Earth Observation Satellites**
* **CGI**
* **Con terra**
* **ESA – European Space Agency**
* **EUMETSAT**
* **Spacebel s.a.**

The editors would like to acknowledge that this work is the result of collaboration and review of many organizations and would like to thank for the comments and contributions from:

* **DLR**
* **GeoSolutions**
* **VITO**

Note: this acknowledgement does not imply a complete endorsement by these organizations.

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# Scope

This OGC standard defines a GeoJSON [NR2] and JSON-LD [NR3] encoding of Earth Observation (EO) metadata for datasets (i.e., products or granules). The standard provides document models for the exchange of information describing EO datasets, both within and between different organizations.

The document model is derived from the conceptual models defined in the Earth Observation Metadata Profile of Observations and Measurements (O&M) OGC 10-157r4 [OR1], and the Unified Metadata Model for Granules (UMM-G) [OR2], depicted below.



Figure 1: EO Metadata Profile of O&M Conceptual Model from [OR1]

Please note that the proposed encoding can also be applied to EO dataset metadata originally encoded according to other models, including ISO-19139 [OR27], ISO-19139-2 [OR28], etc. The mapping between UMM-G to these encodings can be found in [OR2] while this document defines the GeoJSON to UMM-G model. Future versions of this document may contain mappings to ISO models as annexes.



Figure 2: Unified Metadata Model for Granules [OR2]

## Design Approach and Rationale

*This section is non-normative.*

The metadata encoding defined in the document satisfies the following design goals.

* **Feature-based GeoJSON model**: The model maximizes reuse of pre-existing standardised property names. Whereever possible, existing properties from GeoJSON [NR2] and OWS Context [NR5] are used for modelling EO product properties instead of new EO-specific property names. These are then are grouped under either feature.properties, feature.properties.[acquisitionInformation], or feature.properties.productInformation.
* **Simplicity**: This document does not describe the full information models or XML encodings referred to above. The above standards (i.e., OGC 10-157r4 and UMM-G) should be referred to for these details. This standard intends to provide a simpler, overarching exchange format integrating comments from the Committee on Earth Observation Satellites (CEOS) Working Group on Information Systems and Services (WGISS) community, which supported the submission of this standard to the OGC.
* **Multiple use cases**: The metadata model supports metadata for an acquisition (e.g., planned or acquired), for a simple product derived from one acquisition (planned, acquired or archived), or for a synthesis product (i.e., derived from multiple acquisitions over a certain period of time or from acquisitions by multiple sensors).

## Document Outline

Hereafter a brief outline of the document content allows readers to jump directly to the topic of their interest.

* Chapter 3 lists the normative and informative references used in this document.
* Chapter 4 defines the main terms used in the document.
* The conventions used in this document are explained in Chapter 5.
* Chapter 6 gives an overview.
* Chapter 7 specifies the proposed GeoJSON encoding.
* Chapter 8 describes how the encoding can be extended with additional properties and describes the extension to JSON-LD which allows for describing multi-dimensional arrays as allowed by GeoJSON.
* Chapter 9 provides information about the expected MIME media types which correspond to the proposed encodings.
* Chapter 10 describes future work.

Finally, the following information was moved to the appendices.

* Annex A defines the Abstract Test Suite for the standard.
* Annex B includes normative JSON-LD @context definitions that allow interpreting the GeoJSON encoding as JSON-LD. It also formally defines the EO vocabulary (i.e., RDF properties and classes) in RDF Schema format.
* Annex C presents the mapping of the EO properties proposed in this specification to the OGC 10-157r4 and UMM-G conceptual models.
* Annex D contains the complete listing of examples illustrating the encodings defined in this document.
* Annex E includes the JSON schema definitions defining the GeoJSON encoding.
* Annex F explains where the schema file, context files and examples can be found in the OGC schema repository.
* Annex G provides the revision history of this document.

# Conformance

## Conformance to base specifications

This section describes the compliance testing required for an implementation of this standard.

## Conformance classes

The framework, concepts, and methodology for testing, and the criteria to be achieved in order to claim conformance are specified in the OGC Compliance Testing Policies and Procedures and the OGC Compliance Testing web site[[2]](#footnote-2).

Annex A defines a set of tests and conformance classes that will support various applications with a range of different requirements. The following conformance classes are distinguished. Testing is based on data validation. In order to conform to this OGC standard, an implementation shall choose to implement one or more of the conformance classes specified in Annex A (normative).

|  |  |  |
| --- | --- | --- |
| *Conformance Class* | *Description* | *Clause* |
| **/conf/core** | Single EarthObservation object or collection of EarthObservation objects. | Sections 7.1 and Section 7.8 |
| **/conf/earthobservation** | EarthObservation objects. | Section 7.1 |
| **/conf/properties** | Properties objects. | Section 7.1.1 |
| **/conf/links** | Links objects. | Section 7.1.2 |
| **/conf/offering** | Offering objects. | Section 7.1.4 |
| **/conf/metadata-information** | MetadataInformation objects. | Section 7.2 |
| **/conf/data-identification** | DataIdentification objects. | Section 7.3 |
| **/conf/geometry** | Geometry objects. | Section 7.4 |
| **/conf/acquisition-information, /conf/acquisition-parameters** | AcquisitionInformation and AcquisitionParameters objects. | Section 7.6 |
| **/conf/product-information** | ProductInformation objects. | Section 7.7 |
| **/conf/earthobservation-collection** | EarthObservationCollection objects. | Section 7.8 |

Table 1: Conformance classes related to data instances

# References

The following normative documents contain provisions that, through reference in this text, constitute provisions of this document. 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.

## Normative references

[NR1] RFC 7159, The JavaScript Object Notation (JSON) Data Interchange Format, 2014, http://www.ietf.org/rfc/rfc7159.txt

[NR2] RFC 7946, The GeoJSON Format, 2016, https://tools.ietf.org/html/rfc7946

[NR3] JSON-LD 1.0, A JSON-based Serialisation for Linked Data, W3C Recommendation, 2014, <http://www.w3.org/TR/json-ld/>

[NR5] OGC 14-055r2, OGC OWS Context GeoJSON Encoding, 2017, http://docs.opengeospatial.org/is/14-055r2/14-055r2.html

[NR6] OGC 06-121r9, OGC Web Services Common Standard, Version 2.0.0, 2010, http://portal.opengeospatial.org/files/?artifact\_id=38867

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# Terms and definitions

This document uses the terms defined in Sub-clause 5.3 of OGC 06-121r9 [NR6], 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.

For the purposes of this document, the following additional terms and definitions apply.



compaction

While expansion removes context from a given input, compaction’s primary function is to perform the opposite operation: to express a given input according to a particular context. Compaction applies a context that specifically tailors the way information is expressed for a particular person or application. This simplifies applications that consume JSON or JSON-LD by expressing the data in application-specific terms, and it makes the data easier to read by humans [OR13].

context

A set of rules for interpreting a JSON-LD document as specified in the section “The Context” of the JSON-LD specification [NR3].

dataset

Observation obtained by satellite instruments (OGC 10-140). See granule and product.

datastrip

A satellite acquisition. May consists of multiple scenes.

Domain (RDF)

Domain (rdfs:domain) is used to state that any resource that has a given property is an instance of one or more classes [OR10].

expansion

The algorithm that removes [JSON-LD] context is called expansion [OR13].

GeoJSON

A geospatial data interchange format based on Javascript Object Notation (JSON) [NR2].

granule

The smallest aggregation of data that can be independently managed. Granule usually matches the individual file of EO satellite data.

identifier

A character string that may be composed of numbers and characters that is exchanged between the client and the server with respect to a specific identity of a resource.

JSON

A lightweight, text-based, language-independent data interchange format, based on the Javascript programming language.

JSON Schema

JSON Schema is a JSON media type for defining the structure of JSON data. JSON Schema provides a contract for what JSON data is required for a given application and how to interact with it [OR18].

Product

A Product or a Dataset corresponds to an identifiable collection of data under one single identifier. It is independent of a physical form or an encoding even if it is normally distributed in a single file.

Range (RDF)

Range (rdfs:range) is used to state that values of a property are instances of one or more classes [OR10].

RDF Triple

An RDF triple consists of three components: the subject, the predicate and the object. An RDF triple is conventionally written in the order subject, predicate, object. [OR9].

scene

The result of cutting a datastrip into multiple parts

service interface

Shared boundary between an automated system or human being and another automated system or human being [ISO 19101].

swath

Area imaged on the surface by an Earth observation instrument.

synthesis products

Synthesis (or composite) products are products that are generated by combining information from multiple EO Products that are acquired over a certain period of time.

# Conventions

This section provides details and examples for any conventions used in the document. Examples of conventions are symbols, abbreviations, use of XML schema, or special notes regarding how to read the document.

## Abbreviated terms

Some frequently used abbreviated terms:

ALT ALTimetry

API Application Programming Interface

ATM ATMospheric

ATS Abstract Test Suite

CEOS Committee on Earth Observation Satellites

EO Earth Observation

EOP Earth Observation Product

GML Geography Markup Language

HMA Heterogeneous Missions Accessibility

HTTP HyperText Transfer Protocol

IRI Internationalised Resource Identifier

ISO International Organization for Standardisation

JSON JavaScript Object Notation

JSON-LD JavaScript Object Notation for Linked Data

LDP Linked Data Protocol

LMB LiMB looking

OASIS Organization for the Advancement of Structured Information Standards

OGC Open Geospatial Consortium

O&M Observations and Measurements

OPT OPTical

OWC OGC Web Services Context

RDF Resource Description Framework

RDFS RDF Schema

REST Representational State Transfer

SAR Synthetic Aperture Radar

SI International System of Units (French : Système international d’unités)

SSP Synthesis and Systematic

UML Unified Modeling Language

UMM Unified Metadata Model

UMM-G Unified Metadata Model for Granules

URI Uniform Resource Identifier

URL Uniform Resource Locator

URN Uniform Resource Name

W3C World Wide Web Consortium

WGISS Working Group on Information Systems and Services

WKT Well-Known Text

XML eXtensible Markup Language

XSD XML Schema Definition Language

## Symbols

### JSON Schema diagrams

The schema diagrams[[3]](#footnote-3) included in the document show the GeoJSON structure expressed in JSON Schema [OR18] and documented in Annex E.1.

|  |  |  |
| --- | --- | --- |
| **JSON Schema Entity** | **Representation** | **Description** |
| Definition |  | Definitions are shown as blue rectangles with solid borders. |

|  |  |  |
| --- | --- | --- |
| Mandatory property |  | Mandatory properties are shown with solid borders. |
| Optional property |  | Optional properties are shown with dashed borders. |
| Property of type “Object” referring to a “Definition” of the Object. |  | The “Def” attribute inside a rectangle representing a property of type Object refers to the corresponding Object definition. |

|  |  |  |
| --- | --- | --- |
| “All Of” operator | http://manual.altova.com/xmlspy/spyenterprise/jsonalloficon.png | Contains one or more sub-schemas (definitions), added as children of the operator. An instance is valid if it is valid against all these sub-schemas. |
| “Any Of” operator | http://manual.altova.com/xmlspy/spyenterprise/jsonanyoficon.png | Contains one or more sub-schemas (definitions), added as children of the operator. An instance is valid if it is valid against at least one of these sub-schemas. |
| “One Of” operator | http://manual.altova.com/xmlspy/spyenterprise/jsononeof.png | Contains one or more sub-schemas (definitions), added as children of the operator. An instance is valid if it is valid against exactly one of these sub-schemas. |
| Subschema (definitions) |  | The “Def” attribute inside a rectangle representing a (Sub) Schema refers to the corresponding Object definition. |

Table 2: JSON Schema diagram symbols

### JSONPath

The data dictionary tables in the current document use the JSONPath notation [OR34]. A brief overview of this notation is included in the table below which is taken from [OR34].

| **Xpath** | **JSONPath** | **Description** |
| --- | --- | --- |
| / | $ | the root object/element |
| . | @ | the current object/element |
| / | . or [] | child operator |
| // | .. | recursive descent. JSONPath borrows this syntax from E4X. |
| \* | \* | wildcard. All objects/elements regardless their names. |
| [] | [] | subscript operator. Xpath uses it to iterate over element collections and for predicates. In Javascript and JSON it is the native array operator. |
| | | [,] | Union operator in Xpath results in a combination of node sets. JSONPath allows alternate names or array indices as a set. |
| [] | ?() | applies a filter (script) expression. |

## Namespace abbreviations

The following namespace abbreviations will be used in this document:

|  |  |  |
| --- | --- | --- |
| *Abbreviation* | *Full namespace URI* | *Reference* |
| alt | <http://www.opengis.net/alt/2.1/> | [OR1] |
| atm | <http://www.opengis.net/atm/2.1/> | [OR1] |
| atom | <http://www.w3.org/2005/Atom/> | [OR14] |
| dct | <http://purl.org/dc/terms/> | [OR29] |
| eop | <http://www.opengis.net/eop/2.1/> | [OR1] |
| gj | [https://purl.org/geojson/vocab#](https://purl.org/geojson/vocab) | [OR33] |
| gsp | [http://www.opengis.net/ont/geosparql#](http://www.opengis.net/ont/geosparql) | [OR7] |
| iana | <http://www.iana.org/assignments/relation/> | [NR11] |
| ical | [http://www.w3.org/2002/12/cal/ical#](http://www.w3.org/2002/12/cal/ical) | [OR17] |
| lmb | <http://www.opengis.net/lmb/2.1/> | [OR1] |
| media | <http://search.yahoo.com/mrss/> | [OR30] |
| opt | <http://www.opengis.net/opt/2.1/> | [OR1] |
| owc | <http://www.opengis.net/ont/owc/1.0/> | [OR5] |
| owl | [http://www.w3.org/2002/07/owl#](http://www.w3.org/2002/07/owl) |  |
| rdf | [http://www.w3.org/1999/02/22-rdf-syntax-ns#](http://www.w3.org/1999/02/22-rdf-syntax-ns) | [OR11] |
| rdfs | [http://www.w3.org/2000/01/rdf-schema#](http://www.w3.org/2000/01/rdf-schema) | [OR10] |
| sar | <http://www.opengis.net/sar/2.1/> | [OR1] |
| skos | [http://www.w3.org/2004/02/skos/core#](http://www.w3.org/2004/02/skos/core) | [OR31] |
| xs | [http://www.w3.org/2001/XMLSchema-datatypes#](http://www.w3.org/2001/XMLSchema-datatypes) |  |
| xsd | [http://www.w3.org/2001/XMLSchema#](http://www.w3.org/2001/XMLSchema) |  |

Table 3: Namespace abbreviations

## Layout and identifiers

The normative provisions in the current document are denoted by the URI <http://www.opengis.net/spec/eo-geojson/1.0>. All requirements and conformance classes that appear in this document are denoted by relative URIs which are relative to this base URI.

## Style

This document applies the “double quote” guideline defined in [OR16]: “If a property requires quotes, double quotes must be used. All property names must be surrounded by double quotes. Property values of type string must be surrounded by double quotes. Other value types (like omaine or number) should not be surrounded by double quotes.”

## Data dictionary tables

This document includes data dictionary tables with information as per sub-clause 5.5 of OGC 06-121r9 [NR6]. The following comments apply.

* The mapping of property names (column 1) on properties of the abstract metadata models (OGC 10-157r4 and UMM-G) is included in Annex C. Column 1 provides the JSON property name as well as the corresponding JSONPath [OR34] expression.
* Properties representing measurements (e.g., gml:measureType) are encoding in a simplified way. Only the value is represented as a numeric property. The unit of measure is implied and shall correspond to the SI[[4]](#footnote-4) base unitor derived unit without prefix.

# Overview

This standard defines a GeoJSON-based [NR2] serialization syntax for the Earth Observation Vocabulary (Annex B) that conforms to a subset of [NR3] syntax constraints but does not require JSON-LD processing. While other serialization forms are possible, such alternatives are not discussed in this document.

When serialized, absent properties are represented by either (a) setting the property value to null or (b) by omitting the property declaration altogether at the option of the publisher. These representations are semantically equivalent. If a property has an array value, the absence of any items in that array shall be represented by omitting the property entirely or by setting the value to null. The appropriate interpretation of an omitted or explicitly null value is that no value has been assigned as opposed to the view that the given value is empty or nil.

JSON does not have a formal class model. JSON objects are just sets of properties. However, the JSON encoding described in this standard features a “type” property on each JSON object.

An EO Dataset Metadata Document conforming to this standard is a GeoJSON document whose root value is a Feature or FeatureCollection object, and whose MIME media type corresponds to one of the media types described in chapter 9.

## JavaScript Object Notation

JavaScript Object Notation (JSON) is a lightweight, text-based, language-independent data interchange format that defines a small set of formatting rules for the portable representation of structured data. JSON is derived from the object literals of JavaScript, as defined in the ECMAScript Programming Language Standard [NR12] and can represent four primitive types (strings, numbers, boolean values, and null) and two structured types (objects and arrays). The ordering of the members or properties of any JSON object is considered irrelevant. Even though JSON is based on a subset of the JavaScript Programming Language it is currently well supported by nearly all programming languages, including Java, Python, and C#.

The JSON format is currently described by two competing standards, RFC7159 [NR1] and ECMA-404 [NR13]. Both standards documents are consistent, but the latter defines mainly the grammatical syntax where the former provides some additional semantic and security points.

## GeoJSON Format Specification

GeoJSON [NR2] is a format for encoding collections of simple geographical features along with their non-spatial attributes using JSON. GeoJSON consists of a single object representing a geometry, feature, or collection of features. The geometries supported are Point, MultiPoint, LineString, MultiLineString, Polygon, MultiPolygon and Geometry Collections.

# GeoJSON Encoding Specification

## Requirements class: Earth Observation

|  |  |
| --- | --- |
| **Requirements Class** | |
| [**/req/**](http://www.opengis.net/spec/waterml/part2/json/req/req-core)**earthobservation** | |
| Target type | Data instance |
| Dependency | **JSON [NR1]** |
| Dependency | **GeoJSON [NR2]** |
| Dependency | **/req/geometry** |
| Dependency | **/req/properties** |
| **Requirement** | **/req/earthobservation/properties** |

|  |  |
| --- | --- |
| **Requirement** | **/req/earthobservation/properties**  An “EarthObservation” object shall implement the properties shown in Table 4, with the value matching the type shown, and with the obligation shown. |

The EarthObservation block inherits all properties of the GeoJSON Feature object. In addition, it may contain an optional @context property. The @context properties shall typically be absent in the GeoJSON encoding and implicitly refer to the normative @context defined in Annex B.

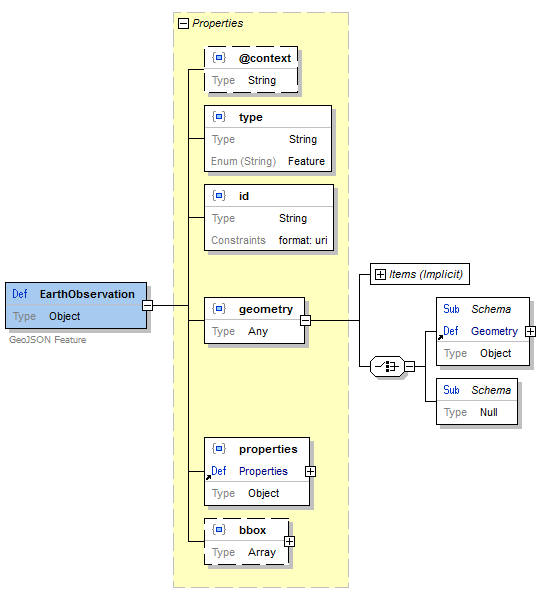


Figure 3: EarthObservation Schema (GeoJSON)

Complete description of EarthObservation is given in Table 4. Most properties are inherited from the Feature object defined in [NR2].

|  |  |  |  |
| --- | --- | --- | --- |
| **JSON Property** | **Definition** | **Data type and values** | **Multiplicity and use** |
| @context  [$.@context](mailto:$.@context) | Optional context property either embedding an actual context or a reference to the normative JSON-LD context defined in Annex B: “normative JSON-LD @context definition.“  See Annex B.1.1. | Property | Zero or one  (optional) |
| type  $.type | Type of the EarthObservation metadata element. This property is a string with fixed value “Feature.”[[5]](#footnote-5) | Property  Range: String  Fixed values: “Feature” | One (mandatory) |
| id  $.id | Unique identifier for the EarthObservation element (IRI). | Property  Range: String | One (mandatory) |
| bbox  $.bbox | Information on the coordinate range of the geometry object representing the footprint (See [NR2]). The value is an array of length 4 (assuming the number of dimensions represented in the contained geometries is 2). Typically, south-west point and north-east point. The value defines a shape with edges that have constant longitude and latitude. | Property [NR2]  Domain: Feature  Range: Array | Zero or one (optional) |
| geometry  $.geometry | Contains the description of the target location observed during the EarthObservation. See section 7.4.  The value shall be either a Geometry object or a JSON null value. | Property [NR2], [OR33]  Domain: Feature  Range: Geometry or null value (See section 7.4) | One (mandatory) |
| properties  $.properties | Groups all other properties of the EarthObservation not covered by the properties higher in this table as imposed by [NR2]. See section 7.1.1 | Property [NR2], [OR33]  Domain: Feature  Range Properties (See Table 5) | One (mandatory) |

Table 4: EarthObservation object properties

Example 1: GeoJSON encoding example

{

“type”: “Feature”,

“id”: “http://fedeo.esa.int/opensearch/request/?parentIdentifier=SEA\_GEC\_1P&uid=SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F”,

“bbox”: [

-2.69574,

61.965195,

0.135472,

63.261372

],

“geometry”: {...},

“properties”: {...}

}

Example 2: GeoJSON encoding example (with explicit normative @context property)

{

“@context”: “https://www.opengis.net/eo-geojson/1.0”,

“type”: “Feature”,

“id”: “http://fedeo.esa.int/opensearch/request/?parentIdentifier=SEA\_GEC\_1P&uid=SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F”,

“bbox”: [

-2.69574,

61.965195,

0.135472,

63.261372

],

“geometry”: {...},

“properties”: {...}

}

In the remainder of the document, we will not include the @context property in the GeoJSON encoding in which case it is implied as explained in Annex B.1.1.

### Properties

|  |  |
| --- | --- |
| **Requirements Class** | |
| [**/req/**](http://www.opengis.net/spec/waterml/part2/json/req/req-core)**properties** | |
| Target type | Data instance |
| Dependency | **/req/acquisition-information** |
| Dependency | **/req/product-information** |
| Dependency | **/req/data-identification** |
| Dependency | **/req/metadata-information** |
| Dependency | **/req/links** |
| Dependency | **/req/offering** |
| **Requirement** | **/req/properties/properties** |
| **Requirement** | **/req/properties/metadata-information** |
| **Requirement** | **/req/properties/data-identification** |

|  |  |
| --- | --- |
| **Requirement** | **/req/properties/properties**  A “Properties” object shall implement the properties shown in Table 5, with the value matching the type shown, and with the obligation shown. |

|  |  |
| --- | --- |
| **Requirement** | **/req/properties/metadata-information**  A “Properties” object shall implement the properties of a MetadataInformation object (Table 8). |

|  |  |
| --- | --- |
| **Requirement** | **/req/properties/data-identification**  A “Properties” object shall implement the properties of a DataIdentification object (Table 9). |

The Properties block contains the EO properties and hypermedia links to related objects. It inherits all MetadataInformation and DataIdentification properties. The EO properties are in two main groups, i.e., “acquisitionInformation” and “productInformation” with multiplicity shown below. This allows having metadata:

* Only consisting of “acquisitionInformation” and no productInformation,
* Consisting of multiple “acquisitionInformation” elements and 0 or 1 “productInformation” elements as occurs for synthesis products.

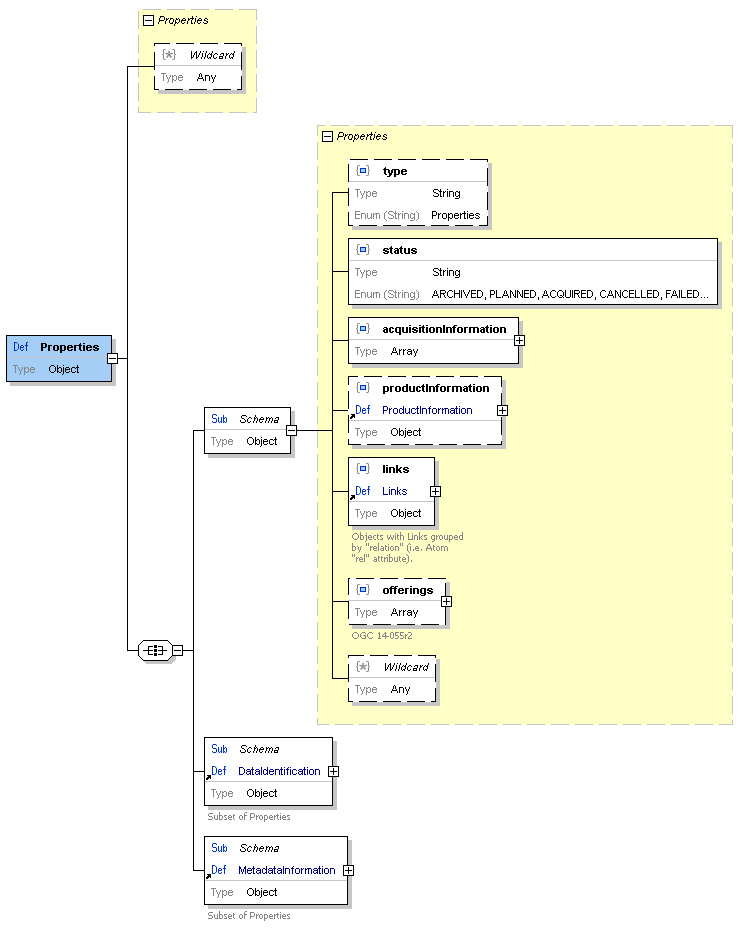


Figure 4: Properties Schema

Complete description of Properties is given in Table 5 and Table 9. For the inherited DataIdentification properties, we refer to Table 9. These properties are not repeated here.

|  |  |  |  |
| --- | --- | --- | --- |
| **JSON Property** | **Definition** | **Data type and values** | **Multiplicity and use** |
| type  $.properties.type | Type of the element. This property has the fixed value “Properties.” | Domain: Properties  Range: String  Fixed value: “Properties” | Zero or one (optional) |
| links  $.properties.links | Refers to related, actionable resources including download location, quicklook, original or alternative metadata representations etc.... See Table 6. | Domain: Properties  Range: Links. (See Table 6) | One (mandatory) |
| offerings  $.properties.offerings | Service or online content offering for the resource targeted at OGC compliant clients. See OGC 14-055r2 [NR5]. | Domain: Properties  Range: Array of Offering. | Zero or more (optional) |
| status  $.properties.status | Refers to product status.  Fixed Values:  - ARCHIVED  - ACQUIRED  - CANCELLED  - FAILED  - PLANNED  - POTENTIAL  - REJECTED  - QUALITYDEGRADED | Domain: Properties  Range: String | One (mandatory) |
| acquisitionInformation  $.properties.acquisitionInformation | Contains product information as presented in Table 14. | Domain: Properties  Range: Array of AcquisitionInformation (See Table 14) | One or more (mandatory) |
| productInformation  $.properties.productInformation | Contains product information as presented in Table 20. | Domain: Properties  Range: ProductInformation (See Table 20) | Zero or one (optional) |

Table 5: Properties object properties

The example below contains also inherited DataIdentification properties defined in Table 9.

Example 3: Properties encoding example

{

„properties“: {

“status”: “ACQUIRED”,

« parentIdentifier » : « SEA\_GEC\_1P »,

« doi » : «  »,

« title » : « SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F »,

« identifier » : « SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F »,

« date » : « 2016-07-02T18 :13 :41.34Z/2016-07-02T18 :14 :06.34Z »,

« updated » : « 2017-01-26T11 :30 :18Z »,

„links“: { }

„acquisitionInformation“: [

{ }

],

„productInformation“: { }

}

}

### Links

|  |  |
| --- | --- |
| **Requirements Class** | |
| [**/req/**](http://www.opengis.net/spec/waterml/part2/json/req/req-core)**links** | |
| Target type | Data instance |
| Dependency | **/req/link** |
| **Requirement** | **/req/links/properties** |

|  |  |
| --- | --- |
| **Requirement** | **/req/links/properties**  A “Links” object shall implement the properties shown in Table 6, with the value matching the type shown, and with the obligation shown. |

The Links block contains references to related resources as hypermedia links. They include references to quicklooks, data download links, or alternative representations of the metadata. For the GeoJSON encoding of the Links object, we use the property names adopted by section 7.1.2 of the GeoJSON encoding for OWS Context OGC 14-055r2 [NR5]. An alternative[[6]](#footnote-6) JSON model with the “rel” attribute modelled as property of the Link object would allow to have a single array with all Link instances, but would not be compliant with OGC 14-055r2 and was thus not withheld.

Although the Links object below allows implementers to refer to original metadata, implementations are encouraged to use the JSON properties defined in the current document to provide metadata for EO products encoded in JSON instead of, or in addition to relying solely on hypermedia links referencing the original (e.g., XML-based) metadata as explained below.

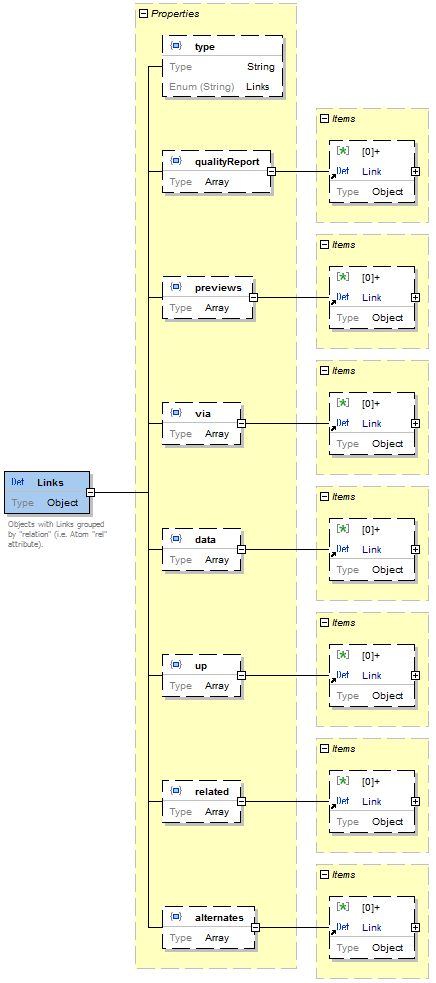


Figure 5: Links Schema

Complete description of Links is given in Table 6.

|  |  |  |  |
| --- | --- | --- | --- |
| **JSON Property** | **Definition** | **Data type and values** | **Multiplicity and use** |
| type  $.properties.links.type | Type of the element. This property has the fixed value “Links.” | String  Fixed value: Links | Zero or one (optional) |
| alternates  $.properties.links.alternates | Reference to a description of the resource in an alternative format.  Is defined by [NR5] §7.1.2. | Range: array of link as defined in Table 7. | Zero or more (optional) |
| via  $.properties.links.via | Reference to a description of the resource in its original format. | Range: array of link as defined in Table 7. | Zero or more (optional) |
| previews  $.properties.links.previews | Reference to a quicklook or browse image representing the resource.  Is defined by [NR5] §7.1.2. | Range: array of link as defined in Table 7. | Zero or more (optional) |
| data  $.properties.links.data | Reference to the location of the data resource.  Is defined by [NR5] §7.1.2. | Range: array of link as defined in Table 7. | Zero or more (optional) |
| qualityReport  $.properties.links.qualityReport | Reference to the location of a related quality report. | Range: array of link as defined in Table 7. | Zero or more (optional) |
| related  $.properties.links.related | Reference to the location of a related resource, e.g., cloud mask, snow mask. | Range: array of link as defined in Table 7. | Zero or more (optional) |
| up  $.properties.links.up | Reference to the metadata of higher level resource (e.g., Collection, also identified by parentIdentifier) resource. | Range: array of link as defined in Table 7. | Zero or more (optional) |

Table 6: Links object properties

Example 4: GeoJSON encoding example

{

“type”: “Feature”,

“id”: “http://fedeo.esa.int/opensearch/request/?parentIdentifier=SEA\_GEC\_1P&uid=SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F”,

“geometry”: { ... },

“properties”: {

“links”: {

“data”: [

{

“href”: “http://tpm-ds.eo.esa.int/products/SEA\_GEC\_1P/1978/09/27/SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F.ZIP”,

“type”: “application/binary”,

“title”: “Download”

}

],

“previews”: [

{

“href”: “http://tpm-ds.eo.esa.int/metadata/SEA\_GEC\_1P/1978/09/27/SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F.BI.PNG”,

“type”: “image/png”,

“title”: “Quicklook”

}

],

“alternates”: [

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/atom%2Bxml&amp;parentIdentifier=SEA\_GEC\_1P&amp;uid=SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F”,

“type”: “application/atom+xml”,

“title”: “Atom format”

}

]

}

}

}

### Link

|  |  |
| --- | --- |
| **Requirement** | **/req/link**  A “Link” object shall implement the properties shown in Table 7, with the value matching the type shown, and with the obligation shown. |

The Link block contains the properties of a hypermedia link to a resource identified by its URI [NR5] and may be extended with media properties from [OR30].

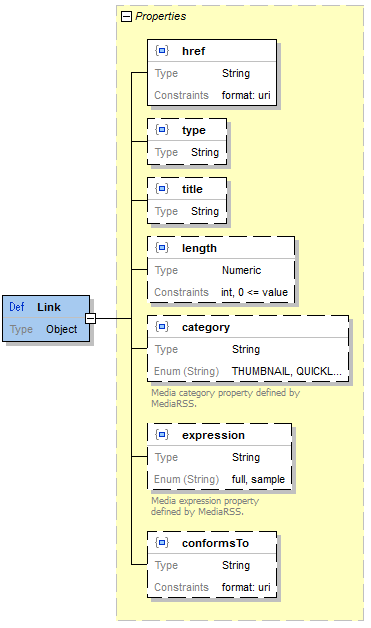


Figure 6: Link Schema

For the GeoJSON encoding of each Link object, we use the encoding defined in section 7.1.10 of the GeoJSON encoding for OWS Context OGC 14-055r2 [NR5]. The equivalent JSON-LD encoding is consistent with section 6.1.2.2 of OGC 15-053 [OR6].

Complete description of Link is given in Table 7.

|  |  |  |  |
| --- | --- | --- | --- |
| **JSON Property** | **Definition** | **Data type and values** | **Multiplicity and use** |
| href  $.properties.links.\*[\*].href | URI describing the related resource.  Is defined by [NR5] §7.1.10. | Range: String | One (mandatory) |
| type  $.properties.links.\*[\*].type | Hint about the type of the representation that is expected to be returned when the value of href is dereferenced. | Range: String (contains a media type). | Zero or one (optional) |
| title  $.properties.links.\*[\*].title | Human readable information about the link. Is defined by [NR5] §7.1.10. | Range: String | Zero or one (optional) |
| length  $.properties.links.\*[\*].length | Hint about the content length (in bytes) of the representation that is expected to be returned when the value of href is dereferenced. Is defined by [NR5] §7.1.10. | Range: Integer | Zero or one (optional) |
| category[[7]](#footnote-7)  $.properties.links.\*[\*].category | Media category [OR30] of the related resource which corresponds to a preview or mask:  - THUMBNAIL  - QUICKLOOK  - ALBUM  - SNOW  - CLOUD  - QUALITY  Only applicable for media resources $.properties.links.previews[\*] or $.properties.links.related[\*] | Range: String | Zero or one (optional) |
| expression7  $.properties.links.\*[\*].expression | Determines if the related resource is a sample or the full version of the product. See [OR30]. Use “full” for “product/ProductInformation/.” Use “sample” for “browse/BrowseInformation/” or “mask/MaskInformation/.”  Only applicable for media resources $.properties.links.previews[\*] or $.properties.links.related[\*] | Range: String | Zero or one (optional) |
| conformsTo7  $.properties.links.\*[\*].conformsTo | Indicates if resource is geo-referenced, (in which case should point to a code space for the CRS), when not supplied it is assumed that the resource is provided in “raw” satellite frame of reference.  E.g.http://www.opengis.net.def/crs/EPSG/0/4326. | Range: String (URI) | Zero or one (optional) |

Table 7: Link object properties

Example 5: JSON encoding example (Data – external access)

{

“data”: [

{

“href”: “http://tpm-ds.eo.esa.int/products/SEA\_GEC\_1P/1978/09/27/SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F.ZIP”,

“type”: “application/binary”,

“title”: “Download”,

“expression”: “full”,

“conformsTo”: “http://www.opengis.net.def/crs/EPSG/0/4326”

}

]

}

The example below illustrates the use of a data link which provides access to a local directory in addition to an HTTP download link. Note the use of the “file” URI scheme as per RFC8089.

Example 6: JSON encoding example (Data – local access)

{

“data”: [

{

“href”: “http://finder.eocloud.eu/download/a9bfbbab-c06f-587a-8c09-12fa76da2c32”,

“type”: “application/x-binary”,

“title”: “Download”

},

{

“href”: “file:///eodata/Sentinel-1/SAR/GRD/2017/05/16/S1B\_IW\_GRDH\_1SDV\_20170516T052808\_20170516T052832\_005619\_009D73\_623B.SAFE”,

“type”: “text/directory”,

“title”: “Download”

}

]

}

Example 7: JSON encoding example (Previews)

{

“previews”: [

{

“href”: “http://gs.mdacorporation.com/browse/RADARSAT-2/2012/08/01/GATN\_RS2\_210731\_1\_1015\_1.jpg”,

“type”: “image/jpeg”,

“title”: “Quicklook”,

“category”: “QUICKLOOK”,

“expression”: “sample”,

“conformsTo”: “http://www.opengis.net.def/crs/EPSG/0/4326”

},

{

“href”: “http://gs.mdacorporation.com/browse/RADARSAT-2/2012/08/01/GATN\_RS2\_210731\_1\_1015\_1\_thumbnail.jpg”,

“type”: “image/jpeg”,

“title”: “Quicklook”,

“category”: “THUMBNAIL”,

“expression”: “sample”,

“conformsTo”: “http://www.opengis.net.def/crs/EPSG/0/4326”

}

]

}

Example 8: JSON encoding example (Masks)

{

“related”: [

{

“href”: “http://daliis.spotimage.fr/wsTools/img/getImage.aspx?ST=S&amp;SN=37998313&amp;IT=CLD&amp;CP=N&amp;SD=T&amp;FT=BMP&amp;CM=75”,

“type”: “image/jpeg”,

“title”: “Cloud Mask”,

“category”: “CLOUD”,

“expression”: “sample”,

“conformsTo”: “http://www.opengis.net.def/crs/EPSG/0/4326”

}

]

}

### Offering

|  |  |
| --- | --- |
| **Requirements Class** | |
| [**/req/**](http://www.opengis.net/spec/waterml/part2/json/req/req-core)**offering** | |
| Target type | Data instance |
| Dependency | **/req/operation** |
| **Requirement** | **/req/offering/properties** |

|  |  |
| --- | --- |
| **Requirement** | **/req/offering/properties**  An “Offering” object shall implement the properties defined in OGC 14-055r2 [NR5], with the value matching the type shown, and with the obligation shown. |

The Offering block is fully defined in OGC 14-055r2 [NR5]. It describes a service or inline content offering for the EO product and is intended to be consumed by clients that support OGC standards. In the context of the current specification, an Offering can be used to describe:

* View services allowing visualisation via OGC WMS or WMTS service interfaces,
* Reference to download or ordering services according to specific OGC protocols (e.g., WCS), or
* Reference to processing resources including WPS or hosted processing services.

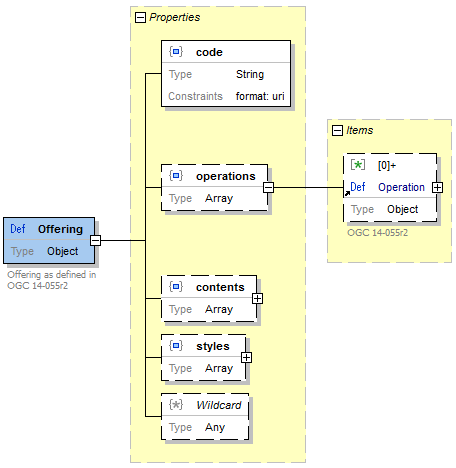


Figure 7: Offering Schema

A number of examples for typical offerings (e.g., WMS, WCS, and WMTS) are included below.

Example 9: JSON encoding example (WMS)

{

« code » : « http ://www.opengis.net/spec/owc-geojson/1.0/req/wms »,

“operations”: [

{

“code”: “GetCapabilities”,

“method”: “GET”,

“type”: “application/xml”,

“href”: “http://eumetview.eumetsat.int/geoserv/wms?REQUEST=GetCapabilities&version=1.3.0&service=WMS”

},

{

“code”: “GetMap”,

“method”: “GET”,

“type”: “image/jpeg”,

“href”: “http://eumetview.eumetsat.int/geoserv/wms?SERVICE=WMS&REQUEST=GetMap&TRANSPARENT=TRUE&EXCEPTIONS=INIMAGE&VERSION=1.3.0&LAYERS=meteosat%3Amsg\_ir108%2Coverlay%3Ane\_10m\_coastline%2Coverlay%3Ane\_10m\_admin\_0\_boundary\_lines\_land&STYLES=raster%2C%2C&SRS=EPSG%3A4326&WIDTH=1161&HEIGHT=693&BBOX=-107.41500082612,-180,107.41500082612,180&FORMAT=image%2Fjpeg&TIME=2017-02-21T12%3A00%3A00.000Z&”

},

]

}

Example 10: JSON encoding example (WCS)

{

« code » : « http ://www.opengis.net/spec/owc-geojson/1.0/req/wcs »,

“operations”: [

{

“code”: “GetCapabilities”,

“method”: “GET”,

“type”: “application/xml”,

“href”: “http://fedeo.esa.int/geoserver/wcs?REQUEST=GetCapabilities&version=2.0.1&service=WCS”

},

{

“code”: “GetCoverage”,

“method”: “GET”,

“type”: “application/x-binary”,

“href”: “http://fedeo.esa.int/geoserver/wcs?service=wcs&amp;version=2.0.1&amp;request=getcoverage&amp;coverageid=ASA\_IMM\_1PNIPA20080308\_183226\_000001722066\_00371\_31487\_2902”

}

]

}

Example 11: JSON encoding example (WMTS)

{

« code » : « http ://www.opengis.net/spec/owc-geojson/1.0/req/wmts »,

“operations”: [

{

“code”: “GetCapabilities”,

“method”: “GET”,

“type”: “application/xml”,

“href”: “http://www.opengis.uab.es/cgi-bin/ICCTiled/MiraMon.cgi?REQUEST=GetCapabilities&SERVICE=WMTS”

},

{

“code”: “ServiceMetadata”,

“method”: “GET”,

“type”: “application/xml”,

“href”: “http://www.opengis.uab.es/SITiled/ICC/1.0.0/WMTSCapabilities.xml”

},

{

“code”: “GetTile”,

“method”: “GET”,

“type”: “image/jpeg”,

“href”: “http://www.opengis.uab.es/cgi-bin/ICCTiled/MiraMon.cgi?REQUEST=GetTile&SERVICE=WMTS&version=1.0.0&format=image/jpeg&layer=Topo250k\_Vers5\_ICC&TileMatrixSet=Cat\_topo250k\_v5\_EPSG23031&TileMatrix=200m&TileRow=1&TileCol=0”

},

{

“code”: “Tile”,

“method”: “GET”,

“type”: “image/jpeg”,

“href”: “http://www.opengis.uab.es/SITiled/ICC/Topo250k\_Vers5\_ICC/default/Cat\_topo250k\_v5\_EPSG23031/200m/1/0.jpg”

}

]

}

In the example below, line breaks were added inside the string literals containing XML content for readability purposes only. In the actual JSON objects, such line breaks inside string literals are not allowed.

Example 12: JSON encoding example (WPS)

{

« code » : « http ://www.opengis.net/spec/owc-geojson/1.0/req/wps »,

“operations”: [

{

“code”: “GetCapabilities”,

“method”: “GET”,

“type”: “application/xml”,

“href”: “http://tep.esa.int/wps/processing?REQUEST=GetCapabilities&SERVICE=WPS”,

“result”: {

“type”: “application/xml”,

“content”: “<wps:Capabilities>...</wps:Capabilities>”

}

},

{

“code”: “DescribeProcess”,

“method”: “POST”,

“type”: “application/xml”,

“href”: “http://tep.esa.int/wps/processing”,

« request » : {

« type » : « application/xml »,

« content » : «

<wps :DescribeProcess

xmlns :ows=\ »http ://www.opengis.net/ows/2.0\ »

xmlns :wps=\ »http ://www.opengis.net/wps/2.0\ »

xmlns :xsi=\ »http ://www.w3.org/2001/XMLSchema-instance\ »

service=\”WPS\”

version=\”2.0.0\”>

<ows:Identifier>LandCoverMapping</ows:Identifier>

</wps:DescribeProcess>

“

},

“result”: {

“type”: “application/xml”,

“content”: “

<wps:ProcessOfferings

xmlns:wps=\”http://www.opengis.net/wps/2.0\”

xmlns:ows=\”http://www.opengis.net/ows/2.0\”

xmlns:xlink=\”http://www.w3.org/1999/xlink\”

xmlns:xsi=\”http://www.w3.org/2001/XMLSchema-instance\”

xmlns:xs=\”http://www.w3.org/2001/XMLSchema\”>

<wps:ProcessOffering jobControlOptions=\”async-execute dismiss\” outputTransmission=\”value reference\”>

<wps:Process>

<ows:Title>Land Cover Mapping</ows:Title>

<ows:Abstract>Land Cover Mapping is based on the Sentinel-2 processing workflow generated for the F-TEP platform.</ows:Abstract>

<ows:Identifier>LandCoverMapping</ows:Identifier>

<wps:Input>

<ows:Title>Sentinel-2 Image</ows:Title>

<ows:Abstract>URL of Sentinel-2 Level 1C image product in the format offered by AWS or IPT, with a size of up to multiple gigabytes.</ows:Abstract>

<ows :Identifier>Image</ows :Identifier>

<wps:LiteralData>

<wps:Format mimeType=\”text/xml\” default=\”true\”/>

<LiteralDataDomain default=\”true\”>

<ows:AnyValue/>

<ows:DataType ows:reference=\”xs:string\”>string</ows:DataType>

</LiteralDataDomain>

</wps:LiteralData>

</wps:Input>

<wps:Input>

<ows:Title>Reference Data</ows:Title>

<ows:Abstract>Representative training data set with land cover class attributes, in OGR vector format supported by GDAL, such as ESRI shapefile, in a flat zip structure containing .shp and the supporting files.</ows:Abstract>

<ows:Identifier>ReferenceData</ows:Identifier>

<wps:ComplexData>

<wps:Format mimeType=\”application/zip\” encoding=\”base64\” default=\”true\”/>

</wps:ComplexData>

</wps:Input>

<wps:Output>

<ows:Title>GeoTIF Image</ows:Title>

<ows:Abstract>Labeled GeoTIFF file, containing for each pixel one of the class codes specified in the training reference data.</ows:Abstract>

<ows :Identifier>Image</ows :Identifier>

<wps:ComplexData>

<wps:Format mimeType=\”image/tiff\” encoding=\”base64\” default=\”true\”/>

</wps:ComplexData>

</wps:Output>

</wps:Process>

</wps:ProcessOffering>

</wps:ProcessOfferings>

“

}

},

{

“code”: “Execute”,

“method”: “POST”,

“type”: “application/xml”,

“href”: “http://tep.esa.int/wps/processing”,

« request » : {

« type » : « application/xml »,

« content » : «

<wps :Execute

xmlns :wps=\ »http ://www.opengis.net/wps/2.0\ »

xmlns :ows=\ »http ://www.opengis.net/ows/2.0\ »

xmlns :xlink=\ »http ://www.w3.org/1999/xlink\ »

xmlns :xsi=\ »http ://www.w3.org/2001/XMLSchema-instance\ »

service=\ »WPS\ »

version=\ »2.0.0\ »

response=\ »document\ »

mode=\”async\”>

<ows:Identifier>LandCoverMapping</ows:Identifier>

<wps:Input id=\”Image\”>

<wps:Data>[http://finder.eocloud.eu/download/d7748f2f-0663-55e6-a32d-2399f40c295a</wps:Data](http://finder.eocloud.eu/download/d7748f2f-0663-55e6-a32d-2399f40c295a%3c/wps:Data)>

</wps:Input>

<wps:Input id=\”ReferenceData\”>

<wps:Data>VghpcyBpcyBhIFppc ... CbmaWxlLg==</wps:Data>

</wps:Input>

<wps:Output id=\”Image\”/>

</wps:Execute>”

},

“result”: {

“type”: “application/xml”,

“content”: “

<wps:StatusInfo

xmlns:wps=\”http://www.opengis.net/wps/2.0\”

xmlns:xsi=\”http://www.w3.org/2001/XMLSchema-instance\”>

<wps:JobID>9843939e-c947-4d75-b3f3-6820d2ad4cd1</wps:JobID>

<wps:Status>Accepted</wps:Status>

<wps:NextPoll>2017-05-15T09:30:47Z</wps:NextPoll>

<wps:PercentCompleted>0</wps:PercentCompleted>

</wps:StatusInfo>

“

}

},

{

“code”: “GetResult”,

“method”: “GET”,

“type”: “application/xml”,

“href”: “http://tep.esa.int/wps/processing?REQUEST=GetResult&SERVICE=WPS&jobid=9843939e-c947-4d75-b3f3-6820d2ad4cd1”,

“result”: {

“type”: “application/xml”,

“content”: “

<wps:Result

xmlns:wps=\”http://www.opengis.net/wps/2.0\”

xmlns:xlink=\”http://www.w3.org/1999/xlink\”

xmlns:xsi=\”http://www.w3.org/2001/XMLSchema-instance\”>

<wps:JobID>9843939e-c947-4d75-b3f3-6820d2ad4cd1</wps:JobID>

<wps :ExpirationDate>2017-09-15T24 :00 :00Z</wps :ExpirationDate>

<wps:Output id=\”Image\”>

<wps:Reference xlink:href=\”http://result.data.server/wps/9843939e-c947-4d75-b3f3-6820d2ad4cd1/image.TIFF\”/>

</wps:Output>

</wps:Result>

“

}

},

{

“code”: “GetStatus”,

“method”: “GET”,

“type”: “application/xml”,

“href”: “http://tep.esa.int/wps/processing?service=WPS&version=2.0.0&request=GetStatus&jobid=9843939e-c947-4d75-b3f3-6820d2ad4cd1”,

“result”: {

“type”: “application/xml”,

“content”: “

<wps:StatusInfo

xmlns:wps=\”http://www.opengis.net/wps/2.0\”

xmlns:xsi=\”http://www.w3.org/2001/XMLSchema-instance\”>

<wps:JobID>9843939e-c947-4d75-b3f3-6820d2ad4cd1</wps:JobID>

<wps:Status>Accepted</wps:Status>

<wps:NextPoll>2017-05-15T09:40:47Z</wps:NextPoll>

<wps:PercentCompleted>20</wps:PercentCompleted>

</wps:StatusInfo>

“

}

}

]

}

### Operation

|  |  |
| --- | --- |
| **Requirement** | **/req/operation**  An “Operation” object shall implement the properties of “Operation” defined in OGC 14-055r2 [NR5], with the value matching the type shown, and with the obligation shown. |

The Operation block is fully defined in OGC 14-055r2 [NR5]. It describes an operation of a service or inline content offering for the EO product and is intended to be consumed by OGC-compliant clients. The “code” property identifies the OGC operation name, e.g., GetCapabilities, GetMap etc.

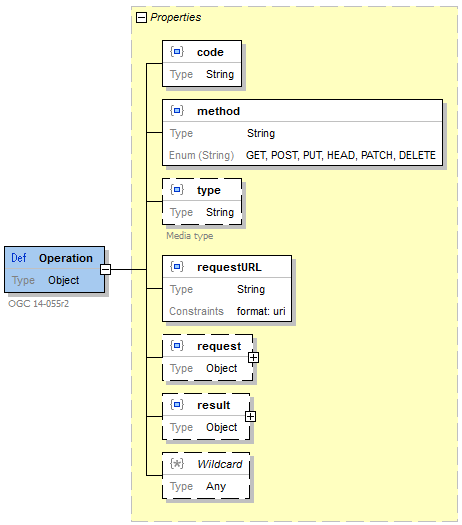


Figure 8: Operation Schema

For examples, we refer the examples of Offering given in section 7.1.4.

## Requirements class: Metadata Information

|  |  |
| --- | --- |
| **Requirements Class** | |
| [**/req/**](http://www.opengis.net/spec/waterml/part2/json/req/req-core)**metadata-information** | |
| Target type | Data instance |
| Dependency | **JSON [NR1]** |
| Dependency | **GeoJSON [NR2]** |
| **Requirement** | **/req/metadata-information/properties** |

|  |  |
| --- | --- |
| **Requirement** | **/req/metadata-information/properties**  A “MetadataInformation” object shall implement the properties shown in Table 8, with the value matching the type shown, and with the obligation shown. |

The MetadataInformation properties are inherited by the Properties block (Table 5).



Figure 9: MetadataInformation Schema

Complete description of the MetadataInformation properties is given in Table 8 .

|  |  |  |  |
| --- | --- | --- | --- |
| **JSON Property** | **Definition** | **Data type and values** | **Multiplicity and use** |
| updated  $.properties.updated | Date of creation or last update of the EO Metadata Document.  DateTime representation, as defined by RFC 3339, section 5.6. 10 | Domain: Properties  Range: DateTime | One (mandatory[[8]](#footnote-8)) |
| published  $.properties.published | Date of first availability of the EO Metadata Document. | Domain: Properties  Range: DateTime | Zero or one (optional) |
| creationDate  $.properties.creationDate | Date of creation of the EO Metadata Document. | Domain: Properties  Range: DateTime | Zero or one (optional) |
| lang  $.properties.lang | Metadata language, not empty with an RFC-3066 code as defined in [NR5]. | Domain: Properties  Range: string | Zero or one (optional) |

Table 8: MetadataInformation properties

Example 13: MetadataInformation encoding example

{

« updated » : « 2017-01-26T11 :30 :18Z »,

« lang » : « en »

}

## Requirements class: Data Identification

|  |  |
| --- | --- |
| **Requirements Class** | |
| [**/req/**](http://www.opengis.net/spec/waterml/part2/json/req/req-core)**data-identification** | |
| Target type | Data instance |
| Dependency | **JSON [NR1]** |
| Dependency | **GeoJSON [NR2]** |
| **Requirement** | **/req/data-identification/properties** |

|  |  |
| --- | --- |
| **Requirement** | **/req/data-identification/properties**  A “DataIdentification” object shall implement the properties shown in Table 9, with the value matching the type shown, and with the obligation shown. |

The DataIdentification properties are inherited by the Properties block (Table 5).

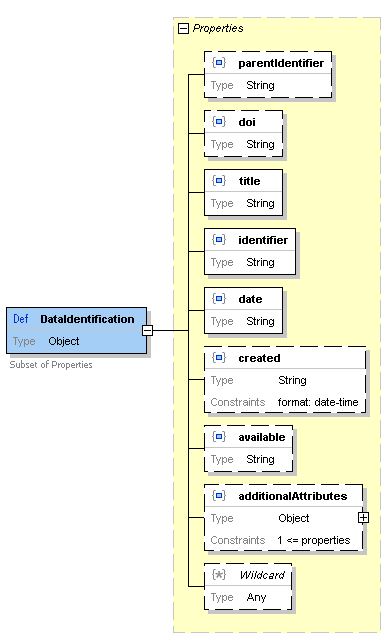


Figure 10: DataIdentification Schema

Complete description of the DataIdentification properties is given in Table 9.

|  |  |  |  |
| --- | --- | --- | --- |
| **JSON Property** | **Definition** | **Data type and values** | **Multiplicity and use** |
| parentIdentifier  $.properties.parentIdentifier | Collection identifier. | Domain: Properties  Range: String | Zero or one (optional) |
| doi  $.properties.doi | Digital Object Identifier identifying the product (see <http://www.doi.org>) | Domain: Properties  Range: String | Zero or one (optional) |
| title  $.properties.title | Human readable title given to the resource, use-case dependent.  Typical examples:   * productType + date + swathIdentifier + polarisationMode (e.g., SAR) * productType + date + tileId (e.g., Sentinel-2) * productType + date + orbitNumber * identifier | Domain: Properties  Range: String | One (mandatory) |
| identifier  $.properties.identifier | Identifier given to the resource, typically the dataset (producer) identifier. | Domain: Properties  Range: String | One (mandatory) |
| date  $.properties.date | Range[[9]](#footnote-9) of dates relevant for the resource (RFC-3339). Formatted as <datetime> “/”<datetime> or “<datetime>/” or “/<datetime> or <datetime> or “/.” | Domain: Properties  Range: String or DateTime | One (mandatory) |
| created  $.properties.created | Date of creation of the resource. | Domain: Properties  Range: DateTime | Zero or one (optional) |
| available  $.properties.available | Date range during which the resource will be available (RFC-3339). Formatted as <datetime> “/”<datetime> or “<datetime>/” or “/<datetime> or <datetime> or “/.” | Domain: Properties  Range: String or DateTime | Zero or one (optional) |
| additionalAttributes | Container for ad-hoc additional metadata attributes which are organization or mission specific. | Domain Properties  Range: Object (See Section 8.1). | Zero or one (optional) |

Table 9: Data Identification properties

The above date property is to contain the following values:

* For synergetic products (derived from multiple acquisitions done at different times), the date property (start/stop) shall be an aggregation of the various acquisition start/stop times.
* For simple products (derived from a single acquisition), or an acquisition only, the date property (start /stop) shall be the same as the acquisitionbegin and end dates found in the (unique) acquisitionInformation element.

Example 14: Data Identification encoding example

{

« parentIdentifier » : « SEA\_GEC\_1P »,

« doi » : «  »,

« title » : « SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F »,

« identifier » : « SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F »,

« date » : « 2016-07-02T18 :13 :41.34Z/2016-07-02T18 :14 :06.34Z »

}

## Requirements class: Spatial Information

### Horizontal Spatial Domain

The spatial information is encoded as a Geometry object as defined by GeoJSON. There are requirements for Position, Point, MultiPoint, LineString, MultiLineString, Polygon, MultiPolygon, Geometry Collection as described in the following subsections.

|  |  |
| --- | --- |
| **Requirements Class** | |
| [**/req/**](http://www.opengis.net/spec/waterml/part2/json/req/req-core)**geometry** | |
| Target type | Data instance |
| Dependency | **/req/point** |
| Dependency | **/req/multi-point** |
| Dependency | **/req/linestring** |
| Dependency | **/req/multi-linestring** |
| Dependency | **/req/polygon** |
| Dependency | **/req/multi-polygon** |
| **Requirement** | **/req/geometry/properties** |

|  |  |
| --- | --- |
| **Requirement** | **/req/geometry/properties**  Objects in a data instance that describe 0-D, 1-D, or 2-D geometries with positions in the WGS-84 system shall be encoded using the GeoJSON geometry encoding [NR2]. |

#### Geometry

The Geometry object contains a type property and coordinates property. The object can be any of the specialisations described below. The expected value for the coordinates property depends on the type of the geometry.

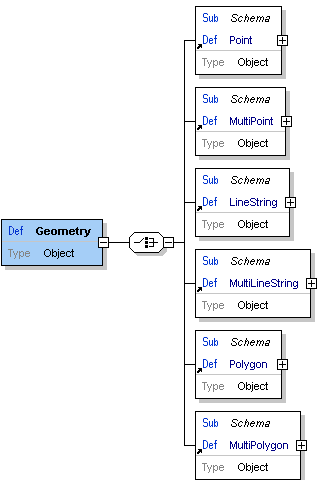


Figure 11: Geometry Schema (GeoJSON)

Complete description of the Geometry properties is given in Table 10. The possible specialisations are explained in subsequent subsections.

|  |  |  |  |
| --- | --- | --- | --- |
| **GeoJSON Property** | **Definition** | **Data type and values** | **Multiplicity and use** |
| type  $.geometry.type | Type of the geometry representing the footprint. Can be one of the geometry types: Point, LineString, Polygon, MultiPoint, MultiLineString or MultiPolygon. | Property [NR2], [OR33]  Range: String | One (mandatory) |
| coordinates  $. Geometry.coordinates | Array with structure determined by the geometry type to be represented. Note that a position (array of numbers) is indicated by longitude, latitude (in that order). | Property [NR2], [OR33]  Range: See section 3.1 of [NR2]. | One (mandatory) |

Table 10: Geometry object properties

Note that consumers that wish to use the standard JSON-LD Processing Algorithms may need to use an alternative representation for the geometry objects as explained in section 8.2 and avoid the use of multi-dimensional arrays.

#### Point

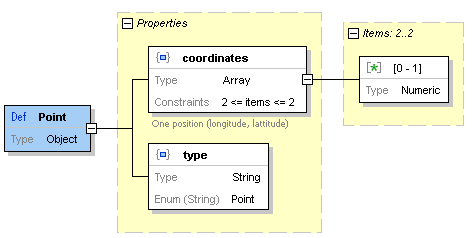


Figure 12: Point Schema (GeoJSON)

Example 15: GeoJSON Point encoding example

{

„type“: „Feature“,

„id“: „http://fedeo.esa.int/opensearch/request/?httpAccept=application/geo%2Bjson&parentIdentifier=EOP:ESA:GPOD-EO:MIP\_NL\_\_2P&uid=MIP\_NL\_\_2PRDPA20110126\_012048\_000060443099\_00003\_46569\_3966.N1“,

“geometry”: {

“type”: “Point”,

“coordinates”:

[

-42.949837,

-23.24841

],

},

“properties”: {}

}

#### MultiPoint

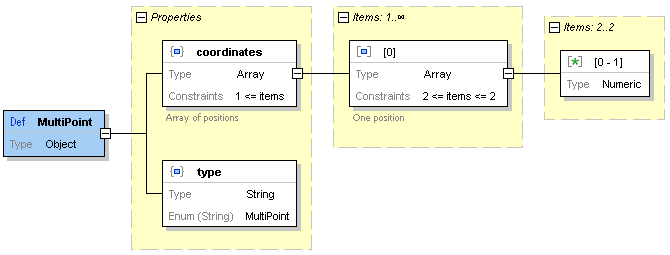


Figure 13: MultiPoint Schema (GeoJSON)

Example 16: GeoJSON MultiLineString encoding example

{

“type”: “Feature”,

“id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/geo%2Bjson&parentIdentifier=EOP:ESA:GPOD-EO:MIP\_NL\_\_2P&uid=MIP\_NL\_\_2PRDPA20110126\_012048\_000060443099\_00003\_46569\_3966.N1”,

“geometry”: {

“type”: “MultiPoint”,

“coordinates”: [

[

-42.949837,

-23.24841

],

[

-43.143765,

-22.411628

],

[

-43.431962,

-21.269959

],

[

-44.354582,

-17.921265

],

[

-44.541317,

-17.084588

],

[

-70.944332,

-23.337905

]

]

},

“properties”: {}

}

#### LineString

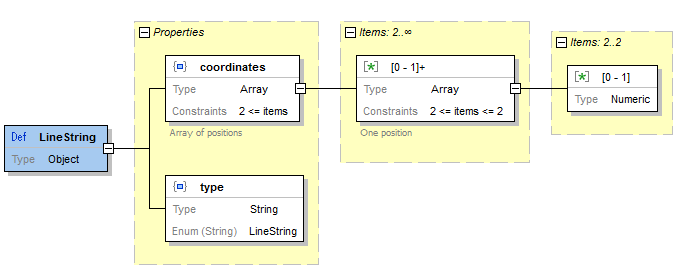


Figure 14: LineString Schema (GeoJSON)

Example 17: GeoJSON LineString encoding example

{

“type”: “Feature”,

“id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/geo%2Bjson&parentIdentifier=EOP:ESA:CRYOSAT:CR2\_SIR&uid=CS\_OFFL\_SIR\_GOP\_1B\_20161020T190953\_20161020T191105\_B002”,

“geometry”: {

“type”: “LineString”,

“coordinates”: [

[

10.029876,

52.316888

],

[

9.358614,

47.976653

]

]

},

“properties”: {}

}

#### MultiLineString

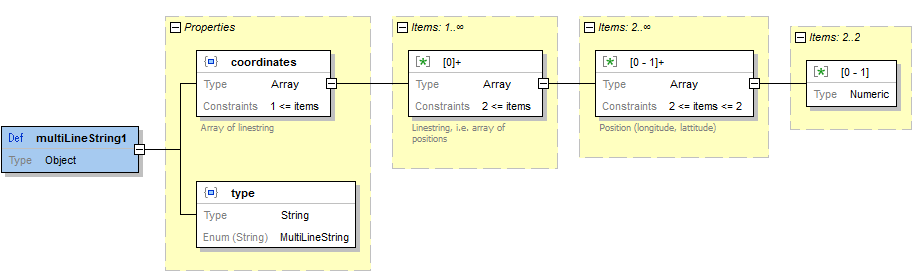


Figure 15: MultiLineString Schema (GeoJSON)

Example 18: GeoJSON MultiLineString encoding example

{

“type”: “Feature”,

“id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/geo%2Bjson&parentIdentifier=EOP:ESA:GPOD-EO:RA2\_MW\_\_1P&uid=RA2\_MW\_\_1PRF-P20021231\_223147\_000062162012\_00316\_04378\_8883.N1”,

“geometry”: {

“type”: “MultiLineString”,

“coordinates”: [

[

[

-136.878,

79.2342

],

[

-144.624,

77.9061

],

[

-151.347,

76.2577

],

[

-156.744,

74.4313

],

[

-161.56,

72.2376

],

[

-163.746,

71.0004

],

[

-167.679,

68.2576

],

[

-171.171,

65.0765

],

[

-174.36,

61.3181

],

[

-177.3,

56.8761

],

[

-180,

51.7103

]

],

[

[

180,

51.7103

],

[

176.173,

42.1564

],

[

174.33,

36.458

],

[

172.381,

29.6249

],

[

170.728,

23.2156

],

[

146.971,

-58.7512

]

]

]

},

“properties”: {}

}

#### Polygon

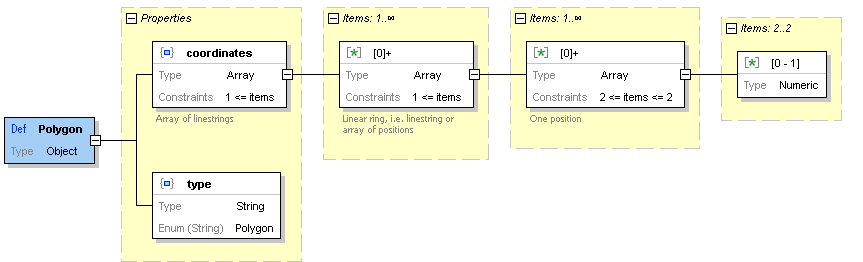


Figure 16: Polygon Schema (GeoJSON)

Note that according to [NR2], Polygon rings shall follow the right-hand rule for orientation (counter-clockwise external rings, clockwise internal rings).

Example 19: GeoJSON Polygon encoding example

{

“type”: “Feature”,

“id”: “http://fedeo.esa.int/opensearch/request/?parentIdentifier=SEA\_GEC\_1P&uid=SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F”,

“geometry”: {

“coordinates”: [

[

[-2.682513, 63.261372],

[-2.695740, 61.997604],

[0.005087, 61.965195],

[0.135472, 63.227173],

[-2.682513, 63.261372]

]

],

“type”: “Polygon”

},

“properties”: { }

}

#### MultiPolygon

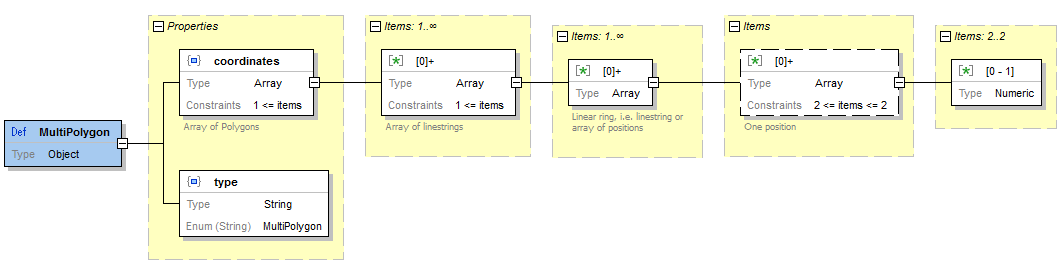


Figure 17: MultiPolygon Schema (GeoJSON)

Example 20: GeoJSON MultiPolygon encoding example

{

„type“: „Feature“,

„id“: „http://fedeo.esa.int/opensearch/request/?httpAccept=application/geo%2Bjson&parentIdentifier=EOP:ESA:GPOD-EO:TLM\_MIRA1A&uid=SM\_REPR\_TLM\_MIRA1A\_20131113T223626\_20131113T234029\_620\_001\_1“,

“geometry”: {

“type”: “MultiPolygon”,

“coordinates”: [

[

[

[

-79.972572,

-40.051556

],

. . .

[

-72.717911,

-41.413269

],

[

-79.972572,

-40.051556

]

]

],

[

[

[

180,

-78.232643

],

[

165.665065,

-76.886392

],

. . .

[

180,

-84.111229

],

[

180,

-78.232643

]

]

]

]

},

“properties”: {}

}

### Vertical Spatial Domain

|  |  |
| --- | --- |
| **Requirement** | **/req/vertical-spatial-domain**  A “VerticalSpatialDomain” object shall implement the properties shown in Table 11 with the value matching the type shown, and with the obligation shown. |

The VerticalSpatialDomain object contains the properties related to the spatial extent in the vertical dimension. Its properties are inherited by the AcquisitionParameters object.

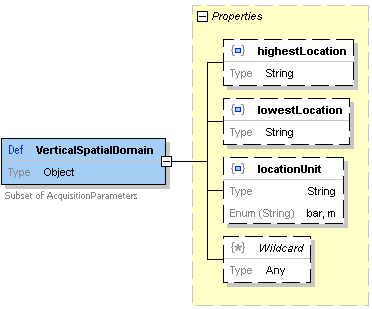


Figure 18: VerticalSpatialDomain Schema

Complete description of the VerticalSpatialDomain properties is given in Table 11.

|  |  |  |  |
| --- | --- | --- | --- |
| **JSON Property** | **Definition** | **Data type and values** | **Multiplicity and use** |
| lowestLocation  $.properties.acquisitionInformation[\*].acquisitionParameters.lowestLocation | Lower bound of measurements in vertical dimension (in meter or bar).  Unit of measure defined by locationUnit property. | Domain: VerticalSpatialDomain  Range: Double | Zero or one (optional) |
| highestLocation  $.properties.acquisitionInformation[\*].acquisitionParameters.highestLocation | Upper bound of measurements in vertical dimension (in meter or bar).  Unit of measure defined by locationUnit property. | Domain: VerticalSpatialDomain  Range: Double | Zero or one (optional) |
| locationUnit  $.properties.acquisitionInformation[\*].acquisitionParameters.locationUnit | Unit of measure used to express lowestLocation and highestLocation: meter (m) or bar (bar). Default is meter (m). | Domain: VerticalSpatialDomain  Range: String (“m”, “bar”) | Zero or one (optional) |

Table 11: Vertical Spatial Domain object properties

Example 21: VerticalSpatialDomain encoding example

{

„lowestLocation“: 40000,

„highestLocation“: 50000,

„locationUnit“: „m“

}

### Orbit Parameters

|  |  |
| --- | --- |
| **Requirement** | **/req/orbit-parameters**  An “OrbitParameters” object shall implement the properties shown in Table 12. With the value matching the type shown, and with the obligation shown. |

The OrbitParameters block contains the properties related to the orbit. Its properties are inherited by the AcquisitionParameters object.

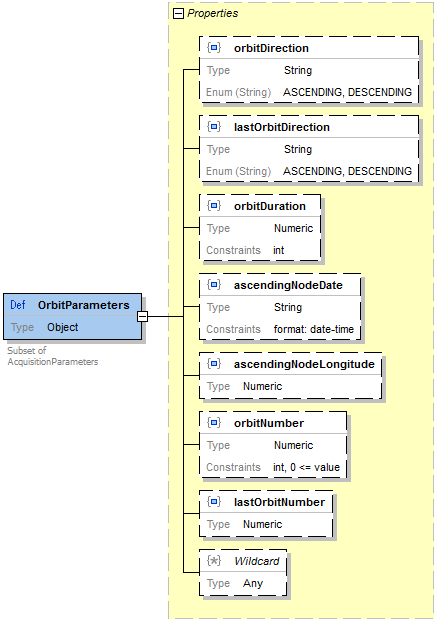


Figure 19: OrbitParameters Schema

Complete description of the OrbitParameters properties is given in Table 12.

|  |  |  |  |
| --- | --- | --- | --- |
| **JSON Property** | **Definition** | **Data type and values** | **Multiplicity and use** |
| orbitDirection  $.properties.acquisitionInformation[\*].acquisitionParameters.orbitDirection | Acquisition orbit direction at the start of the acquisition/product.  Values:   * ASCENDING * DESCENDING | Domain: AcquisitionParameters  Range: String | Zero or one (optional) |
| lastOrbitDirection  $.properties.acquisitionInformation[\*].acquisitionParameters.lastOrbitDirection | Acquisition orbit direction at the end of the acquisition/product. Assumed to be identical to orbitDirection if not present.  Values:   * ASCENDING * DESCENDING | Domain: AcquisitionParameters  Range: String | Zero or one (optional) |
| orbitDuration  $..acquisitionInformation[\*].acquisitionParameters.orbitDuration | Actual orbit duration in milliseconds | Domain: AcquisitionParameters  Range: Integer | Zero or one (optional) |
| orbitNumber  $..acquisitionInformation[\*].acquisitionParameters.orbitNumber | Acquisition orbit number | Domain: AcquisitionParameters  Range: Integer | Zero or one (optional) |
| lastOrbitNumber  $..acquisitionInformation[\*].acquisitionParameters.lastOrbitNumber | Acquisition last orbit number | Domain: AcquisitionParameters  Range: Integer | Zero or one (optional) |
| ascendingNodeDate  $..acquisitionInformation[\*].acquisitionParameters.ascendingNodeDate | UTC date and time at ascending node of orbit | Domain: AcquisitionParameters  Range: DateTime10 | Zero or one (optional) |
| ascendingNodeLongitude  $..acquisitionInformation[\*].acquisitionParameters.ascendingNodeLongitude | Longitude at ascending node of orbit. Should be expressed in degrees. | Domain: AcquisitionParameters  Range: Double | Zero or one (optional) |

Table 12: OrbitParameters object properties

Example 22: OrbitParameters encoding example

{

„orbitNumber“: 20187,

„lastOrbitNumber“: 20187,

„orbitDirection“: „DESCENDING“,

„ascendingNodeDate“: „2014-01-28T14:01:25Z“,

„ascendingNodeLongitude“: 74.784284

}

## Requirements class: Temporal Information

|  |  |
| --- | --- |
| **Requirements Class** | |
| [**/req/**](http://www.opengis.net/spec/waterml/part2/json/req/req-core)**temporal-information** | |
| Target type | Data instance |
| Dependency | **JSON [NR1]** |
| Dependency | **GeoJSON [NR2]** |
| **Requirement** | **/req/temporal-information/properties** |

|  |  |
| --- | --- |
| **Requirement** | **/req/temporal-information/properties**  A “TemporalInformation” object shall implement the properties shown in Table 13, with the value matching the type shown, and with the obligation shown. |

The TemporalInformation object contains the properties related to the start and end time of the acquisition of the data. Its properties are inherited by the AcquisitionParameters object.

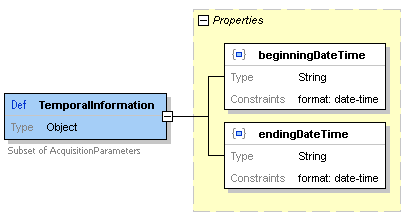


Figure 20: TemporalInformation Schema

Complete description of the TemporalInformation properties is given in Table 13.

|  |  |  |  |
| --- | --- | --- | --- |
| **JSON Property** | **Definition** | **Data type and values** | **Multiplicity and use** |
| beginningDateTime  $..acquisitionInformation[\*].acquisitionParameters.beginningDateTime | Acquisition start date time  DateTime representation, as defined by RFC 3339, section 5.6[[10]](#footnote-10) | Domain: AcquisitionParameters  Range: DateTime | One (mandatory) |
| endingDateTime  $..acquisitionInformation[\*].acquisitionParameters.endingDateTime | Acquisition end date time  DateTime representation, as defined by RFC 3339, section 5.610 | Domain: AcquisitionParameters  Range: DateTime | One (mandatory) |

Table 13 : TemporalInformation object properties

Example 23: TemporalInformation encoding example

{

„beginningDateTime“: „1978-09-27T01:04:30Z“,

„endingDateTime“: „1978-09-27T01:04:45Z“

}

## Requirements class: Acquisition Information

|  |  |
| --- | --- |
| **Requirements Class** | |
| [**/req/**](http://www.opengis.net/spec/waterml/part2/json/req/req-core)**acquisition-information** | |
| Target type | Data instance |
| Dependency | **/req/platform** |
| Dependency | **/req/instrument** |
| Dependency | **/req/instrument-parameters** |
| Dependency | **/req/acquisition-parameters** |
| **Requirement** | **/req/acquisition-information/properties** |

|  |  |
| --- | --- |
| **Requirement** | **/req/acquisition-information/properties**  An “AcquisitionInformation” object shall implement the properties shown in Table 14, with the value matching the type shown, and with the obligation shown. |

The AcquisitionInformation block can appear multiple times and contains information about the platform (i.e., satellite), the sensor and the acquisition parameters.

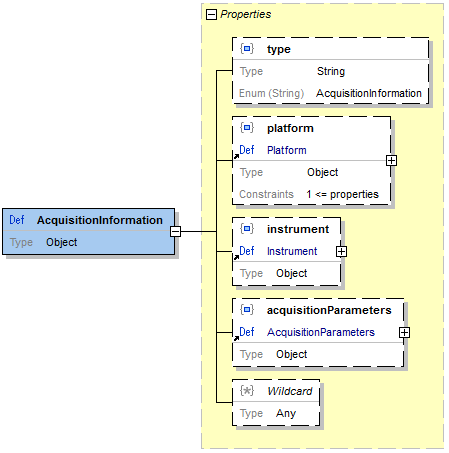


Figure 21: AcquisitionInformation Schema

Complete description of the AcquisitionInformation properties is given in Table 14.

|  |  |  |  |
| --- | --- | --- | --- |
| **JSON Property** | **Definition** | **Data type and values** | **Multiplicity and use** |
| platform  $..acquisitionInformation[\*].platform | The Platform used for the acquisition.  If more than one platform is used for creating the product, then the AcquisitionInformation object occurs more than once. | Domain: AcquisitionInformation  Range: Platform  See Table 15 | Zero or one (optional) |
| instrument  $..acquisitionInformation[\*].instrument | The Instrument/Sensor used for the acquisition.  If more than one instrument is used for creating the product, then the AcquisitionInformation object occurs more than once. | Domain : AcquisitionInformation  Range : Instrument  See Table 16 | Zero or one (optional) |
| acquisitionParameters  $..acquisitionInformation[\*].acquisitionParameters | The acquisition parameters (i.e., pointing angles, etc.) | Domain : AcquisitionInformation  Range : AcquisitionParameters  See Table 18. | Zero or one (optional) |

Table 14 : AcquisitionInformation object properties

Example 24: AcquisitionInformation encoding example

{

„acquisitionInformation“: [

{

„platform“: {

„id“: „http://gcmdservices.gsfc.nasa.gov/kms/concept/1bffe898-f4a2-458e-92c5-cd7c9c1cd5f0“,

„platformShortName“: „Seasat“,

„platformSerialIdentifier“: „1“

},

„instrument“: {

„id“: „http://gcmdservices.gsfc.nasa.gov/kms/concept/a37282d4-322c-4dd0-8edc-36099b9b586c“,

„sensorType“: „RADAR“,

„instrumentShortName“: „SAR“

},

„acquisitionParameters“: {

„operationalMode“: „IM“,

„polarisationMode“: „S“,

„polarisationChannels“: „HH“

„beginningDateTime“: „1978-09-27T01:04:30Z“,

„endingDateTime“: „1978-09-27T01:04:45Z“,

„acquisitionType“: „NOMINAL“,

„acquisitionSubType“: „DEFAULT“,

„orbitNumber“: „1316“,

„orbitDirection“: „DESCENDING“,

„antennaLookDirection“: „RIGHT“,

„acquisitionAngles“: {

„minimumIncidenceAngle“: 19.6,

„maximumIncidenceAngle“: 9.6,

„incidenceAngleVariation“: 9.6

}

}

}

]

}

### Platform

|  |  |
| --- | --- |
| **Requirement** | **/req/platform**  A “Platform” object shall implement the properties shown in Table 15, with the value matching the type shown, and with the obligation shown. |

The Platform block contains the properties of the platform that was used to perform the observation.

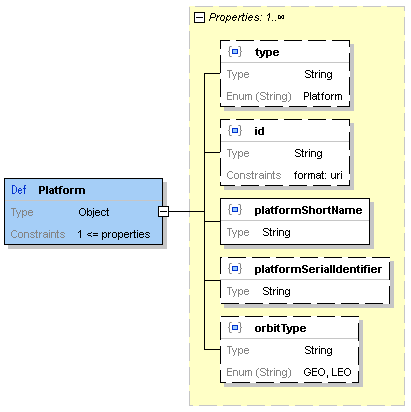


Figure 22: Platform Schema

Complete description of the Platform properties is given in Table 15.

|  |  |  |  |
| --- | --- | --- | --- |
| **JSON Property** | **Definition** | **Data type and values** | **Multiplicity and use** |
| type  $..acquisitionInformation[\*].platform.type | Type of the object. This property has the fixed value “Platform”. | Range: String  Fixed value: “Platform” | Zero or one (optional) |
| id  $..acquisitionInformation[\*].platform.id | URI of platform.  E.g., http://gcmdservices.gsfc.nasa.gov/kms/concept/a1498dff-002d-4d67-9091-16822c608221 for ENVISAT | Range: String (URI) | Zero or one (Optional) |
| platformShortName  $..acquisitionInformation[\*].platform.platformShortName | Platform short name (e.g., “Seasat” or “ENVISAT”) | Domain: Platform  Range: String | One (mandatory) |
| platformSerialIdentifier  $..acquisitionInformation[\*].platform.platformSerialIdentifier | Platform serial identifier (e.g., for Seasat : 1). | Domain: Platform  Range: String | Zero or one (Optional) |
| orbitType  $..acquisitionInformation[\*].platform.orbitType | High level characterisation of main mission types taken from a codelist | Domain: Platform  Range: String  Values:  GEO, LEO | Zero or one (Optional) |

Table 15: Platform object properties

Example 25: Platform encoding example

{

“id”: “http://gcmdservices.gsfc.nasa.gov/kms/concept/1bffe898-f4a2-458e-92c5-cd7c9c1cd5f0”,

“platformShortName”: “Seasat”,

“platformSerialIdentifier”: “1”,

“orbitType”: “LEO”

}

### Instrument

|  |  |
| --- | --- |
| **Requirement** | **/req/instrument**  An “Instrument” object shall implement the properties shown in Table 16, with the value matching the type shown, and with the obligation shown. |

The Instrument block contains the properties of the instrument that was used to perform the observation.

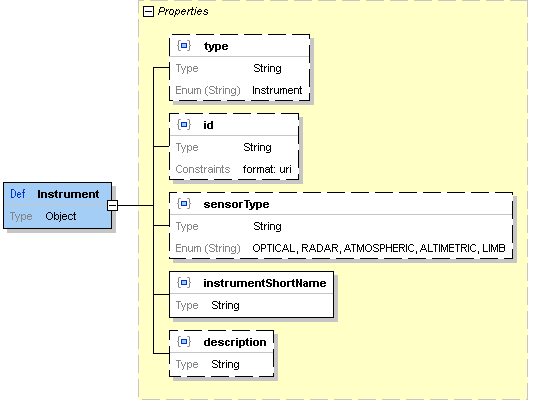


Figure 23: Instrument Schema

A complete description of the Instrument properties is given in Table 16.

|  |  |  |  |
| --- | --- | --- | --- |
| **JSON Property** | **Definition** | **Data type and values** | **Multiplicity and use** |
| type  $..acquisitionInformation[\*].instrument.type | Type of the object. This property has the fixed value “Instrument.” | String  Fixed value: “Instrument” | Zero or one (optional) |
| id  $..acquisitionInformation[\*].instrument.id | URI of instrument.  E.g., http://gcmdservices.gsfc.nasa.gov/kms/concept/912c3308-23bc-4e12-b7fb-9d82e9fc5fe9 for ENVISAT ASAR | Domain: Instrument  Range: String (URI) | Zero or one (optional) |
| sensorType[[11]](#footnote-11)  $..acquisitionInformation[\*].instrument.sensorType | Sensor type based on codelist  Values:  - OPTICAL  - RADAR  - ALTIMETRIC  - ATMOSPHERIC  - LIMB | Domain: Instrument  Range: String | Zero or one (optional) |
| instrumentShortName  $..acquisitionInformation[\*].instrument.instrumentShortName | Instrument (Sensor) name | Domain: Instrument  Range: String | One (mandatory) |
| description  $..acquisitionInformation[\*].instrument.description | Instrument description | Domain: Instrument  Range: String | Zero or one (optional) |

Table 16: Instrument object properties

Example 26: Instrument encoding example

{ “id”: “http://gcmdservices.gsfc.nasa.gov/kms/concept/a37282d4-322c-4dd0-8edc-36099b9b586c”,

“sensorType”: “RADAR”,

“instrumentShortName”: “SAR”

}

### Wavelength Information

|  |  |
| --- | --- |
| **Requirement** | **/req/wavelength-information**  A “WavelenghtInformation” object shall implement the properties shown in Table 17, with the value matching the type shown, and with the obligation shown. |

The WavelengthInformation object contains the properties of the instrument related to the wavelengths used for the observation.

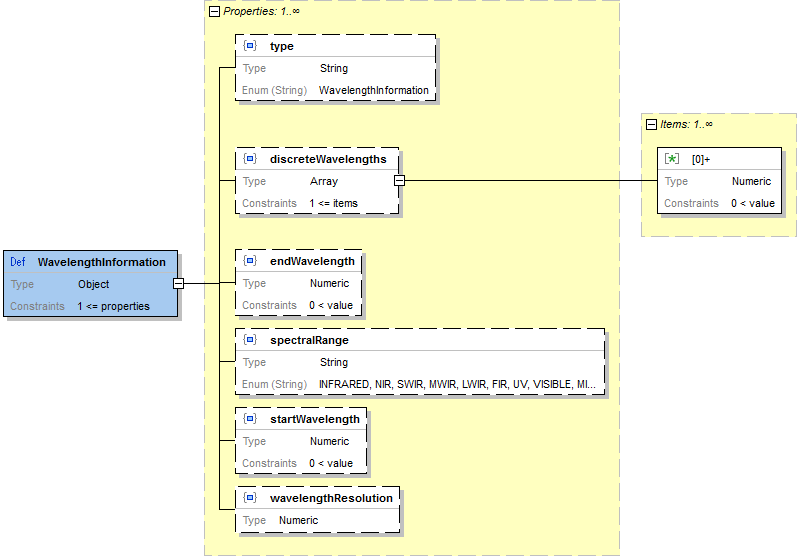


Figure 24: WavelengthInformation Schema

Complete description of the WavelengthInformation properties is given in Table 17.

|  |  |  |  |
| --- | --- | --- | --- |
| **JSON Property** | **Definition** | **Data type and values** | **Multiplicity and use** |
| type  $..acquisitionInformation[\*].instrument.wavelengths[\*].type | Type of the object. This property has the fixed value “WavelengthInformation.” | Domain: WavelengthInformation  Range: String  Fixed value: “WavelengthInformation” | Zero or one (optional) |
| discreteWavelengths  $..wavelengths[\*].discreteWavelengths | List of discrete wavelengths observed in the product.  Unit of measure is SI base unit (m) without prefix. | Domain: WavelengthInformation  Range: Array of Double | Zero or more (optional) |
| startWavelength  $..wavelengths[\*].startWavelength | Start of the observed wavelength range.  Unit of measure is SI base unit (m) without prefix.  Examples:   * 1E-03 (i.e.1 mm – start of microwave range). * 700E-09 (i.e 700nm – start of infrared range). | Domain: WavelengthInformation  Range: Double | Zero or one (optional) |
| endWavelength  $..wavelengths[\*].endWavelength | End of the observed wavelength range  Unit of measure is SI base unit (m) without prefix.  Examples:   * 0.3 (i.e.30 cm – end of microwave range). * 1E-03 (i.e 1mm – end of infrared range). | Domain: WavelengthInformation  Range: Double | Zero or one (optional) |
| spectralRange  $..wavelengths[\*].spectralRange | The observed Spectral Range:  Values:  - INFRARED  - NIR *(for Near Infrared)*  - SWIR *(for Short Wavelength Infrared)*  - MWIR *(for Mid Wavelength Infrared)*  - LWIR *(for Long Wavelength Infrared)*  - FIR *(for Far Infrared)*  - UV  - VISIBLE  - MICROWAVE  - OTHER | Domain: WavelengthInformation  Range: String | Zero or one (optional) |
| wavelengthResolution  $..wavelengths[\*].wavelengthResolution | Spacing between consecutive wavelengths  Unit of measure is SI base unit (m) without prefix. | Domain: WavelengthInformation  Range: Double | Zero or one (optional) |

Table 17: WavelengthInformation object properties

Example 27: WavelengthInformation encoding example

{

“spectralRange”: “INFRARED”,

“startWavelength”: 700E-09,

“endWavelength”: 1E-03

}

### Acquisition Parameters

|  |  |
| --- | --- |
| **Requirements Class** | |
| [**/req/**](http://www.opengis.net/spec/waterml/part2/json/req/req-core)**acquisition-parameters** | |
| Target type | Data instance |
| Dependency | **/req/vertical-spatial-domain** |
| Dependency | **/req/orbit-parameters** |
| Dependency | **/req/temporal-information** |
| Dependency | **/req/acquisition-angles** |
| Dependency | **/req/wavelength-information** |
| **Requirement** | **/req/acquisition-parameters/properties** |
| **Requirement** | **/req/acquisition-parameters/vertical-spatial-domain** |
| **Requirement** | **/req/acquisition-parameters/orbit-parameters** |
| **Requirement** | **/req/acquisition-parameters/temporal-information** |

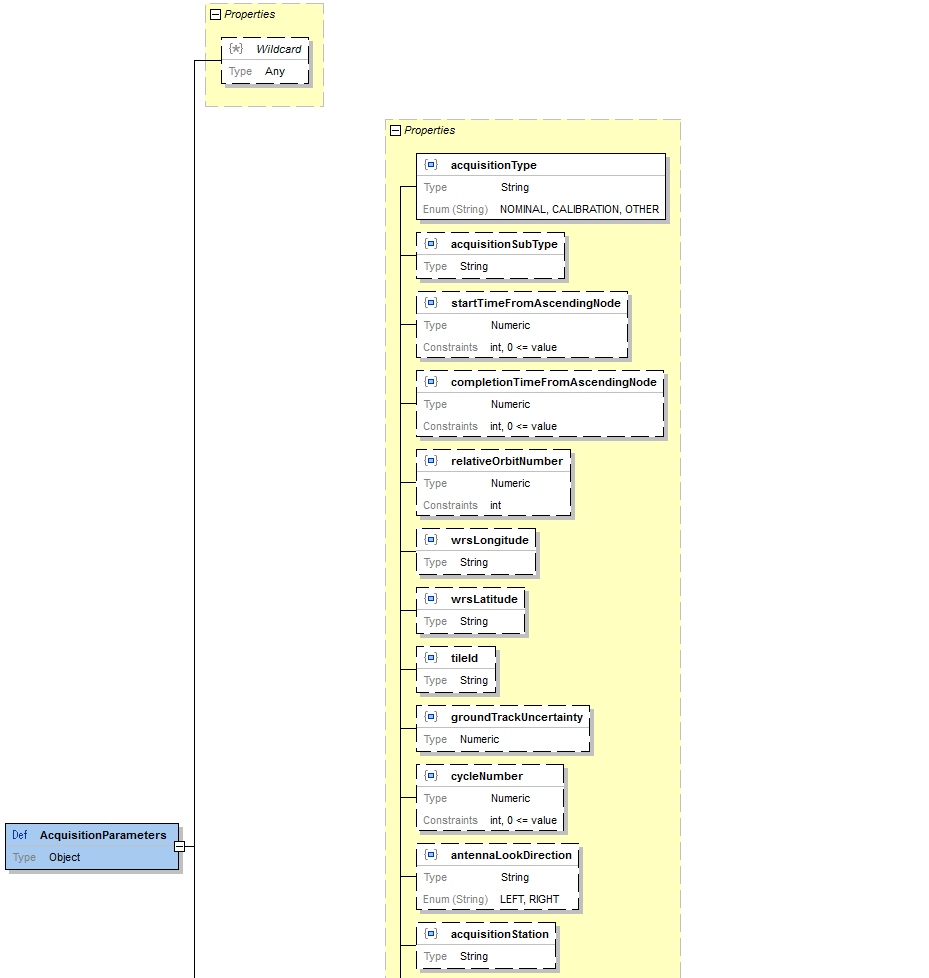
|  |  |
| --- | --- |
| **Requirement** | **/req/acquisition-parameters/properties**  An “AcquisitionParameters” object shall implement the properties shown in Table 18, with the value matching the type shown, and with the obligation shown. |

|  |  |
| --- | --- |
| **Requirement** | **/req/acquisition-parameters/vertical-spatial-domain**  An “AcquisitionParameters” object shall implement the properties of a VerticalSpatialDomain object (Table 11). |

|  |  |
| --- | --- |
| **Requirement** | **/req/acquisition-parameters/orbit-parameters**  An “AcquisitionParameters” object shall implement the properties of an OrbitParameters object (Table 12). |

|  |  |
| --- | --- |
| **Requirement** | **/req/acquisition-parameters/temporal-information**  An “AcquisitionParameters” object shall implement the properties of a TemporalInformation object (Table 13). |

The AcquisitionParameters block contains the properties related to the acquisition of the data.



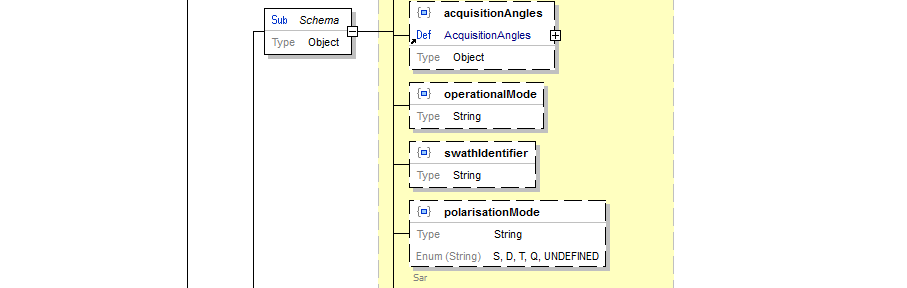


Figure 25: AcquisitionParameters Schema

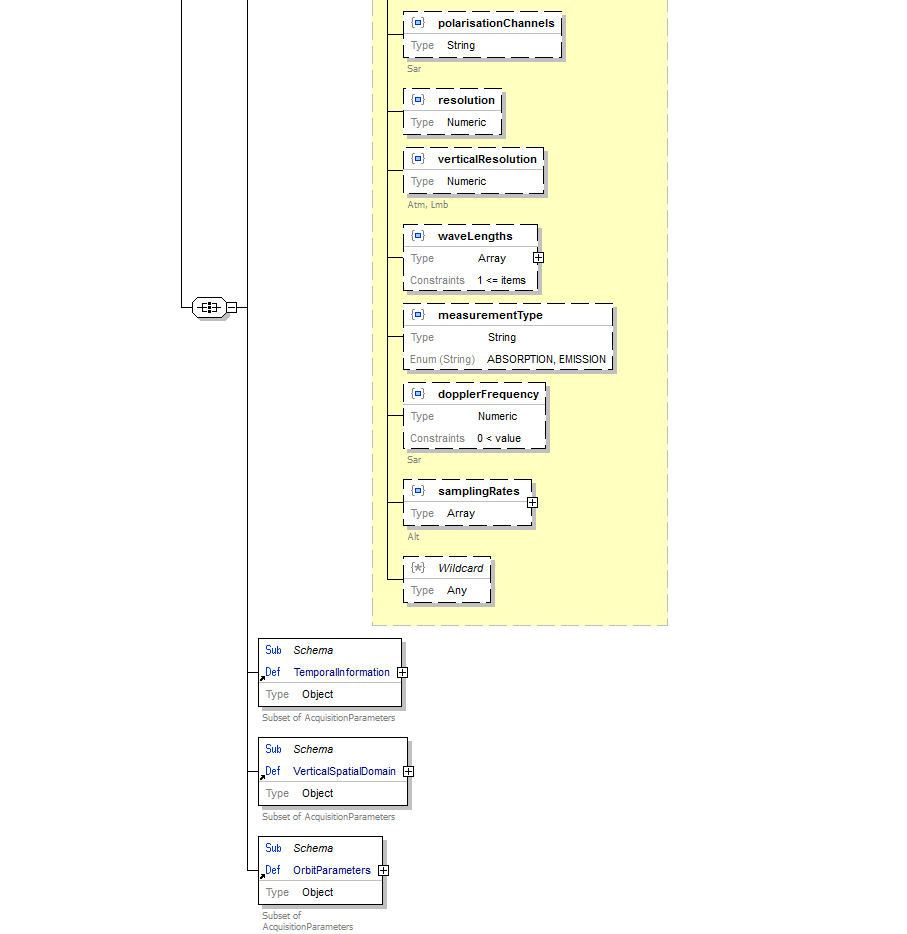


Figure 26: AcquisitionParameters Schema Cont’d

Complete description of the AcquisitionParameters properties is given in Table 18.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **JSON Property** | | **Definition** | **Data type and values** | **Multiplicity and use** |
| type  $.properties.acquisitionInformation[\*].acquisitionParameters.type | | Type of the object. This property has the fixed value “AcquisitionParameters.” | String  Fixed value: “AcquisitionParameters” | Zero or one (optional) |
| acquisitionType  $..acquisitionParameters.acquisitionType | | Used to distinguish at a high level the appropriateness of the acquisition for “general” use, whether the product is a nominal acquisition, special calibration product or other.  Values:  - NOMINAL  - CALIBRATION  - OTHER | Domain: AcquisitionParameters  Range: String | One (mandatory) |
| acquisitionSubType  $..acquisitionParameters.acquisitionSubType | | The broad value defined by the acquisitionType may be further refined by the acquisitionSubType using values from a mission/ground segment specific type definition should refer to mission/ground segment specific codeSpace. | Domain: AcquisitionParameters  Range: String | Zero or one (optional) |
| startTimeFromAscendingNode  $..acquisitionParameters.startTimeFromAscendingNode | | Start time of acquisition in milliseconds from ascending node date | Domain: AcquisitionParameters  Range: Integer | Zero or one (optional) |
| completionTimeFromAscendingNode  $..acquisitionParameters.completionTimeFromAscendingNode | | Stop time of acquisition in milliseconds from ascending node date | Domain: AcquisitionParameters  Range: Integer | Zero or one (optional) |
| relativeOrbitNumber  $..acquisitionParameters.relativeOrbitNumber | | Orbit number since start of cycle. | Domain: AcquisitionParameters  Range: Integer | Zero or one (optional) |
| wrsLongitudeGrid  $..acquisitionParameters.wrsLongitudeGrid | | Neutral wrsLongitudeGrid equivalent to track in track/frame, K in K/J, etc. | Domain: AcquisitionParameters  Range: String | Zero or one (optional) |
| wrsLatitudeGrid  $..acquisitionParameters.wrsLatitudeGrid | | Neutral wrsLatitudeGrid equivalent to frame in track/frame, J in K/J, etc. | Domain: AcquisitionParameters  Range: String | Zero or one (optional) |
| tileId  $..acquisitionParameters.tileId | | While track/frame can be used to represent the first part of an MGRS coordinate (i.g. grid zone), the tileId identifies e.g., the second part of an MGRS coordinate (square identification), e.g., in case of Sentinel.  Used when the world reference system coordinates can not be expressed in X/Y (Track/Frame) terms, such has for UTM tiles. (used for Sentinel-2 L1C granules). | Domain: AcquisitionParameters  Range: String | Zero or one (optional) |
| groundTrackUncertainty  $..acquisitionParameters.groundTrackUncertainty | | Measure of the uncertainty of the ground track. Sometimes known as deadband e.g., 1000m (1Km) deadband.  Unit of measure is SI base unit (m) without prefix. | Domain: AcquisitionParameters  Range: Double | Zero or one (optional) |
| cycleNumber  $..acquisitionParameters.cycleNumber | | Number of Cycles | Domain: AcquisitionParameters  Range: Integer | Zero or one (optional)  Only applicable to altimetric products. |
| antennaLookDirection  $..acquisitionParameters.antennaLookDirection | | Look direction of antenna taken from codelist  Values:  - LEFT  - RIGHT | Domain: AcquisitionParameters  Range: String | Zero or one (optional)  Only applicable to radar products. |
| acquisitionStation  $..acquisitionParameters.acquisitionStation | | Acquisition / receiving station code. Possible values are mission specific and should be retrieved using codespace. | Domain: AcquisitionParameters  Range: String | Zero or more (optional)  comma-separated names. |
| acquisitionAngles  $..acquisitionParameters.acquisitionAngles | | Acquisition angles | Domain: AcquisitionParameters  Range: AcquisitionAngles | See Table 19 |
| operationalMode  $..acquisitionParameters.operationalMode | Sensor mode. Possible values are mission specific. | | Domain: AcquisitionParameters  Range: String | Zero or one (optional) |
| swathIdentifier  $..acquisitionParameters.swathIdentifier | Swath identifier (e.g., Envisat ASAR has 7 distinct swaths (I1,I2,I3...I7) that correspond to precise incidence angles for the sensor). | | Domain: AcquisitionParameters  Range: String | Zero or one (optional) |
| polarisationMode  $..acquisitionParameters.polarisationMode | Polarisation mode taken from codelist:  S (for single),  D (for dual),  T (for twin),  Q (for quad),  UNDEFINED | | Domain: AcquisitionParameters  Range: String (S, D, T, Q, UNDEFINED) | Zero or one (optional) |
| polarisationChannels  $..acquisitionParameters.polarisationChannels | Polarisation channel transmit/receive configuration: horizontal, vertical.  Values:  - HH  - HV  - VH  - VV  - HH, VV  - HH, VH  - HH, HV  - VH, VV  - VH, HV  - VV, HV  - VV, VH  - HV, VH  - HH, HV, VH, VV  - UNDEFINED | | Domain: AcquisitionParameters  Range: String | Zero or more (optional). |
| Resolution  $..acquisitionParameters.resolution | Sensor resolution.  Unit of measure is SI base unit (m) without prefix. | | Domain: AcquisitionParameters  Range: Double | Zero or one (optional) |
| verticalResolution  $..acquisitionParameters.verticalResolution | lmb: Vertical spacing of data (if regular)  atm: Full width at half maximum of the rows of the vertical averaging kernel matrix  Unit of measure is SI base unit (m) without prefix. | | Domain: AcquisitionParameters  Range: Double | Zero or one (optional)  Only applicable to atmospheric and Limb looking products. |
| Wavelengths  $..acquisitionParameters.wavelengths | List of discrete wavelengths observed in the product. | | Domain: AcquisitionParameters  Range: WavelengthInformation (See Table 17) | Zero or more (optional) |
| measurementType  $..acquisitionParameters.measurementType | Measurement type taken from codelist:  Values:  - ABSORPTION  - EMISSION | | Domain: AcquisitionParameters  Range: String | Zero or one (optional)  Only applicable to limb looking products. |
| dopplerFrequency  $..acquisitionParameters.dopplerFrequency | Doppler Frequency of acquisition | | Domain: AcquisitionParameters  Range: Double | Zero or one (optional). |
| samplingRates  $..acquisition Parameters.samplingRates | Rate at which samples are provided in product. Some products may contain more than one sampling rate, e.g., 1kHz and 20kHz. Cardinality is therefore zero or more.  Unit of measure (Hz) is SI derived unit[[12]](#footnote-12) without prefix. | | Domain: AcquisitionParameters  Range: Array of Double | Zero or more (optional).  Only applicable to altimetric products. |

Table 18: AcquisitionParameters object properties

Example 28: Radar AcquisitionParameters encoding example

{

“beginningDateTime”: “1978-09-27T01:04:30Z”,

“endingDateTime”: “1978-09-27T01:04:45Z”,

“acquisitionType”: “NOMINAL”,

“acquisitionSubType”: “DEFAULT”,

“orbitNumber”: 1316,

“orbitDirection”: “DESCENDING”,

“antennaLookDirection”: “RIGHT”,

“acquisitionAngles”: {

“minimumIncidenceAngle”: 19.6,

“maximumIncidenceAngle”: 9.6,

“incidenceAngleVariation”: 9.6

},

“operationalMode”: “IM”,

“polarisationMode”: “S”,

“polarisationChannels”: “HH”,

“wavelengths”: {

“spectralRange”: “OTHER”

}

}

Example 29: Optical AcquisitionParameters encoding example

{

...

“operationalMode”: “IM”,

“wavelengths”: {

“spectralRange”: “VISIBLE”

}

}

Example 30: Altimeter AcquisitionParameters encoding example

{

...

“operationalMode”: “LRM”,

“resolution”: 0.7,

“samplingRates”: [1000, 20000]

}

### Acquisition Angles

|  |  |
| --- | --- |
| **Requirement** | **/req/acquisition-angles**  An “AcquisitionAngles” object shall implement the properties shown in Table 19, with the value matching the type shown, and with the obligation shown. |

The AcquisitionAngles block contains the properties related to the acquisition angles.

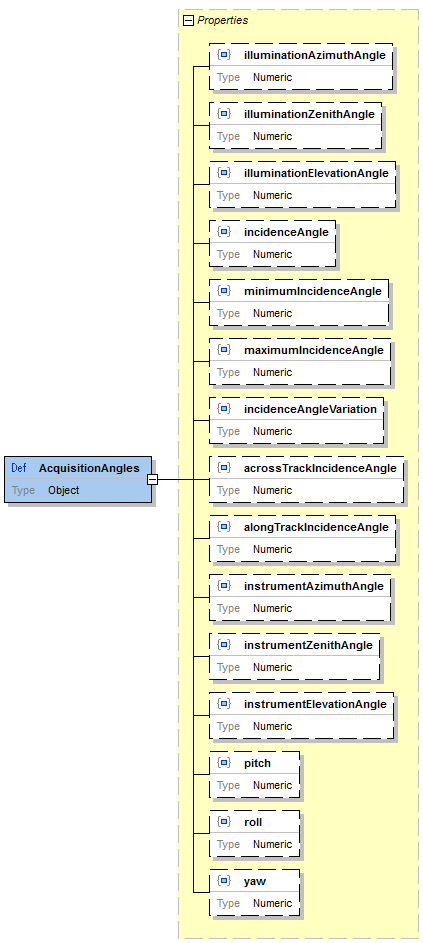


Figure 27: AcquisitionAngles Schema

Complete description of the AcquisitionAngles block is given in Table 19.

|  |  |  |  |
| --- | --- | --- | --- |
| **JSON Property** | **Definition** | **Data type and values** | **Multiplicity and use** |
| type  $.properties.acquisitionInformation[\*].acquisitionParameters.acquisitionAngles.type | Type of the object. This property has the fixed value “AcquisitionAngles.” | Range: String  Fixed value: “AcquisitionAngles” | Zero or one (optional) |
| illuminationAzimuthAngle  $..acquisitionAngles.illuminationAzimuthAngle | Mean illumination/solar azimuth angle given in degrees. (i.e., uom=’deg’) | Domain : AcquisitionAngles  Range : Double | Zero or one (optional) |
| illuminationZenithAngle  $..acquisitionAngles.illuminationZenithAngle | Mean illumination/solar zenith angle given in degrees. (i.e., uom=’deg’) | Domain : AcquisitionAngles  Range : Double | Zero or one (optional) |
| illuminationElevationAngle  $..acquisitionAngles.illuminationElevationAngle | Mean illumination/solar elevation angle given in degrees. (i.e., uom=’deg’) | Domain : AcquisitionAngles  Range : Double | Zero or one (optional) |
| incidenceAngle  $..acquisitionAngles.incidenceAngle | Acquisition global incidence angle given in degrees (i.e., uom=’deg’) | Domain : AcquisitionAngles  Range : Double | Zero or one (optional) |
| minimumIncidenceAngle  $..acquisitionAngles.minimumIncidenceAngle | Minimum incidence angle | Domain : AcquisitionAngles  Range : Double | Zero or one (optional) |
| maximumIncidenceAngle  $..acquisitionAngles.maximumIncidenceAngle | Maximum incidence angle | Domain : AcquisitionAngles  Range : Double | Zero or one (optional) |
| incidenceAngleVariation  $..acquisitionAngles.incidenceAngleVariation | Incidence angle variation | Domain : AcquisitionAngles  Range : Double | Zero or one (optional) |
| acrossTrackIncidenceAngle  $..acquisitionAngles.acrossTrackIncidenceAngle | Acquisition across track incidence angle given in degrees. (i.e., uom=’deg’) | Domain : AcquisitionAngles  Range : Double | Zero or one (optional) |
| alongTrackIncidenceAngle  $..acquisitionAngles.alongTrackIncidenceAngle | Acquisition along track incidence angle given in degrees. (i.e., uom=’deg’) | Domain : AcquisitionAngles  Range : Double | Zero or one (optional) |
| instrumentAzimuthAngle  $..acquisitionAngles.instrumentAzimuthAngle | Mean instrument azimuth angle given in degrees. (i.e., uom=’deg’) | Domain : AcquisitionAngles  Range : Double | Zero or one (optional) |
| instrumentZenithAngle  $..acquisitionAngles.instrumentZenithAngle | Mean instrument zenith angle given in degrees. (i.e., uom=’deg’) | Domain : AcquisitionAngles  Range : Double | Zero or one (optional) |
| instrumentElevationAngle  $..acquisitionAngles.instrumentElevationAngle | Mean instrument elevation angle given in degrees. (i.e., uom=’deg’) | Domain : AcquisitionAngles  Range : Double | Zero or one (optional) |
| pitch  $..acquisitionAngles.pitch | Satellite pitch angle given in degrees (i.e., uom=’deg’) | Domain : AcquisitionAngles  Range : Double | Zero or one (optional) |
| roll  $..acquisitionAngles.roll | Satellite roll angle given in degrees (i.e., uom=’deg’) | Domain : AcquisitionAngles  Range : Double | Zero or one (optional) |
| yaw  $..acquisitionAngles.yaw | Satellite yaw angle given in degrees (i.e., uom=’deg’) | Domain : AcquisitionAngles  Range : Double | Zero or one (optional) |

Table 19: AcquisitionAngles object properties

Example 31: AcquisitionAngles encoding example

{

„acquisitionInformation“: [

{

„acquisitionParameters“: {

„acquisitionAngles“: {

„minimumIncidenceAngle“: 19.6,

„maximumIncidenceAngle“: 9.6,

„incidenceAngleVariation“: 9.6

}

}

}

]

}

## Requirements class: Product Information

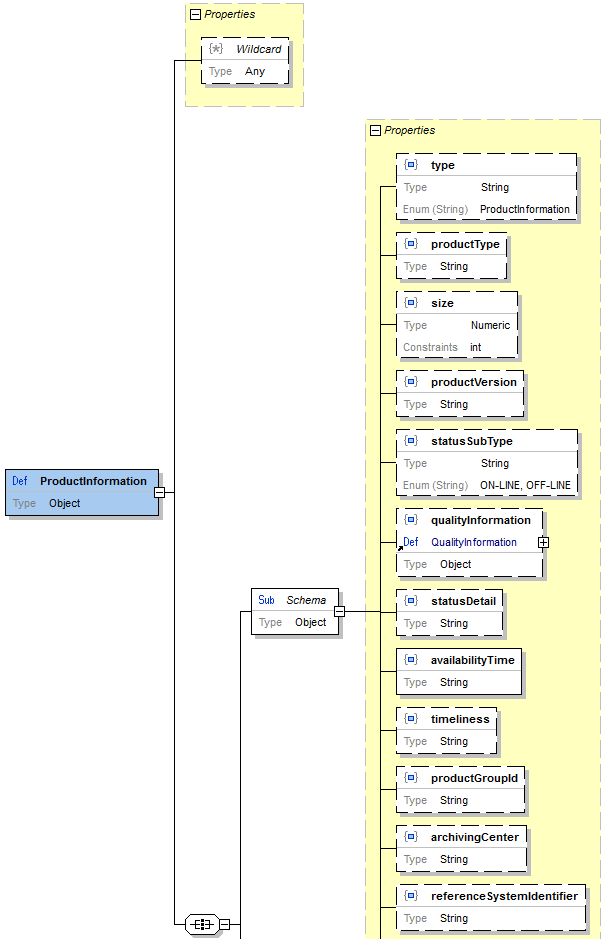
|  |  |
| --- | --- |
| **Requirements Class** | |
| [**/req/**](http://www.opengis.net/spec/waterml/part2/json/req/req-core)**product-information** | |
| Target type | Data instance |
| Dependency | **JSON [NR1]** |
| Dependency | **GeoJSON [NR2]** |
| Dependency | **/req/coverage-description** |
| Dependency | **/req/processing-information** |
| Dependency | **/req/quality-information** |
| **Requirement** | **/req/product-information/properties** |
| **Requirement** | **/req/product-information/processing-information** |
| **Requirement** | **/req/product-information/coverage-description** |

|  |  |
| --- | --- |
| **Requirement** | **/req/product-information/properties**  A “ProductInformation” object shall implement the properties shown in Table 20, with the value matching the type shown, and with the obligation shown. |

|  |  |
| --- | --- |
| **Requirement** | **/req/product-information/processing-information**  A “ProductInformation” object shall implement the properties of a ProcessingInformation object (Table 22). |

|  |  |
| --- | --- |
| **Requirement** | **/req/product-information/coverage-description**  A “ProductInformation” object shall implement the properties of a CoverageDescription object (Table 23). |

The ProductInformation block contains the properties related to the product which is the result of the observation and acquisition of the data, including the Quality Information. It inherits all properties of the ProcessingInformation and CoverageDescription objects.



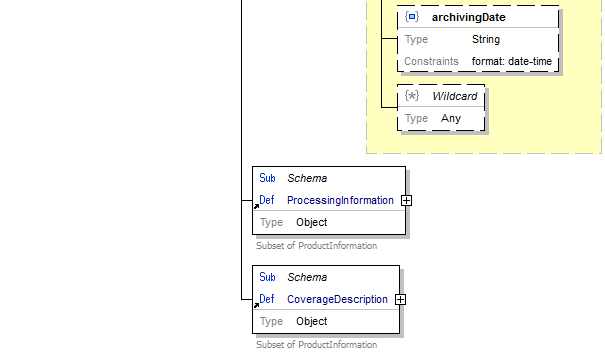


Figure 28: ProductInformation Schema

Complete description of the ProductInformation block is given in Table 20.

|  |  |  |  |
| --- | --- | --- | --- |
| **JSON Property** | **Definition** | **Data type and values** | **Multiplicity and use** |
| type  $.properties.productInformation.type | Type of the object. This property has the fixed value “ProductInformation.” | Domain: ProductInformation  Range: String  Fixed value: “ProductInformation” | Zero or one (optional) |
| productType  $.properties.productInformation.productType | Describes the product type in case that mixed types are available within a single collection, this is a ground segment specific definition | Domain: ProductInformation  Range: String | Zero or one (optional) |
| size  $.properties.productInformation.size | Product size (bytes) allowing the user to realise how long a download is likely to take | Domain: ProductInformation  Range: Integer (Number of bytes) | Zero or one (optional) |
| statusSubType  $.properties.productInformation.statusSubType | Refines the status of a product when the “status” is set to “ARCHIVED”.  Possible values:  - “ON-LINE”  - “OFF-LINE” | Domain: ProductInformation  Range: String | Zero or one (optional) |
| statusDetail  $.properties.productInformation.statusDetail | This field refers to the status value. It should be used to motivate the reason of a failure, cancelation, rejection or degraded quality. | Domain: ProductInformation  Range: String | Zero or one (optional) |
| availabilityTime  $.properties.productInformation.availabilityTime | The time when the result becomes available  DateTime representation, as defined by RFC 3339, section 5.610 | Domain: ProductInformation  Range: DateTime | One (mandatory) |
| timeliness  $.properties.productInformation.timeliness | Timeliness of the product, such as “near real time”, “rush”. Possible values are mission specific and shall refer to mission/ground segment dedicated codeSpace.  Example of values could be “NRT”, “NOMINAL”, “NTC” or “STC” | Domain: ProductInformation  Range: String | Zero or one (optional) |
| productGroupId  $.properties.productInformation.productGroupId | Holds the identifier of a particular group to which the product belongs to. Group members represent then “granules” or “portions” of end-user products that are eligible for specific aggregations (e.g., all Sentinel-2 granules having the same productGroupId can be assembled together to form a Sentinel-2 end-user product). | Domain: ProductInformation  Range: String | Zero or one (optional) |
| productVersion  $.properties.productInformation.productVersion | Product version | Domain: ProductInformation  Range: String | Zero or one (Optional) |
| archivingCenter  $.properties.productInformation.archivingCenter | Archiving center code. Possible values are mission specific. | Domain: ProductInformation  Range: String | Zero or one (Optional) |
| archivingDate  $.properties.productInformation.archivingDate | Archiving date time.  DateTime representation, as defined by RFC 3339, section 5.610 | Domain: ProductInformation  Range: DateTime | Zero or one (Optional) |
| referenceSystemIdentifier  $.properties.productInformation.referenceSystemIdentifier | Indicates if product is geo-referenced, (in which case should point to a code space for the CRS), when not supplied it is assumed that the product is provided in “raw” satellite frame of reference  E.g., <http://www.opengis.net/def/crs/EPSG/0/4326> | Domain: ProductInformation  Range: String (URI) | Zero or one (Optional) |
| qualityInformation  $.properties.productInformation.qualityInformation | Contains properties related to the quality of the product. | Domain: ProductInformation  Range: QualityInformation | Zero or one (Optional)  See Table 21 |

Table 20: ProductInformation object properties

Example 32: ProductInformation encoding example

{

“productType”: “SEA\_GEC\_1P”,

“referenceSystemIdentifier”: “http://www.opengis.net/def/crs/EPSG/0/4326”,

“size”: 255211520,

“productVersion”: “1.0”,

“statusSubType”: “ON-LINE”,

“availabilityTime”: “1978-09-27T01:04:45Z”,

“timeliness”: “NOMINAL”,

« archivingcenter » : « ASF »,

« archivingDate » : « 1978-09-28T02 :05 :56Z »,

“qualityInformation”: { ... }

}

### Quality Information

|  |  |
| --- | --- |
| **Requirement** | **/req/quality-information**  A “QualityInformation” object shall implement the properties shown in Table 21, with the value matching the type shown, and with the obligation shown. |

The QualityInformation block contains the properties related to the quality of the product.

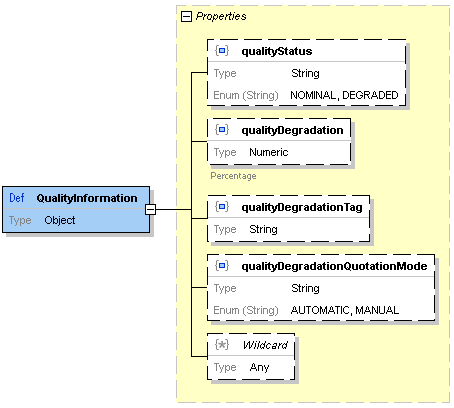


Figure 29: QualityInformation Schema

Complete description of the QualityInformation block is given in Table 21.

|  |  |  |  |
| --- | --- | --- | --- |
| **JSON Property** | **Definition** | **Data type and values** | **Multiplicity and use** |
| type  $.properties.productInformation.qualityInformation.type | Type of the object. This property has the fixed value “QualityInformation.” | Range: String  Fixed value: “QualityInformation” | Zero or one (optional) |
| qualityStatus  $..qualityInformation.qualityStatus | Indicator that specifies whether the product quality is degraded or not. This optional field shall be provided if the product has passed a quality check.  Values:  DEGRADED, NOMINAL | Domain: QualityInformation  Range: String | Zero or one (optional) |
| qualityDegradation  $..qualityInformation.qualityDegradation | Quality degradation percentage (i.e., uom=’%’) | Domain: QualityInformation  Range: Double | Zero or one (optional) |
| qualityDegradationQuotationMode  $..qualityInformation.qualityDegradationQuotationMode | Indicator to know how the quality degradation percentage has been calculated.  Values:  AUTOMATIC, MANUAL | Domain: QualityInformation  Range: String | Zero or one (optional) |
| qualityDegradationTag  $..qualityInformation.qualityDegradationTag | Contains further textual information concerning the quality degradation. It shall be provided if qualityStatus value is DEGRADED. Possible values are mission specific and should refer to mission/ground segment dedicated codeSpace.  Example of values could be “RADIOMETRY” or “GEOLOCATION”. | Domain: QualityInformation  Range: String | Zero or one (optional) |

Table 21: QualityInformation object properties

Example 33: QualityInformation encoding example

{

„qualityStatus“: „DEGRADED“,

„qualityDegradationQuotationMode“: „AUTOMATIC“

}

### Processing Information

|  |  |
| --- | --- |
| **Requirement** | **/req/processing-information**  A “ProcessingInformation” object shall implement the properties shown in Table 22, with the value matching the type shown, and with the obligation shown. |

The ProcessingInformation object contains the properties related to the processing of the data.

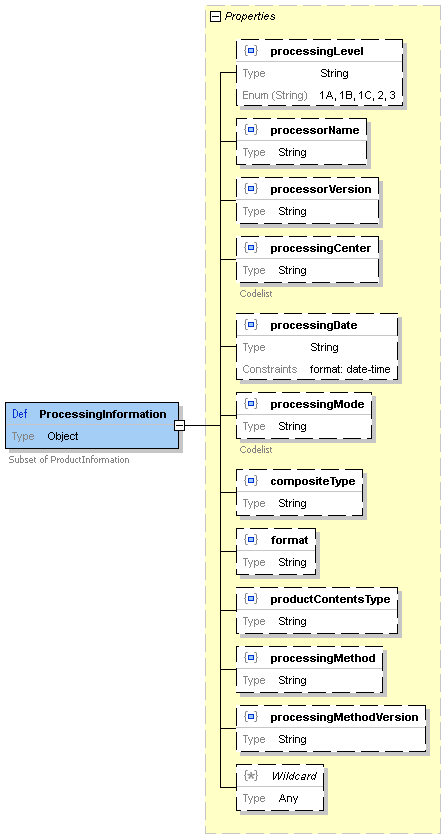


Figure 30: ProcessingInformation Schema

Complete description of the ProcessingInformation properties is given in Table 22.

|  |  |  |  |
| --- | --- | --- | --- |
| **JSON Property** | **Definition** | **Data type and values** | **Multiplicity and use** |
| compositeType  $.properties.productInformation.compositeType | Type of composite product expressed as timeperiod that the composite product covers using ISO 8601 duration format P[n]Y[n]M[n]D encoding[[13]](#footnote-13), e.g., P10D for a 10-day composite. | Domain: ProcessingInformation  Range: String | Zero or one (optional) |
| format  $.properties.productInformation.format | Native product format. | Domain: ProcessingInformation  Range: String | Zero or one (optional) |
| processingMethod[[14]](#footnote-14)  $.properties.productInformation.processingMethod | Method used to compute datalayer. (e.g., Kalman filtering, ROSE) | Domain: ProcessingInformation  Range: String | Zero or one (optional) |
| processingMethodVersion  $.properties.productInformation.processingMethodVersion | Method version (e.g., 1.0) | Domain: ProcessingInformation  Range: String | Zero or one (optional) |
| processingCenter  $.properties.productInformation.processingCenter | Processing center code. Possible values are mission specific. | Domain: ProcessingInformation  Range: String | Zero or one (optional) |
| processingDate  $.properties.productInformation.processingDate | Processing date time  DateTime representation, as defined by RFC 3339, section 5.610 | Domain: ProcessingInformation  Range: DateTime | Zero or one (optional) |
| processingLevel  $.properties.productInformation.processingLevel | Processing level applied to the product | Domain: ProcessingInformation  Range: String  “1A”, “1B”, “1C”, “2”, “3” | Zero or one (optional) |
| processingMode  $.properties.productInformation.processingMode | Processing mode taken from mission specific code list  Examples of values are:   * NRT * NOMINAL * BACKLOGGED * REPROCESSED * VALIDATE | Domain: ProcessingInformation  Range: String | Zero or one (optional) |
| processorName  $.properties.productInformation.processorName | Processor software name (e.g., FastROSE) | Domain: ProcessingInformation  Range: String | Zero or one (optional) |
| processorVersion  $.properties.productInformation.processorVersion | Processor software version (e.g., 1.0) | Domain: ProcessingInformation  Range: String | Zero or one (optional) |
| productContentsType  $.properties.productInformation.productContentsType | Classification of product according to ground type covered. Note cardinality allows for multiple instances of this property.  Allowed Values:   * COASTAL * CONTINENTAL * HYDROLOGY * ICE * OPEN\_OCEAN * OTHER * REGIONAL | Domain: ProcessingInformation  Range: Array of String | Zero or more (optional)  Only applicable to altimetric products. |

Table 22: ProcessingInformation object properties

Example 34: ProcessingInformation encoding example

{

„processingCenter“: „PDS“,

„processingDate“: „2016-02-01T04:58:31Z”,

„processingLevel“: „2“,

„processorVersion“: „3.1“

}

### Coverage Description

|  |  |
| --- | --- |
| **Requirement** | **/req/coverage-description**  A “CoverageDescription” object shall implement the properties shown in Table 23, with the value matching the type shown, and with the obligation shown. |

The CoverageDescription object contains the properties related to the coverage. Its properties are inherited by the ProductInformation object.

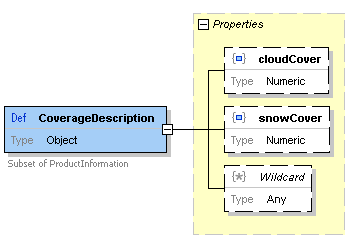


Figure 31: CoverageDescription Schema

Complete description of the CoverageDescription properties is given in Table 23.

|  |  |  |  |
| --- | --- | --- | --- |
| **JSON Property** | **Definition** | **Data type and values** | **Multiplicity and use** |
| cloudCover  $.properties.productInformation.cloudCover | Cloud cover percentage (i.e., uom=’%’) | Range: Double | Zero or one (optional) |
| snowCover  $.properties.productInformation.snowCover | Snow cover percentage (i.e., uom=’%’) | Range: Double | Zero or one (optional) |

Table 23: CoverageDescription object properties

Example 35: CoverageDescription encoding example

{

“cloudCover”: 0,

“snowCover”: 0

}

## Requirements class: Collections of Earth Observations

|  |  |
| --- | --- |
| **Requirements Class** | |
| [**/req/**](http://www.opengis.net/spec/waterml/part2/json/req/req-core)**earthobservation-collection** | |
| Target type | Data instance |
| Dependency | **JSON [NR1]** |
| Dependency | **GeoJSON [NR2]** |
| Dependency | **/req/earthobservation** |
| **Requirement** | **/req/earthobservation-collection/properties** |

|  |  |
| --- | --- |
| **Requirement** | **/req/earthobservation-collection/properties**  An Observation Collection (i.e., “FeatureCollection”) object shall implement the properties shown in Table 21, with the value matching the type shown, and with the obligation shown. |

The FeatureCollection object (fully defined in [NR2]) models a collection (i.e., set) of EarthObservations. Such collections (or sets) of metadata are typically used in responses from service interfaces compliant with OpenSearch extensions; W3C LDP; OASIS Odata[[15]](#footnote-15); OASIS searchRetrieve[[16]](#footnote-16) or in OGC Web Services (OWS) Context documents. The current section does not define the encoding of the protocol specific information such as information to facilitate traversal of results (paging) or other as these differ for each protocol. E.g., W3C LDP proposes traversal links as part of the HTTP header, while the various OpenSearch extensions include similar information in the HTTP body (payload). It does also not impose additional properties which are required if it is embedded in an OGC Web Map Context (OWC) according to OGC 14-055r2 [NR5].

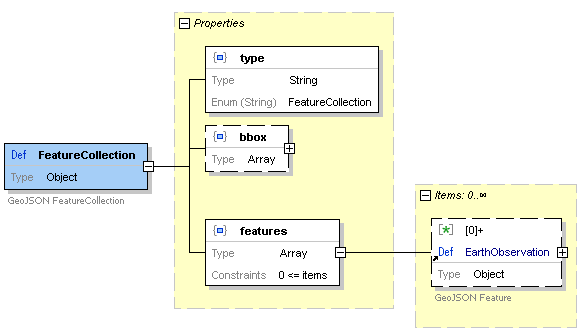


Figure 32: FeatureCollection Schema (GeoJSON)

Complete description of the FeatureCollection is given in Table 24.

|  |  |  |  |
| --- | --- | --- | --- |
| **GeoJSON Property** | **Definition** | **Data type and values** | **Multiplicity and use** |
| type  $.type | As defined by [NR2]. | Range: String  Fixed value: “FeatureCollection” | One (mandatory) |
| bbox  $.bbox | Information on the coordinate range of the geometry objects which are contained. The value is an array of length 2\*n where n is the number of dimensions represented in the contained geometries. Typically, south-west point and north-east point. The value defines a shape with edges that have constant longitude and latitude. As defined by [NR2]. | Domain: FeatureCollection  Range: Array of Double | Zero or one (optional) |
| features  $.features | Collection of EarthObservation (Feature) objects as defined by [NR2].  It is possible for the Array to be empty. | Range: Array of Feature | Zero or more (optional) |

Table 24: FeatureCollection object properties

Example 36: FeatureCollection encoding example (GeoJSON)

{

“type”: “FeatureCollection”,

“features”: [

{

“type”: “Feature”,

“id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/geo%2Bjson&parentIdentifier=EOP:ESA:OADS:SEA\_GEC\_1P&uid=SE1\_OPER\_SEA\_GEC\_1P\_19780810T062657\_19780810T062712\_000633\_0147\_1101\_1957”,

...

},

{

“type”: “Feature”,

“id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/geo%2Bjson&parentIdentifier=EOP:ESA:OADS:SEA\_GEC\_1P&uid=SE1\_OPER\_SEA\_GEC\_1P\_19780810T062801\_19780810T062816\_000633\_0147\_1177\_0594”,

...

}

]

}

# Extensibility

## Additional properties

In the current EO Dataset Metadata GeoJSON(-LD) Encoding Standard, an “extension” is any property, or object type not defined by the Earth Observation Dataset Metadata Vocabulary in the current document. Consuming implementations that encounter unfamiliar extensions shall not stop processing or signal an error and shall continue processing the items as if those properties were not present. Note that support for extensions can vary across implementations and no normative processing model for extensions is defined. Accordingly, implementations that rely too heavily on the use of extensions may experience reduced interoperability with other implementations.

For extensions, JSON-LD [NR3] is used as the primary mechanism for defining and disambiguating extensions. Implementations that wish to fully support extensions should use JSON-LD mechanisms.

It is important to note that the JSON-LD Processing Algorithms [OR13], as currently defined, will silently ignore any property not defined in a JSON-LD @context. Implementations that publish EO Dataset Metadata documents containing extension properties should provide a @context definition for all extensions.

Although JSON objects are extendable by default, it is good practice to group “additional attributes” or “vendor specific information” in the AdditionalAttributes object. See DataIdentification properties (Table 9) in section 7.3.

Example 37: AdditionalAttributes encoding example

{

...

“properties”: {

“parentIdentifier”: “urn:ogc:def:EOP:VITO:PROBAV\_L2A\_1KM\_V001”,

“doi”: “”,

“title”: “urn:ogc:def:EOP:VITO:PROBAV\_L2A\_1KM\_V001:PROBAV\_CENTER\_L2A\_20161206\_001317\_1KM:V101”,

“identifier”: “urn:ogc:def:EOP:VITO:PROBAV\_L2A\_1KM\_V001:PROBAV\_CENTER\_L2A\_20161206\_001317\_1KM:V101”,

« date » : « 2016-12-06T00 :13 :17Z/2016-12-06T00 :14 :01Z »,

« updated » : « 2017-05-05T12 :51 :16Z »,

“additionalAttributes”: {

“productDescription”: “PROBA-VEGETATION Level2A Top Of Atmosphere Segment at 1KM resolution”,

“northPoleIndicator”: false,

“southPoleIndicator”: false,

“iCPGeometric”: “PROBAV\_ICP\_GEOMETRIC#CENTER\_20160208\_V01”,

“iCPGeometricValidity”: “2016-02-08T00:00:00Z”,

“iCPGeometricVersion”: “01”,

“iCPRadiometric”: “PROBAV\_ICP\_GEOMETRIC#CENTER\_20160208\_V01”,

« iCPRadiometricValidity » : « 2016-02-08T00 :00 :00Z »,

« iCPRadiometricVersion » : « 01 »,

« landPercentage » : 3.413,

“missingDataPercentage”: 0.000,

“cameraID”: “CENTER”,

“isSampleImage”: false,

“mapProjectionReference”: “GEOGRAPHIC\_LAT\_LON”

}

}

}

JSON-LD mechanisms can be used to define the extensions as shown in the following examples.

Example 38: AdditionalAttributes encoding example (GeoJSON)

{

« @context » : {

« vgt » : « https ://pdfintegration.vgt.vito.be/ »,

…

« productDescription » : « vgt :productDescription »,

« northPoleIndicator » : « vgt :northPoleIndicator »,

« southPoleIndicator » : « vgt :southPoleIndicator »,

« iCPGeometric » : « vgt :iCPGeometric »,

« iCPGeometricValidity » : « vgt :iCPGeometricValidity »

…

},

…

« properties » : {

« parentIdentifier » : « urn :ogc :def :EOP :VITO :PROBAV\_L2A\_1KM\_V001 »,

“doi”: “”,

“title”: “urn:ogc:def:EOP:VITO:PROBAV\_L2A\_1KM\_V001:PROBAV\_CENTER\_L2A\_20161206\_001317\_1KM:V101”,

“identifier”: “urn:ogc:def:EOP:VITO:PROBAV\_L2A\_1KM\_V001:PROBAV\_CENTER\_L2A\_20161206\_001317\_1KM:V101”,

« date » : « 2016-12-06T00 :13 :17Z/2016-12-06T00 :14 :01Z »,

« updated » : « 2017-05-05T12 :51 :16Z »,

“additionalAttributes”: {

“productDescription”: “PROBA-VEGETATION Level2A Top Of Atmosphere Segment at 1KM resolution”,

“northPoleIndicator”: false,

“southPoleIndicator”: false,

“iCPGeometric”: “PROBAV\_ICP\_GEOMETRIC#CENTER\_20160208\_V01”,

“iCPGeometricValidity”: “2016-02-08T00:00:00Z”,

...

}

}

}

Example 39: AdditionalAttributes encoding example (JSON-LD)

{

“@context”: {

...

“vgt”: “https://pdfintegration.vgt.vito.be/”,

...

},

...

“gj:properties”: {

“eop:parentIdentifier”: “urn:ogc:def:EOP:VITO:PROBAV\_L2A\_1KM\_V001”,

“eop:doi”: “”,

“dct:title”: “urn:ogc:def:EOP:VITO:PROBAV\_L2A\_1KM\_V001:PROBAV\_CENTER\_L2A\_20161206\_001317\_1KM:V101”,

“dct:identifier”: “urn:ogc:def:EOP:VITO:PROBAV\_L2A\_1KM\_V001:PROBAV\_CENTER\_L2A\_20161206\_001317\_1KM:V101”,

« dct :date » : « 2016-12-06T00 :13 :17Z/2016-12-06T00 :14 :01Z »,

“dct:modified”: “2017-05-05T12:51:16Z”,

“eop:additionalAttributes”: {

“vgt:productDescription”: “PROBA-VEGETATION Level2A Top Of Atmosphere Segment at 1KM resolution”,

“vgt:northPoleIndicator”: false,

“vgt:southPoleIndicator”: false,

“vgt:iCPGeometric”: “PROBAV\_ICP\_GEOMETRIC#CENTER\_20160208\_V01”,

“vgt:iCPGeometricValidity”: “2016-02-08T00:00:00Z”,

...

}

}

}

## JSON-specific constructs

Please note that there are valid JSON constructs which cannot be used within a JSON-LD document. For instance, JSON-LD forbids “arrays of arrays” as used by the GeoJSON specification. While implementations are free to use such constructs as extensions within an EO Dataset Metadata document, consumers that use the standard JSON-LD Processing Algorithms will be required to either ignore such extensions or map those to alternative compatible constructs prior to applying the JSON-LD algorithms. Complex geometries can be converted to GeoSPARQL [OR7] “Well-Known Text” representations as illustrated in the non-normative example below:

Example 40: JSON-LD encoding example using GeoSPARQL

{

“@context”: {

“gj”: “https://purl.org/geojson/vocab#”,

“gsp”: “http://www.opengis.net/ont/geosparql#”,

“eop”: “http://www.opengis.net/ont/eo-geojson/1.0/”

},

“@type”: [

“gj:Feature”,

“gsp:Feature”,

“eop:EarthObservation”

],

“@id”: “http://fedeo.esa.int/opensearch/request/?parentIdentifier=SEA\_GEC\_1P&uid=SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F”,

“gsp:hasGeometry”: {

“gsp:asWKT”: “Polygon((-2.682513, 63.261372, -2.695740, 61.997604, 0.005087, 61.965195, 0.135472, 63.227173, -2.682513, 63.261372))”,

“@type”: “gsp:Geometry”

},

“gj:properties”: {}

}

# Media Types for any data encoding(s)

When EO Dataset Metadata is delivered using HTTP, the following MIME media types shall be used:

|  |  |
| --- | --- |
| **Media type** | **Description** |
| application/geo+json | GeoJSON representation with implicit normative context or normative context linked via a http://www.w3.org/ns/json-ld#context HTTP Link Header.  See examples in annexes D.1.\*.2. |
| application/ld+json ;profile= » <http://www.w3.org/ns/json-ld#compacted> » | GeoJSON-LD representation compacted according to the normative context and with all context information within the body of the document.  See examples in annexes D.1.\*.3. |
| application/ld+json | GeoJSON-LD representation with all context information within the body of the document.  See examples in annexes D.1.\*.4. |

Table 25: Media types

# Future Work (Non-Normative)

Several future enhancements of this proposed document are possible. Obvious enhancements are:

* Refactor and refine JSON Schema [OR18] in Annex E for documentation and structural validation by referring to external JSON schema for GeoJSON and OWS Context (OGC 14-055r2); and
* Encoding for EO dataset series.

1. Abstract Test Suite (Normative)
2. Introduction

Conformance is tested using a set of JSON Schema [OR18] definitions which formalize the requirements described above. Strictly, each object definition is a “JSON Schema,” so a JSON schema document may include multiple, sometimes nested, “JSON Schemas,” providing the definition of the objects. Using JSON References, JSON schema supports inclusion of schemas defined in a JSON schema document into new schemas defined in the same or another document, so standard JSON objects may be defined once and re-used in multiple contexts, and a set of related object definitions may be composed from multiple documents.

The dependencies of the EO-GeoJSON requirement classes (green) and requirements (orange) correspond to the dependencies of the JSON schema definitions as shown in the Figure below. Arrows indicate dependencies.



Figure 33: Conformance and requirements class dependencies

1. Conformance Class: /conf/core

Entire JSON objects defined by the current specification are either individual earthobervation objects or collections of earthobservation objects (i.e., an earthobservation-collection object).

|  |  |
| --- | --- |
| **Conformance Class** | **/conf/core** |
| **Requirements** | /req/earthobservation  /req/earthobservation-collection |
| **Dependency** | A JSON Schema Validator |
| **Test** | /conf/earthobservation |
| /conf/earthobservation-collection |

1. Conformance Class : /conf/earthobservation

|  |  |  |
| --- | --- | --- |
| **Conformance Class** | **/conf/earthobservation** | |
| **Requirements** | /req/earthobservation | |
| **Dependency** | A JSON Schema Validator | |
| **Test** | /conf/earthobservation | |
| **Requirement** | **req/earthobservation/properties,**  **[req/geometry],  [req/properties].** |
| **Test purpose** | Verify that the JSON instance document is a valid EarthObservation object. |
| **Test method** | Validate the JSON instance document using the appropriate object definition from the JSON Schema (Annex E:). Pass if no errors reported. Fail otherwise. |
| **Test type** | Capability |

1. Conformance Class: /conf/properties

|  |  |  |
| --- | --- | --- |
| **Conformance Class** | **/conf/properties** | |
| **Requirements** | /req/properties | |
| **Dependency** | A JSON Schema Validator | |
| **Test** | /conf/properties | |
| **Requirement** | **req/properties/properties,**  **req/properties/metadata-information,**  **req/properties/data-identification,**  **[req/offering],**  **[req/acquisition-information],**  **[req/product-information],**  **[req/metadata-information],**  **[req/data-identification],**  **[req/links].** |
| **Test purpose** | Verify that the JSON instance document is a valid Properties object. |
| **Test method** | Validate the JSON instance document using the appropriate object definition from the JSON Schema (Annex E:). Pass if no errors reported. Fail otherwise. |
| **Test type** | Capability |

1. Conformance Class: /conf/links

|  |  |  |
| --- | --- | --- |
| **Conformance Class** | **/conf/links** | |
| **Requirements** | /req/links | |
| **Dependency** | A JSON Schema Validator | |
| **Test** | /conf/links | |
| **Requirement** | **req/links/properties,**  **req/link** |
| **Test purpose** | Verify that the JSON instance document is a valid Links object. |
| **Test method** | Validate the JSON instance document using the appropriate object definition from the JSON Schema (Annex E:). Pass if no errors reported. Fail otherwise. |
| **Test type** | Capability |

1. Conformance Class: /conf/offering

|  |  |  |
| --- | --- | --- |
| **Conformance Class** | **/conf/offering** | |
| **Requirements** | /req/offering | |
| **Dependency** | A JSON Schema Validator | |
| **Test** | /conf/offering | |
| **Requirement** | **req/offering/properties,**  **req/operation** |
| **Test purpose** | Verify that the JSON instance document is a valid Offering object as defined in OGC 14-055r2 [NR5]. |
| **Test method** | Validate the JSON instance document using the appropriate object definition from the JSON Schema (Annex E:). Pass if no errors reported. Fail otherwise. |
| **Test type** | Capability |

1. Conformance Class: /conf/metadata-information

|  |  |  |
| --- | --- | --- |
| **Conformance Class** | **/conf/metadata-information** | |
| **Requirements** | /req/metadata-information | |
| **Dependency** | A JSON Schema Validator | |
| **Test** | /conf/metadata-information | |
| **Requirement** | **req/metadata-information/properties** |
| **Test purpose** | Verify that the JSON instance document is a valid MetadataInformation object. |
| **Test method** | Validate the JSON instance document using the appropriate object definition from the JSON Schema (Annex E:). Pass if no errors reported. Fail otherwise. |
| **Test type** | Capability |

1. Conformance Class: /conf/data-identification

|  |  |  |
| --- | --- | --- |
| **Conformance Class** | **/conf/data-identification** | |
| **Requirements** | /req/data-identification | |
| **Dependency** | A JSON Schema Validator | |
| **Test** | /conf/data-identification | |
| **Requirement** | **req/data-identification/properties** |
| **Test purpose** | Verify that the JSON instance document is a valid DataIdentification object. |
| **Test method** | Validate the JSON instance document using the appropriate object definition from the JSON Schema (Annex E:). Pass if no errors reported. Fail otherwise. |
| **Test type** | Capability |

1. Conformance Class: /conf/geometry

|  |  |  |
| --- | --- | --- |
| **Conformance Class** | **/conf/geometry** | |
| **Requirements** | /req/geometry | |
| **Dependency** | A JSON Schema Validator | |
| **Test** | /conf/geometry | |
| **Requirement** | **req/geometry/properties** |
| **Test purpose** | Verify that any objects within the document with a “type” property that matches one of the types from GeoJSON conforms to the GeoJSON format [NR2]. |
| **Test method** | Validate the JSON instance document using the appropriate object definition from the JSON Schema (Annex E:). Pass if no errors reported. Fail otherwise. |
| **Test type** | Capability |

1. Conformance Class: /conf/acquisition-information

|  |  |  |
| --- | --- | --- |
| **Conformance Class** | **/conf/acquisition-information** | |
| **Requirements** | /req/acquisition-information | |
| **Dependency** | A JSON Schema Validator | |
| **Test** | /conf/acquisition-information | |
| **Requirement** | **req/acquisition-information/properties,  req/platform,  req/instrument, [req/instrument-parameters],  [req/acquisition-parameters].** |
| **Test purpose** | Verify that the JSON instance document is a valid AcquisitionInformation object. |
| **Test method** | Validate the JSON instance document using the appropriate object definition from the JSON Schema (Annex E:). Pass if no errors reported. Fail otherwise. |
| **Test type** | Capability |

1. Conformance Class: /conf/acquisition-parameters

|  |  |  |
| --- | --- | --- |
| **Conformance Class** | **/conf/acquisition-parameters** | |
| **Requirements** | /req/acquisition-parameters | |
| **Dependency** | A JSON Schema Validator | |
| **Test** | /conf/acquisition-parameters | |
| **Requirement** | **req/acquisition-parameters/properties,**  **req/acquisition-parameters/vertical-spatial-domain,**  **req/acquisition-parameters/orbit-parameters,**  **req/acquisition-parameters/temporal-information,**  **req/wavelength-information,**  **req/acquisition-angles,**  **req/vertical-spatial-domain,**  **req/orbit-parameters,**  **req/temporal-information.** |
| **Test purpose** | Verify that the JSON instance document is a valid AcquisitionParameters object. |
| **Test method** | Validate the JSON instance document using the appropriate object definition from the JSON Schema (Annex E:). Pass if no errors reported. Fail otherwise. |
| **Test type** | Capability |

1. Conformance Class: /conf/product-information

|  |  |  |
| --- | --- | --- |
| **Conformance Class** | **/conf/product-information** | |
| **Requirements** | /req/product-information | |
| **Dependency** | A JSON Schema Validator | |
| **Test** | /conf/product-information | |
| **Requirement** | **req/product-information/properties,**  **req/product-information/processing-information,**  **req/product-information/coverage-description,**  **req/quality-information,**  **req/processing-information,**  **req/coverage-description.** |
| **Test purpose** | Verify that the JSON instance document is a valid ProductInformation object. |
| **Test method** | Validate the JSON instance document using the appropriate object definition from the JSON Schema (Annex E:). Pass if no errors reported. Fail otherwise. |
| **Test type** | Capability |

1. Conformance Class: /conf/earthobservation-collection

|  |  |  |
| --- | --- | --- |
| **Conformance Class** | **/conf/earthobservation-collection** | |
| **Requirements** | /req/earthobservation-collection | |
| **Dependency** | A JSON Schema Validator | |
| **Test** | /conf/earthobservation-collection | |
| **Requirement** | **req/earthobservation-collection/properties,**  **[req/earthobservation].** |
| **Test purpose** | Verify that the JSON instance document is a valid EarthObservationColllection object. |
| **Test method** | Validate the JSON instance document using the appropriate object definition from the JSON Schema (Annex E:). Pass if no errors reported. Fail otherwise. |
| **Test type** | Capability |

1. Interpreting JSON as JSON-LD (Non-Normative)

The JSON-LD encoding proposed in this annex supports a seamless transition from GeoJSON based implementations to JSON-LD based implementations with a minimum number of edits. The GeoJSON encoding proposed can be interpreted as JSON-LD by JSON-LD-aware implementations through the use of the normative @context document provided in this annex.

B.1 Introduction

B.1.1 JSON-LD

The serialized GeoJSON form of an EO Dataset Metadata document shall be consistent with what would be produced by the standard JSON-LD 1.0 Processing Algorithms and API [OR13] Compaction Algorithm using, at least, the normative JSON-LD @context definition provided in „Annex B: normative JSON-LD @context definition“. Implementations may augment the provided @context with additional @context definitions but shall not override or change the normative context. Implementations may also use additional properties and values not defined in the JSON-LD @context with the understanding that any such properties will likely be unsupported and ignored by consuming implementations that use the standard JSON-LD algorithms. See the Extensibility section for more information on handling extensions within EO Dataset Metadata documents.

JSON-LD uses the special @context property to define the processing context. The value of the @context property is defined by the JSON-LD specification. Implementations producing EO Dataset Metadata documents should include a @context property with a value that includes a reference to the normative JSON-LD @context definition using the URL „https://www.opengis.net/eo-geojson/1.0“. Implementations may use the alternative URL „http:// www.opengis.net/eo-geojson/1.0“ instead.

When a JSON-LD enabled EO Dataset Metadata implementation encounters a GeoJSON document identified using the „application/geo+json“ MIME media type, and that document does not contain a @context property whose value includes a reference to the normative JSON-LD @context definition, the implementation shall assume that the normative @context definition still applies.

Alternatively, implementations can refer to the normative JSON-LD context document via an HTTP Link header as described in section 6.8 of the JSON-LD specification [NR3]. This allows the GeoJSON documents to be unambiguously machine readable as JSON-LD.

**Example 41: Referencing a JSON-LD context from a GeoJSON document**

GET /document.json HTTP/1.1

Host: example.com

Accept: application/ld+json,application/geo+json,\*/\*;q=0.1

HTTP/1.1 200 OK

...

Content-Type: application/geo+json

Link: <https://www.opengis.net/eo-geojson/1.0>; rel=”http://www.w3.org/ns/json-ld#context”; type=”application/ld+json”

{

. . .

}

B.1.2 Semantic Web and JSON-LD

The W3C Semantic Web Activity is defining a collection of technologies that enables a “Web of data” where information is easily shared and reused across applications. Some key pieces of this technology stack are the RDF (Resource Description Framework), RDFS (RDF Schema) data models [OR9, OR10] and JSON-LD [NR3]. The JSON-LD encoding proposed in the current document can be interpreted as the proposed encoding in RDF for EO Dataset Metadata. Each *JSON(-LD) property* proposed corresponds to an RDF predicate which is represented with a URI.



Figure 34: RDF Triple

RDF is a data model built on edge-node “graphs.” Each link in a graph consists of three things (with many aliases depending on the mapping from other types of data models):

* Subject (start node, instance, entity, feature)
* Predicate (verb, property, attribute, relationship, link)
* Object (value, end node, non-literal values can be used as a Subject)

Any of the three values in a single triple can be represented via a URI (with an optional fragment identifier). Subjects and objects are called nodes. Objects can also be represented as a literal value. Note that the same node may play the role of a Subject in some edges, and the role of the Object in others.

All proposed properties are defined (via a normative @context document) with an URI from existing, well-known, vocabularies where available, e.g., Dublin Core (dct☺, GeoJSON-LD (gj☺, Atom (atom☺, OGC Web Context (owc☺ etc. Only vocabulary items specific to EO (namespace eop) are defined in addition in the current specification (in Annex B.3).

In the proposed specification, the “id” JSON property (or “@id” JSON-LD property) corresponds to a URI representing a Subject or Object (e.g., of type eop:Platform or eop:Instrument).

B.2 JSON-LD @context definition

B.2.1 JSON-LD 1.1

The current annex provides the normative JSON-LD @context which is implied by the GeoJSON encoding as explained above. It is available at <http://schemas.opengis.net/eo-geojson/1.0/eo-geojson.jsonld> (See Annex E:).

JSON-LD 1.1 [OR32] aware clients can apply this JSON-LD @context to interpret the GeoJSON encoding as JSON-LD. The context relies on JSON-LD 1.1 specific features, in particular „scoped contexts“ and „nested properties“. The expressiveness of JSON-LD 1.0 @context is too limited to isolate the required context information to support compacting and expansion in a single external context document. It would require inserting inline contexts in the GeoJSON encoding.

{

„@context“: {

„@version“: 1.1,

„@vocab“: „http://www.opengis.net/ont/eo-geojson/1.0/“,

“xsd”: “http://www.w3.org/2001/XMLSchema#”,

“dct”: “http://purl.org/dc/terms/”,

“atom”: “http://www.w3.org/2005/Atom/”,

“iana”: “http://www.iana.org/assignments/relation/”,

“eop”: “http://www.opengis.net/ont/eo-geojson/1.0/”,

“epsg”: “http://www.opengis.net/def/crs/EPSG/0/”,

“owc”: “http://www.opengis.net/ont/owc/1.0/”,

“gj”: “https://purl.org/geojson/vocab#”,

“gsp”: “http://www.opengis.net/ont/geosparql#”,

“ical”: “http://www.w3.org/2002/12/cal/ical#”,

“media”: “http://search.yahoo.com/mrss/”,

“title”: “dct:title”,

« identifier » : « dct :identifier »,

« format » : « dct :format »,

« lang » : {

« @id » : « dct :language »,

« @type » : « @id »,

« @context » : {

« @base » : « http ://id.loc.gov/vocabulary/iso639-1/ »

}

},

“kind”: {

“@id”: “dct:type”,

“@type”: “@id”

},

“updated”: “dct:modified”,

“published”: “dct:issued”,

“creator”: “dct:creator”,

“description”: “dct:description”,

“date”: “dct:date”,

“created”: “dct:created”,

“available”: “dct:available”,

“up”: “iana:up”,

“via”: “iana:via”,

“data”: “iana:enclosure”,

“related”: “iana:related”,

“profiles”: “iana:profile”,

“links”: “@nest”,

“Links”: “owc:Links”,

“Offering”: “owc:Offering”,

“offerings”: {

“@id”: “owc:offerings”,

“@context”: {

“@vocab”: “http://www.opengis.net/ont/owc/1.0/”,

« code » : {

« @id » : « owc :code »,

« @type » : « @id »

}

}

},

“Link”: “atom:link”,

“previews”: “iana:icon”,

“alternates”: “iana:alternate”,

“qualityReport”: “iana:describedby”,

“href”: “@id”,

“mediaType”: “atom:type”,

“productVersion”: “eop:version”,

“beginningDateTime”: “ical:dtstart”,

“endingDateTime”: “ical:dtend”,

“expression”: “media:expression”,

“category”: {

“@id”: “media:category”,

“@type”: “@id”,

“@context”: {

“@base”: “http://www.opengis.net/ont/eo-geojson/1.0/”

}

},

“hasGeometry”: “gsp:hasGeometry”,

“asWKT”: “gsp:asWKT”,

“Feature”: “gj:Feature”,

“FeatureCollection”: “gj:FeatureCollection”,

“GeometryCollection”: “gj:GeometryCollection”,

“LineString”: “gj:LineString”,

“MultiLineString”: “gj:MultiLineString”,

“MultiPoint”: “gj:MultiPoint”,

« MultiPolygon » : « gj :MultiPolygon »,

« Point » : « gj :Point »,

« Polygon » : « gj :Polygon »,

« bbox » : {

« @container » : « @list »,

« @id » : « gj :bbox »

},

“coordinates”: “gj:coordinates”,

“features”: {

“@container”: “@set”,

“@id”: “gj:features”

},

“geometry”: “gj:geometry”,

“id”: “@id”,

“properties”: “@nest”,

“additionalAttributes”: “@nest”,

“type”: “@type”,

“links”: {

“@id”: “owc:links”,

“@context”: {

“@vocab”: “http://www.iana.org/assignments/relation/”,

“type”: “atom:type”

}

},

“operations”: {

“@id”: “owc:operations”,

“@context”: {

“href”: “owc:href”,

“code”: “owc:code”,

“type”: “owc:type”

}

},

“contents”: {

“@id”: “owc:contents”,

“@context”: {

“type”: “owc:type”

}

},

“conformsTo”: {

“@type”: “@id”,

“@id”: “dct:conformsTo”

},

“referenceSystemIdentifier”: {

“@type”: “@id”

},

“acquisitionType”: {

“@type”: “@id”,

“@context”: {

“@base”: “http://www.opengis.net/ont/eo-geojson/1.0/AcquisitionType/”

}

},

“antennaLookDirection”: {

“@type”: “@id”,

“@context”: {

“@base”: “http://www.opengis.net/ont/eo-geojson/1.0/”

}

},

“discreteWavelengths”: “eop:discreteWavelength”,

“highestLocation”: “eop:maximumAltitude”,

“locationUnit”: {

“@id”: “eop:altitudeUnit”,

“@type”: “@vocab”,

“@context”: {

“m”: “http://www.opengis.net/ont/eo-geojson/1.0/Unit/Meter”,

“bar”: “http://www.opengis.net/ont/eo-geojson/1.0/Unit/Bar”

}

},

“lowestLocation”: “eop:minimumAltitude”,

“measurementType”: {

“@type”: “@id”,

“@context”: {

“@base”: “http://www.opengis.net/ont/eo-geojson/1.0/”

}

},

“orbitDirection”: {

“@type”: “@id”,

“@context”: {

“@base”: “http://www.opengis.net/ont/eo-geojson/1.0/”

}

},

“orbitType”: {

“@type”: “@id”,

“@context”: {

“@base”: “http://www.opengis.net/ont/eo-geojson/1.0/”

}

},

« polarisationChannels » : {

« @type » : « @id »,

« @context » : {

« @base » : « http ://www.opengis.net/ont/eo-geojson/1.0/PolarisationChannels/ »

}

},

« polarisationMode » : {

« @type » : « @id »,

« @context » : {

« @base » : « http ://www.opengis.net/ont/eo-geojson/1.0/PolarisationMode/ »

}

},

« samplingRates » : « eop :samplingRate »,

« sensorType » : {

« @type » : « @id »,

« @context » : {

« @base » : « http ://www.opengis.net/ont/eo-geojson/1.0/ »

}

},

« spectralRange » : {

« @type » : « @id »,

« @context » : {

« @base » : « http ://www.opengis.net/ont/eo-geojson/1.0/SpectralRange/ »

}

},

« status » : {

« @type » : « @id »,

« @context » : {

« @base » : « http ://www.opengis.net/ont/eo-geojson/1.0/ »

}

}

}

}

B.3 RDF Schema Vocabulary Definition

A non-normative definition of the EO Dataset GeoJSON vocabulary is provided [here](http://geo.spacebel.be/opensearch/json.html) and/or at the namespace as a convenience for implementers wishing to use RDF mechanisms for processing EO Dataset GeoJSON(-LD). Note, however, that this document provides the normative definition of the vocabulary.

The vocabulary relies on the proposed OWC GeoJSON Vocabulary which is presented in section B.3.2.

B.3.1 EO GeoJSON Vocabulary

The information is best viewed using on-line tools such as Parrot[[17]](#footnote-17), Lode[[18]](#footnote-18) or WIDOCO[[19]](#footnote-19).

**@prefix** dc: **<http://purl.org/dc/elements/1.1/> .**

**@prefix** dcterms: **<http://purl.org/dc/terms/> .**

**@prefix** eop: **<http://www.opengis.net/ont/eo-geojson/1.0/> .**

**@prefix** ianarel: **<http://www.iana.org/assignments/relation/> .**

**@prefix** media: **<http://search.yahoo.com/mrss/> .**

**@prefix** owc: **<http://www.opengis.net/ont/owc/1.0/> .**

**@prefix** owl: **<http://www.w3.org/2002/07/owl#> .**

**@prefix** rdf: **<http://www.w3.org/1999/02/22-rdf-syntax-ns#> .**

**@prefix** rdfs: **<http://www.w3.org/2000/01/rdf-schema#> .**

**@prefix** skos : **<http ://www.w3.org/2004/02/skos/core#> .**

**@prefix** vann: **<http://purl.org/vocab/vann/> .**

**@prefix** void : **<http ://rdfs.org/ns/void#> .**

**@prefix** xml: **<http://www.w3.org/XML/1998/namespace> .**

**@prefix** xsd: **<http://www.w3.org/2001/XMLSchema#> .**

**media:category** a owl:ObjectProperty ;

rdfs:label “category” ;

dc:description “””Media category of the related resource which corresponds to a preview or mask:

- THUMBNAIL

- QUICKLOOK

- ALBUM

- SNOW

- CLOUD

- QUALITY

Only applicable for media resources.”””;

dcterms:source “OGC 17-003, MediaRSS”^^xsd:string ;

rdfs:isDefinedBy media: ;

rdfs:seeAlso <http://www.rssboard.org/media-rss#media-category> .

**media:expression** a owl:DatatypeProperty ;

rdfs:label “expression” ;

dc:description “Determines if the related resource is a sample or the full version of the product. Use \”full\” for “product/ProductInformation/”. Use \”sample\” for \”browse/BrowseInformation/\” or \”mask/MaskInformation/\”.” ;

dcterms:source “OGC 17-003, MediaRSS”^^xsd:string ;

rdfs:isDefinedBy media: ;

rdfs:seeAlso <http://www.rssboard.org/media-rss#media-content> .

**ianarel:describedby** a owl:ObjectProperty ;

rdfs:label “qualityReport” ;

dc:description “Reference to the location of a related quality report as defined by OGC 14-055r2 §7.1.2.” ;

dcterms:source “OGC 17-003, OGC 14-055r2”^^xsd:string ;

rdfs:isDefinedBy eop: ;

rdfs:seeAlso <https://tools.ietf.org/html/rfc5988> .

**ianarel:related** a owl:ObjectProperty ;

rdfs:label “related” ;

dc:description “Reference to the location of a related resource, e.g., cloud mask, snow mask.” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:isDefinedBy eop: ;

rdfs:seeAlso <https://tools.ietf.org/html/rfc5988> .

**ianarel:up** a owl:ObjectProperty ;

rdfs:label “up” ;

dc:description “Reference to the metadata of higher level resource (e.g., Collection, also identified by parentIdentifier) resource.” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:isDefinedBy eop: ;

rdfs:seeAlso <https://tools.ietf.org/html/rfc5988> .

**eop:ABSORPTION** a eop:MeasurementType ;

dc:description “Measurement type constant.” .

**eop:ACQUIRED** a eop:StatusType ;

dc :description « Acquisition status constant. » .

**eop:ALBUM** a eop:CategoryType ;

dc:description “Category constant.” .

**eop:ALTIMETRIC** a eop:SensorType ;

dc :description « Sensor type constant. » .

**eop:ARCHIVED** a eop:StatusType ;

dc :description « Acquisition status constant. » .

**eop:ASCENDING** a eop:OrbitDirectionType ;

dc :description « Orbit direction constant. » .

**eop:ATMOSPHERIC** a eop:SensorType ;

dc :description « Sensor type constant. » .

**<http ://www.opengis.net/ont/eo-geojson/1.0/AcquisitionType/CALIBRATION>** a eop :AcquisitionType ;

dc :description « Acquisition type constant. » .

**<http ://www.opengis.net/ont/eo-geojson/1.0/AcquisitionType/NOMINAL>** a eop :AcquisitionType ;

dc :description « Acquisition type constant. » .

**<http ://www.opengis.net/ont/eo-geojson/1.0/AcquisitionType/OTHER>** a eop :AcquisitionType ;

dc :description « Acquisition type constant. » .

**eop:CANCELLED** a eop:StatusType ;

dc :description « Acquisition status constant. » .

**eop:CLOUD** a eop:CategoryType ;

dc:description “Category constant.” .

**eop:DESCENDING** a eop:OrbitDirectionType ;

dc :description « Orbit direction constant. » .

**eop:EMISSION** a eop:MeasurementType ;

dc:description “Measurement type constant.” .

**eop:EarthObservation** a owl:Class ;

rdfs:label “EarthObservation” ;

vann:example “””

{

“@context”: “https://www.opengis.net/eo-geojson/1.0”,

“type”: “Feature”,

“id”: <http://fedeo.esa.int/opensearch/request/?parentIdentifier=SEA_GEC_1P&uid=SE1_OPER_SEA_GEC_1P_19780927T010430_19780927T010445_001316_0000_2267_9B4F>”,

“bbox”: [

-2.69574,

61.965195,

0.135472,

63.261372

],

“geometry”: {...},

“properties”: {...}

}

“””;

rdfs:comment “ Earth Observation as defined in OGC 10-157r4” ;

rdfs:isDefinedBy eop: ;

rdfs:subClassOf <http://purl.org/geojson/vocab#Feature> .

**eop:FAILED** a eop:StatusType ;

dc :description « Acquisition status constant. » .

**eop:GEO** a eop:OrbitType ;

dc :description « Orbit type constant. » .

**eop:LEFT** a eop:AntennaLookDirectionType ;

dc:description “Antenna look direction constant.” .

**eop:LEO** a eop:OrbitType ;

dc:description “Orbit type constant.” .

**eop:LIMB** a eop:SensorType ;

dc :description « Sensor type constant. » .

**eop:OPTICAL** a eop:SensorType ;

dc :description « Sensor type constant. » .

**eop:PLANNED** a eop:StatusType ;

dc :description « Acquisition status constant. » .

**eop:POTENTIAL** a eop:StatusType ;

dc :description « Acquisition status constant. » .

**<http ://www.opengis.net/ont/eo-geojson/1.0/PolarisationChannels/HH>** a eop :PolarisationChannelsType ;

dc :description « Polarisation channel constant. » .

**<http ://www.opengis.net/ont/eo-geojson/1.0/PolarisationChannels/HH\_HV>** a eop :PolarisationChannelsType ;

dc :description « Polarisation channel constant. » .

**<http ://www.opengis.net/ont/eo-geojson/1.0/PolarisationChannels/HH\_HV\_VH\_VV>** a eop :PolarisationChannelsType ;

dc :description « Polarisation channel constant. » .

**<http ://www.opengis.net/ont/eo-geojson/1.0/PolarisationChannels/HH\_VH>** a eop :PolarisationChannelsType ;

dc :description « Polarisation channel constant. » .

**<http ://www.opengis.net/ont/eo-geojson/1.0/PolarisationChannels/HH\_VV>** a eop :PolarisationChannelsType ;

dc :description « Polarisation channel constant. » .

**<http ://www.opengis.net/ont/eo-geojson/1.0/PolarisationChannels/HV>** a eop :PolarisationChannelsType ;

dc :description « Polarisation channel constant. » .

**<http ://www.opengis.net/ont/eo-geojson/1.0/PolarisationChannels/HV\_VH>** a eop :PolarisationChannelsType ;

dc :description « Polarisation channel constant. » .

**<http ://www.opengis.net/ont/eo-geojson/1.0/PolarisationChannels/UNDEFINED>** a eop :PolarisationChannelsType ;

dc :description « Polarisation channel constant. » .

**<http ://www.opengis.net/ont/eo-geojson/1.0/PolarisationChannels/VH>** a eop :PolarisationChannelsType ;

dc :description « Polarisation channel constant. » .

**<http ://www.opengis.net/ont/eo-geojson/1.0/PolarisationChannels/VH\_HV>** a eop :PolarisationChannelsType ;

dc :description « Polarisation channel constant. » .

**<http ://www.opengis.net/ont/eo-geojson/1.0/PolarisationChannels/VH\_VV>** a eop :PolarisationChannelsType ;

dc :description « Polarisation channel constant. » .

**<http ://www.opengis.net/ont/eo-geojson/1.0/PolarisationChannels/VV>** a eop :PolarisationChannelsType ;

dc :description « Polarisation channel constant. » .

**<http ://www.opengis.net/ont/eo-geojson/1.0/PolarisationChannels/VV\_HV>** a eop :PolarisationChannelsType ;

dc :description « Polarisation channel constant. » .

**<http ://www.opengis.net/ont/eo-geojson/1.0/PolarisationChannels/VV\_VH>** a eop :PolarisationChannelsType ;

dc :description « Polarisation channel constant. » .

**<http ://www.opengis.net/ont/eo-geojson/1.0/PolarisationMode/D>** a eop :PolarisationModeType ;

dc :description « Polarisation mode constant. » .

**<http ://www.opengis.net/ont/eo-geojson/1.0/PolarisationMode/Q>** a eop :PolarisationModeType ;

dc :description « Polarisation mode constant. » .

**<http ://www.opengis.net/ont/eo-geojson/1.0/PolarisationMode/S>** a eop :PolarisationModeType ;

dc :description « Polarisation mode constant. » .

**<http ://www.opengis.net/ont/eo-geojson/1.0/PolarisationMode/T>** a eop :PolarisationModeType ;

dc :description « Polarisation mode constant. » .

**<http ://www.opengis.net/ont/eo-geojson/1.0/PolarisationMode/UNDEFINED>** a eop :PolarisationModeType ;

dc :description « Polarisation mode constant. » .

**eop:QUALITY** a eop:CategoryType ;

dc:description “Category constant.” .

**eop:QUALITYDEGRADED** a eop:StatusType ;

dc :description « Acquisition status constant. » .

**eop:QUICKLOOK** a eop:CategoryType ;

dc:description “Category constant.” .

**eop:RADAR** a eop:SensorType ;

dc:description “Sensor type constant.” .

**eop:REJECTED** a eop:StatusType ;

dc:description “Acquisition status constant.” .

**eop:RIGHT** a eop:AntennaLookDirectionType ;

dc:description “Antenna look direction constant.” .

**eop:SNOW** a eop:CategoryType ;

dc:description “Category constant.” .

**<http://www.opengis.net/ont/eo-geojson/1.0/SpectralRange/MICROWAVE>** a eop:SpectralRangeType ;

dc:description “SpectralRange type constant.” .

**<http://www.opengis.net/ont/eo-geojson/1.0/SpectralRange/OTHER>** a eop:SpectralRangeType ;

dc:description “SpectralRange type constant.” .

**<http://www.opengis.net/ont/eo-geojson/1.0/SpectralRange/UV>** a eop:SpectralRangeType ;

dc:description “SpectralRange type constant for Ultraviolet (UV).” .

**<http://www.opengis.net/ont/eo-geojson/1.0/SpectralRange/VISIBLE>** a eop:SpectralRangeType ;

dc :description « SpectralRange type constant. » .

**eop:THUMBNAIL** a eop:CategoryType ;

dc:description “Category constant.” .

**eop:acquisitionAngles** a owl:FunctionalProperty,

owl:ObjectProperty ;

rdfs:label “acquisitionAngles” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs :comment « Acquisition angles. » ;

rdfs :omaine op :AcquisitionParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range eop:AcquisitionAngles .

**eop:acquisitionInformation** a owl:ObjectProperty ;

rdfs :label « acquisitionInformation » ;

dc :description « Contains acquisition information. » ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs :comment « Contains acquisition information. » ;

rdfs:domain eop:Properties ;

rdfs:isDefinedBy eop: ;

rdfs:range eop:AcquisitionInformation .

**eop:acquisitionParameters** a owl:FunctionalProperty,

owl:ObjectProperty ;

rdfs:label “acquisitionParameters” ;

dc:description “The acquisition parameters (i.e., pointing angles, etc.).” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:domain eop:AcquisitionInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range eop:AcquisitionParameters .

**eop:acquisitionStation** a owl:DatatypeProperty ;

rdfs:label “acquisitionStation” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Acquisition / receiving station code. Possible values are mission specific and should be retrieved using codespace.” ;

rdfs:domain eop:AcquisitionParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:acquisitionSubType** a owl:DatatypeProperty ;

rdfs:label “acquisitionSubType” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “The broad value defined by the acquisitionType is too restrictive, so mission specific type definition should refer to mission/ground segment dedicated codeSpace.” ;

rdfs:domain eop:AcquisitionParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:acquisitionType** a owl:FunctionalProperty,

owl:ObjectProperty ;

rdfs:label “acquisitionType” ;

dc:description “””AcquisitionType can be one of:

- NOMINAL

- CALIBRATION

- OTHER.”””;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:domain eop:AcquisitionParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range eop:AcquisitionType .

**eop:acrossTrackIncidenceAngle** a owl:DatatypeProperty ;

rdfs:label “acrossTrackIncidenceAngle” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Acquisition across track incidence angle in degrees (i.e., uom=’deg’).” ;

rdfs:domain eop:AcquisitionAngles ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:additionalAttributes** a owl:ObjectProperty ;

rdfs:label “additionalAttributes” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Container for ad-hoc additional metadata attributes which are omaine opa or mission specific.” ;

rdfs:domain eop:DataIdentification ;

rdfs:isDefinedBy eop: .

**eop:alongTrackIncidenceAngle** a owl:DatatypeProperty ;

rdfs:label “alongTrackIncidenceAngle” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Acquisition along track incidence angle in degrees (i.e., uom=’deg’).” ;

rdfs:domain eop:AcquisitionAngles ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:altitudeUnit** a owl:ObjectProperty ;

rdfs:label “locationUnit” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Unit of measure used to express lowestLocation and highestLocation: meter (m) or bar (bar). Default is meter (m).” ;

rdfs:domain eop:VerticalSpatialDomain ;

rdfs:isDefinedBy eop: ;

rdfs:range eop:AltitudeUnitType .

**eop:antennaLookDirection** a owl:ObjectProperty ;

rdfs:label “antennaLookDirection” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “””Look direction of antenna taken from codelist

Values:

- LEFT

- RIGHT.”””;

rdfs:domain eop:AcquisitionParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range eop:AntennaLookDirectionType .

**eop:archivingCenter** a owl:DatatypeProperty ;

rdfs:label “archivingCenter” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Archiving center code. Possible values are mission specific.” ;

rdfs:domain eop:ProductInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:archivingDate** a owl:DatatypeProperty ;

rdfs:label “archivingDate” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Archiving date time.” ;

rdfs:domain eop:ProductInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:dateTime .

**eop:ascendingNodeDate** a owl:DatatypeProperty ;

rdfs:label “ascendingNodeDate” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “UTC date and time at ascending node of orbit.” ;

rdfs:domain eop:OrbitParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:dateTime .

**eop:ascendingNodeLongitude** a owl:DatatypeProperty ;

rdfs:label “ascendingNodeLongitude” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “””Longitude at ascending node of orbit. Should be expressed in degrees.

“””;

rdfs:domain eop:OrbitParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:availabilityTime** a owl:DatatypeProperty ;

rdfs:label “availabilityTime” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “””The time when the result becomes available

dateTime in ISO 8601 format (CCYY-MM-DDThh:mm[:ss[.cc]]Z).”””;

rdfs:domain eop:ProductInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:dateTime .

**eop:cloudCover** a owl:DatatypeProperty ;

rdfs:label “cloudCover” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Cloud cover percentage (i.e., uom=’%’).” ;

rdfs:domain eop:CoverageDescription ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:completionTimeFromAscendingNode** a owl:DatatypeProperty ;

rdfs:label “completionTimeFromAscendingNode” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Stop time of acquisition in milliseconds from ascending node date.” ;

rdfs:domain eop:AcquisitionParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:integer .

**eop:compositeType** a owl:DatatypeProperty ;

rdfs:label “compositeType” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Type of composite product expressed as timeperiod that the composite product covers using ISO 8601 duration format P[n]Y[n]M[n]D encoding , e.g., P10D for a 10 day composite.” ;

rdfs:domain eop:ProcessingInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string ;

rdfs:seeAlso <https://en.wikipedia.org/wiki/ISO\_8601#Durations> .

**eop:cycleNumber** a owl:DatatypeProperty ;

rdfs:label “cycleNumber” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Number of Cycles.” ;

rdfs:domain eop:AcquisitionParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:integer .

**eop:discreteWavelength** a owl:DatatypeProperty ;

rdfs:label “discreteWavelengths” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Discrete wavelength observed in the product. Unit of measure is SI base unit (m) without prefix.” ;

rdfs:domain eop:WavelengthInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:doi** a owl:DatatypeProperty ;

rdfs:label “doi” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Digital Object Identifier identifying the product (see http://www.doi.org).” ;

rdfs:domain eop:DataIdentification ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:dopplerFrequency** a owl:DatatypeProperty ;

rdfs:label “dopplerFrequency” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Doppler Frequency of acquisition. Unit of measure is SI base unit (m) without prefix.” ;

rdfs:domain eop:AcquisitionParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:endWavelength** a owl:DatatypeProperty ;

rdfs:label “endWavelength” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “End of the observed wavelength range. Unit of measure is SI base unit (m) without prefix.” ;

rdfs:domain eop:WavelengthInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:groundTrackUncertainty** a owl:DatatypeProperty ;

rdfs:label “groundTrackUncertainty” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Measure of the uncertainty of the ground track. Sometimes known as deadband e.g., 1000m (1Km) deadband. Unit of measure is SI base unit (m) without prefix.” ;

rdfs:domain eop:AcquisitionParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:illuminationAzimuthAngle** a owl:DatatypeProperty ;

rdfs:label “illuminationAzimuthAngle” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Mean illumination/solar azimuth angle given in degrees (i.e., uom=’deg’).” ;

rdfs:domain eop:AcquisitionAngles ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:illuminationElevationAngle** a owl:DatatypeProperty ;

rdfs:label “illuminationElevationAngle” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Mean illumination/solar elevation angle in degrees (i.e., uom=’deg’).” ;

rdfs:domain eop:AcquisitionAngles ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:illuminationZenithAngle** a owl:DatatypeProperty ;

rdfs:label “illuminationZenithAngle” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Mean illumination/solar zenith angle in degrees (i.e., uom=’deg’).” ;

rdfs:domain eop:AcquisitionAngles ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:incidenceAngle** a owl:DatatypeProperty ;

rdfs:label “incidenceAngle” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Acquisition global incidence angle in degrees (i.e., uom=’deg’).” ;

rdfs:domain eop:AcquisitionAngles ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:incidenceAngleVariation** a owl:DatatypeProperty ;

rdfs:label “incidenceAngleVariation” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Incidence angle variation in degrees (i.e., uom=’deg’).” ;

rdfs:domain eop:AcquisitionAngles ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:instrument** a owl:FunctionalProperty,

owl:ObjectProperty ;

rdfs:label “instrument” ;

dc:description “””The Instrument/Sensor used for the acquisition.

If more than one instrument is used for creating the product, then the AcquisitionInformation object occurs more than once.”””;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:domain eop:AcquisitionInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range eop:Instrument .

**eop:instrumentAzimuthAngle** a owl:DatatypeProperty ;

rdfs:label “instrumentAzimuthAngle” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Mean instrument azimuth angle in degrees (i.e., uom=’deg’).” ;

rdfs:domain eop:AcquisitionAngles ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:instrumentElevationAngle** a owl:DatatypeProperty ;

rdfs:label “instrumentElevationAngle” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Mean instrument elevation angle in degrees (i.e., uom=’deg’).” ;

rdfs:domain eop:AcquisitionAngles ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:instrumentShortName** a owl:DatatypeProperty ;

rdfs:label “instrumentShortName” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Instrument (Sensor) name.” ;

rdfs:domain eop:Instrument ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:instrumentZenithAngle** a owl:DatatypeProperty ;

rdfs:label “instrumentZenithAngle” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Mean instrument zenith angle in degrees (i.e., uom=’deg’).” ;

rdfs:domain eop:AcquisitionAngles ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:lastOrbitDirection** a owl:ObjectProperty ;

rdfs:label “lastOrbitDirection” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “””Acquisition orbit direction at the end of the acquisition/product. Assumed to be identical to orbitDirection if not present.

Values:

• ASCENDING

• DESCENDING”””;

rdfs:domain eop:OrbitParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range eop:OrbitDirectionType .

**eop:lastOrbitNumber** a owl:DatatypeProperty ;

rdfs:label “lastOrbitNumber” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Acquisition last orbit number.” ;

rdfs:domain eop:OrbitParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:integer .

**eop:maximumAltitude** a owl:DatatypeProperty ;

rdfs:label “highestLocation” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Lower bound of measurements in vertical dimension. Unit of measure defined by locationUnit property.” ;

rdfs:domain eop:VerticalSpatialDomain ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:maximumIncidenceAngle** a owl:DatatypeProperty ;

rdfs:label “maximumIncidenceAngle” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Maximum incidence angle in degrees (i.e., uom=’deg’).” ;

rdfs:domain eop:AcquisitionAngles ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:measurementType** a owl:ObjectProperty ;

rdfs:label “measurementType” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “””Measurement type taken from codelist:

Values:

- ABSORPTION

- EMISSION.”””;

rdfs:domain eop:AcquisitionParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range eop:MeasurementType .

**eop:minimumAltitude** a owl:DatatypeProperty ;

rdfs:label “lowestLocation” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Upper bound of measurements in vertical dimension. Unit of measure defined by locationUnit property.” ;

rdfs:domain eop:VerticalSpatialDomain ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:minimumIncidenceAngle** a owl:DatatypeProperty ;

rdfs:label “minimumIncidenceAngle” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Minimum incidence angle in degrees (i.e., uom=’deg’).” ;

rdfs:domain eop:AcquisitionAngles ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:operationalMode** a owl:DatatypeProperty ;

rdfs:label “operationalMode” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Sensor mode. Possible values are mission specific.” ;

rdfs:domain eop:AcquisitionParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:orbitDirection** a owl:ObjectProperty ;

rdfs:label “orbitDirection” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “””Acquisition orbit direction at the start of the acquisition/product.

Values:

• ASCENDING

• DESCENDING”””;

rdfs:domain eop:OrbitParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range eop:OrbitDirectionType .

**eop:orbitDuration** a owl:DatatypeProperty ;

rdfs:label “orbitDuration” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Actual orbit duration in milliseconds.” ;

rdfs:domain eop:OrbitParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:integer .

**eop:orbitNumber** a owl:DatatypeProperty ;

rdfs:label “orbitNumber” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs :comment « Acquisition orbit number. » ;

rdfs:domain eop:OrbitParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:integer .

**eop:orbitType** a owl:ObjectProperty ;

rdfs:label “orbitType” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “High level omaine opation of main mission types taken from a codelist.” ;

rdfs:domain eop:Platform ;

rdfs:isDefinedBy eop: ;

rdfs:range eop:OrbitType .

**eop:parentIdentifier** a owl:DatatypeProperty ;

rdfs:label “parentIdentifier” ;

dcterms:source “OGC 17-003”^^xsd:string ;

vann:example “””

{

« parentIdentifier » : « SEA\_GEC\_1P »

}

«  » » ;

rdfs :comment « Collection identifier. » ;

rdfs:domain eop:DataIdentification ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:pitch** a owl:DatatypeProperty ;

rdfs:label “pitch” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Satellite pitch angle in degrees (i.e., uom=’deg’).” ;

rdfs:domain eop:AcquisitionAngles ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:platform** a owl:FunctionalProperty,

owl:ObjectProperty ;

rdfs:label “platform” ;

dc:description “The Platform used for the acquisition. If more than one platform is used for creating the product, then the AcquisitionInformation object occurs more than once.” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:domain eop:AcquisitionInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range eop:Platform .

**eop:platformSerialIdentifier** a owl:DatatypeProperty ;

rdfs:label “platformSerialIdentifier” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Platform serial identifier (e.g., for Seasat : 1).” ;

rdfs:domain eop:Platform ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:platformShortName** a owl:DatatypeProperty ;

rdfs:label “platformShortName” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Platform short name (e.g., \”Seasat\” or \”ENVISAT\”).” ;

rdfs:domain eop:Platform ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:polarisationChannels** a owl:ObjectProperty ;

rdfs:label “polarisationChannels” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “””Polarisation channel transmit/receive configuration: horizontal, vertical.

Values:

- HH

- HV

- VH

- VV

- HH, VV

- HH, VH

- HH, HV

- VH, VV

- VH, HV

- VV, HV

- VV, VH

- HV, VH

- HH, HV, VH, VV

- UNDEFINED”””;

rdfs:domain eop:AcquisitionParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range eop:PolarisationChannelsType .

**eop:polarisationMode** a owl:ObjectProperty ;

rdfs:label “polarisationMode” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “””Polarisation mode taken from codelist:

S (for single),

D (for dual),

T (for twin),

Q (for quad),

UNDEFINED.”””;

rdfs:domain eop:AcquisitionParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range eop:PolarisationModeType .

**eop:processingCenter** a owl:DatatypeProperty ;

rdfs:label “processingCenter” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Processing center code. Possible values are mission specific.” ;

rdfs:domain eop:ProcessingInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:processingDate** a owl:DatatypeProperty ;

rdfs:label “processingDate” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Processing date time.” ;

rdfs:domain eop:ProcessingInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:dateTime .

**eop:processingLevel** a owl:DatatypeProperty ;

rdfs:label “processingLevel” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Processing level applied to the product: \”1A\”, \”1B\”, \”1C\”, \”2\”, \”3\”.” ;

rdfs:domain eop:ProcessingInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:processingMethod** a owl:DatatypeProperty ;

rdfs:label “processingMethod” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Method used to compute datalayer. (e.g., Kalman filtering, ROSE).” ;

rdfs:domain eop:ProcessingInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:processingMethodVersion** a owl:DatatypeProperty ;

rdfs:label “processingMethodVersion” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Method version (e.g., 1.0).” ;

rdfs:domain eop:ProcessingInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:processingMode** a owl:DatatypeProperty ;

rdfs:label “processingMode” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “””Processing mode taken from mission specific code list.

Examples of values are:

• NRT

• NOMINAL

• BACKLOGGED

• REPROCESSED

• VALIDATE.”””;

rdfs:domain eop:ProcessingInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:processorName** a owl:DatatypeProperty ;

rdfs:label “processorName” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Processor software name (e.g., FastROSE).” ;

rdfs:domain eop:ProcessingInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:processorVersion** a owl:DatatypeProperty ;

rdfs:label “processorName” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Processor software version (e.g., 1.0).” ;

rdfs:domain eop:ProcessingInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:productContentType** a owl:DatatypeProperty ;

rdfs:label “productContentType” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “””Classification of product according to ground type covered. Note cardinality allows for multiple instances of this property.

Allowed Values:

• COASTAL

• CONTINENTAL

• HYDROLOGY

• ICE

• OPEN\_OCEAN

• OTHER

• REGIONAL.”””;

rdfs:domain eop:ProcessingInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:productGroupId** a owl:DatatypeProperty ;

rdfs:label “productGroupId” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Holds the identifier of a particular group to which the product belongs to. Group members represent then \”granules\” or \”portions\” of end-user products that are eligible for specific aggregations (e.g., all Sentinel-2 granules having the same productGroupId can be assembled together to form a Sentinel-2 end-user product).” ;

rdfs:domain eop:ProductInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:productInformation** a owl:FunctionalProperty,

owl:ObjectProperty ;

rdfs:label “productInformation” ;

dc :description « Contains product information. » ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs :comment « Contains product information. » ;

rdfs:domain eop:Properties ;

rdfs:isDefinedBy eop: ;

rdfs:range eop:ProductInformation .

**eop:productType** a owl:DatatypeProperty ;

rdfs:label “productType” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Describes the product type in case that mixed types are available within a single collection, this is a ground segment specific definition.” ;

rdfs:domain eop:ProductInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:productVersion** a owl:DatatypeProperty ;

rdfs:label “productVersion” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Product version.” ;

rdfs:domain eop:ProductInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:qualityDegradation** a owl:DatatypeProperty ;

rdfs:label “qualityDegradation” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Quality degradation percentage (i.e., uom=’%’).” ;

rdfs:domain eop:QualityInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:qualityDegradationQuotationMode** a owl:DatatypeProperty ;

rdfs:label “qualityDegradationQuotationMode” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “””Indicator to know how the quality degradation percentage has been calculated.

Values:

AUTOMATIC, MANUAL.”””;

rdfs:domain eop:QualityInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:qualityDegradationTag** a owl:DatatypeProperty ;

rdfs:label “qualityDegradationTag” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “””Contains further textual information concerning the quality degradation. It shall be provided if qualityStatus value is DEGRADED. Possible values are mission specific and should refer to mission/ground segment dedicated codeSpace.

Example of values could be “RADIOMETRY” or “GEOLOCATION”.”””;

rdfs:domain eop:QualityInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:qualityInformation** a owl:FunctionalProperty,

owl:ObjectProperty ;

rdfs:label “qualityInformation” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Contains properties related to the quality of the product.” ;

rdfs:domain eop:ProductInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range eop:QualityInformation .

**eop:qualityStatus** a owl:DatatypeProperty ;

rdfs:label “qualityStatus” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “””Indicator that specifies whether the product quality is degraded or not. This optional field shall be provided if the product has passed a quality check.

Values:

DEGRADED, NOMINAL.”””;

rdfs:domain eop:QualityInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:relativeOrbitNumber** a owl:DatatypeProperty ;

rdfs:label “relativeOrbitNumber” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Orbit number since start of cycle.” ;

rdfs:domain eop:AcquisitionParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:integer .

**eop:resolution** a owl:DatatypeProperty ;

rdfs:label “resolution” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Sensor resolution. Unit of measure is SI base unit (m) without prefix.” ;

rdfs:domain eop:AcquisitionParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:roll** a owl:DatatypeProperty ;

rdfs:label “roll” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Satellite roll angle in degrees (i.e., uom=’deg’).” ;

rdfs:domain eop:AcquisitionAngles ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:samplingRate** a owl:DatatypeProperty ;

rdfs:label “samplingRates” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Rate at which samples are provided in product. Some products may contain more than one sampling rate, e.g., 1kHz and 20kHz. Cardinality is therefore zero to many. Unit of measure (Hz) is SI derived unit without prefix.” ;

rdfs:domain eop:AcquisitionParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:sensorType** a owl:ObjectProperty ;

rdfs:label “sensorType” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “””Sensor type based on codelist. Values:

- OPTICAL

- RADAR

- ALTIMETRIC

- ATMOSPHERIC

- LIMB. » » » ;

rdfs :omaine op :Instrument ;

rdfs:isDefinedBy eop: ;

rdfs:range eop:SensorType .

**eop:size** a owl:DatatypeProperty ;

rdfs:label “size” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Product size (bytes) allowing the user to realise how long a download is likely to take.” ;

rdfs:domain eop:ProductInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:integer .

**eop:snowCover** a owl:DatatypeProperty ;

rdfs:label “snowCover” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Snow cover percentage (i.e., uom=’%’).” ;

rdfs:domain eop:CoverageDescription ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:spectralRange** a owl:ObjectProperty ;

rdfs:label “spectralRange” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “””The observed Spectral Range:

Values:

- INFRARED

- NIR

- SWIR

- MWIR

- LWIR

- FIR

- UV

- VISIBLE

- MICROWAVE

- OTHER.”””;

rdfs:domain eop:WavelengthInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range eop:SpectralRangeType .

**eop:startTimeFromAscendingNode** a owl:DatatypeProperty ;

rdfs:label “startTimeFromAscendingNode” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Start time of acquisition in milliseconds from ascending node date.” ;

rdfs:domain eop:AcquisitionParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:integer .

**eop:startWavelength** a owl:DatatypeProperty ;

rdfs:label “startWavelength” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Start of the observed wavelength range. Unit of measure is SI base unit (m) without prefix.” ;

rdfs:domain eop:WavelengthInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:status** a owl:FunctionalProperty,

owl:ObjectProperty ;

rdfs:label “status” ;

dc:description “””Refers to product status.

Fixed Values :

- ARCHIVED

- ACQUIRED

- CANCELLED

- FAILED

- PLANNED

- POTENTIAL

- REJECTED

- QUALITYDEGRADED.”””;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:domain eop:Properties ;

rdfs:isDefinedBy eop: ;

rdfs:range eop:StatusType .

**eop:statusDetail** a owl:DatatypeProperty ;

rdfs:label “statusDetail” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “This field refers to the status value. It should be used to motivate the reason of a failure, cancelation, rejection or degraded quality.” ;

rdfs:domain eop:ProductInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:statusSubType** a owl:DatatypeProperty ;

rdfs:label “statusSubType” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “””Refines the status of a product when the “status” is set to “ARCHIVED”.

Possible values:

- “ON-LINE”

- “OFF-LINE”.”””;

rdfs:domain eop:ProductInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:swathIdentifier** a owl:DatatypeProperty ;

rdfs:label “swathIdentifier” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Swath identifier (e.g., Envisat ASAR has 7 distinct swaths (I1,I2,I3...I7) that correspond to precise incidence angles for the sensor).” ;

rdfs:domain eop:AcquisitionParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:tileId** a owl:DatatypeProperty ;

rdfs:label “tileId” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “””While track/frame can be used to represent the first part of an MGRS coordinate (i.g. grid zone), the tileId identifies e.g., the second part of an MGRS coordinate (square identification), e.g., in case of Sentinel.

Used when the world reference system coordinates can not be expressed in X/Y (Track/Frame) terms, such has for UTM tiles. (used for Sentinel-2 L1C granules).”””;

rdfs:domain eop:AcquisitionParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:timeliness** a owl:DatatypeProperty ;

rdfs:label “timeliness” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “””Timeliness of the product, such as “near real time”, “rush”. Possible values are mission specific and shall refer to mission/ground segment dedicated codeSpace.

Example of values could be “NRT”, “NOMINAL”, “NTC” or “STC”.”””;

rdfs:domain eop:ProductInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:verticalResolution** a owl:DatatypeProperty ;

rdfs:label “verticalResolution” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “””lmb: Vertical spacing of data (if regular)

atm: Full width at half maximum of the rows of the vertical averaging kernel matrix

Unit of measure is SI base unit (m) without prefix.”””;

rdfs:domain eop:AcquisitionParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:wavelengthResolution** a owl:DatatypeProperty ;

rdfs:label “wavelengthResolution” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Spacing between consecutive wavelengths. Unit of measure is SI base unit (m) without prefix.” ;

rdfs:domain eop:WavelengthInformation ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:wavelengths** a owl:ObjectProperty ;

rdfs:label “wavelengths” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “List of discrete wavelengths observed in the product.” ;

rdfs:domain eop:AcquisitionParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range eop:WavelengthInformation .

**eop:wrsLatitudeGrid** a owl:DatatypeProperty ;

rdfs:label “wrsLatitudeGrid” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Neutral wrsLatitudeGrid equivalent to frame in track/frame, J in K/J, etc.” ;

rdfs:domain eop:AcquisitionParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:wrsLongitudeGrid** a owl:DatatypeProperty ;

rdfs:label “wrsLongitudeGrid” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Neutral wrsLongitudeGrid equivalent to track in track/frame, K in K/J, etc.” ;

rdfs:domain eop:AcquisitionParameters ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:string .

**eop:yaw** a owl:DatatypeProperty ;

rdfs:label “yaw” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Satellite yaw angle in degrees (i.e., uom=’deg’).” ;

rdfs:domain eop:AcquisitionAngles ;

rdfs:isDefinedBy eop: ;

rdfs:range xsd:double .

**eop:AltitudeUnitType** a owl:Class ;

rdfs:label “AltitudeUnitType” ;

rdfs:comment “Enumeration of altitudeUnit constants.” ;

rdfs:isDefinedBy eop: ;

owl:equivalentClass [ a owl:Class ;

owl:I ( <http://www.opengis.net/ont/eo-geojson/1.0/Unit/Bar> <http://www.opengis.net/ont/eo-geojson/1.0/Unit/Meter> ) ] .

**<http://www.opengis.net/ont/eo-geojson/1.0/SpectralRange/FIR>** a eop:SpectralRangeType ;

dc:description “SpectralRange type constant for Far Infrared (FIR).” ;

skos:broader <http://www.opengis.net/ont/eo-geojson/1.0/SpectralRange/INFRARED> .

**<http://www.opengis.net/ont/eo-geojson/1.0/SpectralRange/LWIR>** a eop:SpectralRangeType ;

dc:description “SpectralRange type constant for Long Wavelength Infrared (LWIR).” ;

skos:broader <http://www.opengis.net/ont/eo-geojson/1.0/SpectralRange/INFRARED> .

**<http://www.opengis.net/ont/eo-geojson/1.0/SpectralRange/MWIR>** a eop:SpectralRangeType ;

dc:description “SpectralRange type constant for Mid Wavelength Infrared (MWIR).” ;

skos:broader <http://www.opengis.net/ont/eo-geojson/1.0/SpectralRange/INFRARED> .

**<http://www.opengis.net/ont/eo-geojson/1.0/SpectralRange/NIR>** a eop:SpectralRangeType ;

dc:description “SpectralRange type constant for Near Infrared (NIR).” ;

skos:broader <http://www.opengis.net/ont/eo-geojson/1.0/SpectralRange/INFRARED> .

**<http://www.opengis.net/ont/eo-geojson/1.0/SpectralRange/SWIR>** a eop:SpectralRangeType ;

dc:description “SpectralRange type constant for Short Wavelength Infrared (SWIR).” ;

skos:broader <http://www.opengis.net/ont/eo-geojson/1.0/SpectralRange/INFRARED> .

**eop:TemporalInformation** a owl:Class ;

rdfs:label “TemporalInformation” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Contains the properties related to the start and end time of the acquisition of the data. Its properties are inherited by the AcquisitionParameters object.” ;

rdfs:isDefinedBy eop: .

**<http://www.opengis.net/ont/eo-geojson/1.0/Unit/Bar>** a eop:Unit,

owl:NamedIndividual ;

rdfs:label “bar” ;

dc:description “Unit constant representing non-SI unit \”bar\” (bar).” .

**<http://www.opengis.net/ont/eo-geojson/1.0/Unit/Meter>** a eop:Unit,

owl:NamedIndividual ;

rdfs:label “meter” ;

dc:description “Unit constant representing SI unit \”meter\” (m).” .

**eop:Unit** a owl:Class ;

rdfs:label “Unit” ;

rdfs:comment “Base class to include all unit constants.” ;

rdfs:isDefinedBy eop: .

**eop:AntennaLookDirectionType** a owl:Class ;

rdfs:label “AntennaLookDirectionType” ;

rdfs:comment “Enumeration of antennaLookDirectionType constants.” ;

rdfs:isDefinedBy eop: .

**eop:CoverageDescription** a owl:Class ;

rdfs:label “CoverageDescription” ;

rdfs:comment “Contains the properties related to the coverage. Its properties are inherited by the ProductInformation object.” ;

rdfs:isDefinedBy eop: .

**eop:MeasurementType** a owl:Class ;

rdfs:label “MeasurementType” ;

rdfs:comment “Enumeration of measurementType constants.” ;

rdfs:isDefinedBy eop: .

**eop:OrbitType** a owl:Class ;

rdfs:label “OrbitType” ;

rdfs:comment “Enumeration of orbitType constants.” ;

rdfs:isDefinedBy eop: .

**eop:Properties** a owl:Class ;

rdfs:label “Properties” ;

rdfs:comment “Object containing the properties of the Earth Observation.” ;

rdfs:isDefinedBy eop: ;

rdfs:seeAlso <https://tools.ietf.org/html/rfc7946> ;

rdfs:subClassOf eop:DataIdentification,

owc:Properties .

**eop:AcquisitionType** a owl:Class ;

rdfs:label “AcquisitionType” ;

rdfs:comment “Enumeration of acquisitionType constants.” ;

rdfs:isDefinedBy eop: .

**eop:DataIdentification** a owl:Class ;

rdfs:label “DataIdentification” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Base class of Properties.” ;

rdfs:isDefinedBy eop: .

**eop:OrbitDirectionType** a owl:Class ;

rdfs:label “OrbitDirectionType” ;

rdfs:comment “Enumeration of orbit direction constants.” ;

rdfs:isDefinedBy eop: .

**eop:Platform** a owl:Class ;

rdfs:label “Platform” ;

dcterms:source “OGC 17-003”^^xsd:string ;

vann:example “””

{

“@context”: “https://www.opengis.net/eo-geojson/1.0”,

“type”: “Platform”,

“id”: “http://gcmdservices.gsfc.nasa.gov/kms/concept/a1498dff-002d-4d67-9091-16822c608221”,

“platformShortName”: “Seasat”,

“platformSerialIdentifier”: “1”,

“orbitType”: “LEO”

}

“””;

rdfs:comment “Contains the properties of the platform (satellite) that was used to perform the observation. Use as \”id\” the URI defined by GCMD to identify the platform. A list of URI can be downloaded from https://gcmdservices.gsfc.nasa.gov/static/kms/platforms/platforms.rdf.” ;

rdfs:isDefinedBy eop: ;

rdfs:seeAlso <https://gcmdservices.gsfc.nasa.gov/static/kms/platforms/platforms.rdf> .

**eop:VerticalSpatialDomain** a owl:Class ;

rdfs:label “VerticalSpatialDomain” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Contains the properties related to the spatial extent in the vertical dimension. Its properties are inherited by the AcquisitionParameters object.” ;

rdfs:isDefinedBy eop: .

**eop:AcquisitionInformation** a owl:Class ;

rdfs :label « AcquisitionInformation » ;

vann :example «  » »

{

« @context » : « https ://www.opengis.net/eo-geojson/1.0 »,

« type » : « AcquisitionInformation »,

“platform”: {

“id”: “http://gcmdservices.gsfc.nasa.gov/kms/concept/1bffe898-f4a2-458e-92c5-cd7c9c1cd5f0”,

“platformShortName”: “Seasat”,

“platformSerialIdentifier”: “1”

},

“instrument”: {

“id”: “http://gcmdservices.gsfc.nasa.gov/kms/concept/a37282d4-322c-4dd0-8edc-36099b9b586c”,

“sensorType”: “RADAR”,

“instrumentShortName”: “SAR”

},

“acquisitionParameters”: {

“operationalMode”: “IM”,

“polarisationMode”: “S”,

“polarisationChannels”: “HH”,

“beginningDateTime”: “1978-09-27T01:04:30Z”,

“endingDateTime”: “1978-09-27T01:04:45Z”,

“acquisitionType”: “NOMINAL”,

“acquisitionSubType”: “DEFAULT”,

“orbitNumber”: “1316”,

“orbitDirection”: “DESCENDING”,

“antennaLookDirection”: “RIGHT”,

“acquisitionAngles”: {

“minimumIncidenceAngle”: 19.6,

“maximumIncidenceAngle”: 9.6,

“incidenceAngleVariation”: 9.6

}

}

}

“””;

rdfs:comment “Acquisition information of the Earth Observation as defined in OGC 17-003” ;

rdfs:isDefinedBy eop: .

**eop:QualityInformation** a owl:Class ;

rdfs:label “QualityInformation” ;

rdfs:comment “Contains the properties related to the quality of the product.” ;

rdfs:isDefinedBy eop: .

**<http://www.opengis.net/ont/eo-geojson/1.0/SpectralRange/INFRARED>** a eop:SpectralRangeType ;

dc :description « SpectralRange type constant. » ;

skos:narrower <http://www.opengis.net/ont/eo-geojson/1.0/SpectralRange/FIR>,

<http://www.opengis.net/ont/eo-geojson/1.0/SpectralRange/LWIR>,

<http://www.opengis.net/ont/eo-geojson/1.0/SpectralRange/MWIR>,

<http://www.opengis.net/ont/eo-geojson/1.0/SpectralRange/NIR>,

<http://www.opengis.net/ont/eo-geojson/1.0/SpectralRange/SWIR> .

**eop:CategoryType** a owl:Class ;

rdfs:label “CategoryType” ;

rdfs:comment “Enumeration of category constants.” ;

rdfs:isDefinedBy eop: .

**eop:PolarisationModeType** a owl:Class ;

rdfs:label “PolarisationModeType” ;

rdfs:comment “Enumeration of polarisationMode constants.” ;

rdfs:isDefinedBy eop: .

**eop:SensorType** a owl:Class ;

rdfs:label “SensorType” ;

rdfs:comment “Enumeration of sensorType constants.” ;

rdfs:isDefinedBy eop: .

**eop:WavelengthInformation** a owl:Class ;

rdfs:label “WavelengthInformation” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Contains the properties of the instrument related to the wavelengths used for the observation.” ;

rdfs:isDefinedBy eop: .

**eop:OrbitParameters** a owl:Class ;

rdfs:label “OrbitParameters” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:comment “Contains the properties related to the orbit. Its properties are inherited by the AcquisitionParameters object.” ;

rdfs:isDefinedBy eop: .

**eop:StatusType** a owl:Class ;

rdfs:label “StatusType” ;

rdfs:comment “Enumeration of acquisition status constants.” ;

rdfs:isDefinedBy eop: .

**eop:ProcessingInformation** a owl:Class ;

rdfs:label “ProcessingInformation” ;

rdfs:comment “Contains the properties related to the processing of the data.” ;

rdfs:isDefinedBy eop: .

**eop:SpectralRangeType** a owl:Class ;

rdfs:label “SpectralRangeType” ;

rdfs:comment “Enumeration of spectralRangeType constants.” ;

rdfs:isDefinedBy eop: .

**eop:ProductInformation** a owl:Class ;

rdfs:label “ProductInformation” ;

rdfs:comment “Product information of the Earth Observation product as defined in OGC 17-003” ;

rdfs:isDefinedBy eop: ;

rdfs:subClassOf eop:CoverageDescription,

eop:ProcessingInformation .

**eop:Instrument** a owl:Class ;

rdfs:label “Instrument” ;

dcterms:source “OGC 17-003”^^xsd:string ;

vann:example “””

{

“@context”: “https://www.opengis.net/eo-geojson/1.0”,

“type”: “Instrument”,

“id”: “http://gcmdservices.gsfc.nasa.gov/kms/concept/a37282d4-322c-4dd0-8edc-36099b9b586c”,

“sensorType”: “RADAR”,

“instrumentShortName”: “SAR”

}

“””;

rdfs:comment “Contains the properties of the instrument that was used to perform the observation. Use as \”id\” the URI defined by GCMD to identify the instrument. A list of URI can be downloaded from https://gcmdservices.gsfc.nasa.gov/static/kms/instruments/instruments.rdf.” ;

rdfs:isDefinedBy eop: ;

rdfs:seeAlso <https://gcmdservices.gsfc.nasa.gov/static/kms/instruments/instruments.rdf> .

**eop:AcquisitionParameters** a owl:Class ;

rdfs:label “AcquisitionParameters” ;

dcterms:source “OGC 17-003”^^xsd:string ;

vann:example “””

{

“@context”: “https://www.opengis.net/eo-geojson/1.0”,

“type”: “AcquisitionParameters”,

“beginningDateTime”: “1978-09-27T01:04:30Z”,

« endingDateTime » : « 1978-09-27T01 :04 :45Z »,

« acquisitionType » : « NOMINAL »,

“acquisitionSubType”: “DEFAULT”,

“orbitNumber”: “1316”,

“orbitDirection”: “DESCENDING”,

“antennaLookDirection”: “RIGHT”,

“acquisitionAngles”: {

“minimumIncidenceAngle”: 19.6,

“maximumIncidenceAngle”: 9.6,

“incidenceAngleVariation”: 9.6

}

}

“””;

rdfs:comment “Contains the properties related to the acquisition of the data.” ;

rdfs:isDefinedBy eop: ;

rdfs:subClassOf eop:OrbitParameters,

eop:TemporalInformation,

eop:VerticalSpatialDomain .

**eop:PolarisationChannelsType** a owl:Class ;

rdfs:label “PolarisationChannelsType” ;

rdfs:comment “Enumeration of polarisationChannels constants.” ;

rdfs:isDefinedBy eop: .

**eop:AcquisitionAngles** a owl:Class ;

rdfs :label « AcquisitionAngles » ;

vann :example «  » »

{

« @context » : « https ://www.opengis.net/eo-geojson/1.0 »,

« type » : « AcquisitionAngles »,

“minimumIncidenceAngle”: 19.6,

“maximumIncidenceAngle”: 9.6,

“incidenceAngleVariation”: 9.6

}

“””;

rdfs:comment “Contains the properties related to the acquisition angles.” ;

rdfs:isDefinedBy eop: .

**eop:** a owl:Ontology ;

dc:contributor “John Taylor, CGI”^^xsd:string,

“Olivier Barois, European Space Agency”^^xsd:string,

“Sirko Schindler, DLR”^^xsd:string ;

dc:creator “Yves Coene, Spacebel s.a.”^^xsd:string ;

dc:date “2018-11-09”^^xsd:string ;

dc:title “OGC 17-003 – Earth Observation Dataset Metadata Vocabulary” ;

dcterms:license “http://www.opengeospatial.org/ogc/software” ;

vann:preferredNamespacePrefix “eop” ;

vann:preferredNamespaceUri “http://www.opengis.net/ont/eo-geojson/1.0/” ;

void:vocabulary dcterms: ;

rdfs:comment “””This vocabulary defines the classes and properties required to model Earth Observation (EO) metadata for datasets (i.e., products or granules). It provides the models for the exchange of information describing EO datasets, both within and between different organizations.

The implementation is derived from the conceptual models defined in the Earth Observation Metadata Profile of Observations and Measurements OGC 10-157r4, and the Unified Metadata Model for Granules (UMM-G).”””^^xsd:string;

owl:imports <http://www.opengis.net/ont/owc/1.0/>,

<http://purl.org/geojson/vocab#> ;

owl:versionInfo “1.0.0”^^xsd:string .

B.3.2 OWC GeoJSON Vocabulary

The Vocabulary in the current section is required by the EO GeoJSON Vocabulary presented in the previous section. It is expected to be replaced in the future by an official OWL vocabulary representing OGC 14-055r2 resources.

**@prefix** atom: **<http://www.w3.org/2005/Atom/> .**

**@prefix** dc: **<http://purl.org/dc/elements/1.1/> .**

**@prefix** dcterms: **<http://purl.org/dc/terms/> .**

**@prefix** ianarel: **<http://www.iana.org/assignments/relation/> .**

**@prefix** media: **<http://search.yahoo.com/mrss/> .**

**@prefix** owc: **<http://www.opengis.net/ont/owc/1.0/> .**

**@prefix** owl: **<http://www.w3.org/2002/07/owl#> .**

**@prefix** rdf: **<http://www.w3.org/1999/02/22-rdf-syntax-ns#> .**

**@prefix** rdfs: **<http://www.w3.org/2000/01/rdf-schema#> .**

**@prefix** skos : **<http ://www.w3.org/2004/02/skos/core#> .**

**@prefix** vann: **<http://purl.org/vocab/vann/> .**

**@prefix** void : **<http ://rdfs.org/ns/void#> .**

**@prefix** xml: **<http://www.w3.org/XML/1998/namespace> .**

**@prefix** xsd: **<http://www.w3.org/2001/XMLSchema#> .**

**ianarel:alternate** a owl:ObjectProperty ;

rdfs:label “alternates” ;

dc:description “””Reference to a description of the resource in an alternative format.

Is defined by OGC 14-055r2 §7.1.2.”””;

dcterms:source “OGC 17-003, OGC 14-055r2”^^xsd:string ;

vann:example “””

{

“@context”: “https://www.opengis.net/eo-geojson/1.0”,

“alternates”: [

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/atom%2Bxml&parentIdentifier=SEA\_GEC\_1P&uid=SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F”,

“type”: “application/atom+xml”,

“title”: “Atom format”

}

]

}

“””;

rdfs:isDefinedBy owc: ;

rdfs:seeAlso <https://tools.ietf.org/html/rfc5988> .

**ianarel:enclosure** a owl:ObjectProperty ;

rdfs:label “data” ;

dc:description “Reference to the location of the data resource as defined by OGC 14-055r2 §7.1.2.12” ;

dcterms:source “OGC 14-055r2”^^xsd:string ;

vann:example “””

{

“@context”: “https://www.opengis.net/eo-geojson/1.0”,

“data”: [

{

“href”: “http://tpm-ds.eo.esa.int/products/SEA\_GEC\_1P/1978/09/27/SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F.ZIP”,

“type”: “application/binary”,

“title”: “Download”

}

]

}

“””;

rdfs:isDefinedBy owc: ;

rdfs:seeAlso <https://tools.ietf.org/html/rfc5988> .

**ianarel:icon** a owl:ObjectProperty ;

rdfs:label “previews” ;

dc:description “””Reference to a quicklook or browse image representing the resource.

Is defined by OGC 14-055r2 §7.1.2.10”””;

dcterms:source “OGC 14-055r2”^^xsd:string ;

vann:example “””

{

“@context”: “https://www.opengis.net/eo-geojson/1.0”,

“previews”: [

{

“href”: “http://tpm-ds.eo.esa.int/metadata/SEA\_GEC\_1P/1978/09/27/SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F.BI.PNG”,

“type”: “image/png”,

“title”: “Quicklook”

}

]

}

“””;

rdfs:isDefinedBy owc: ;

rdfs:seeAlso <https://tools.ietf.org/html/rfc4287#section-4.2.5>,

<https://tools.ietf.org/html/rfc5988> .

**ianarel:via** a owl:ObjectProperty ;

rdfs:label “via” ;

dc:description “Reference to a description of the resource in its original format. Is defined by OGC 14-055r2 §7.1.2.15” ;

dcterms:source “OGC 14-055r2”^^xsd:string ;

rdfs:isDefinedBy owc: ;

rdfs:seeAlso <https://tools.ietf.org/html/rfc5988> .

**owc:code** a owl:DatatypeProperty ;

rdfs:label “code” ;

dcterms:source “OGC 17-003”^^xsd:string ;

vann:example “””

« code » : « http ://www.opengis.net/spec/owc-geojson/1.0/req/wms »

“””;

rdfs:comment “””Code identifying the type of offering, equal to a requirement class identifier (URI) for the extension defining the operation.

Examples:

- <http://www.opengis.net/spec/owc-geojson/1.0/req/wcs>

- <http://www.opengis.net/spec/owc-geojson/1.0/req/wmts>”””;

rdfs:domain owc:Offering ;

rdfs:isDefinedBy owc: ;

rdfs:range xsd:anyURI ;

rdfs:seeAlso <http://docs.opengeospatial.org/is/12-084r2/12-084r2.html#54> .

**owc:links** a owl:FunctionalProperty,

owl:ObjectProperty ;

rdfs:label “links” ;

dc:description “Refers to related, actionable resources including download location, quicklook, original or alternative metadata representations.” ;

dcterms:source “OGC 14-055r2”^^xsd:string ;

rdfs:domain owc:Properties ;

rdfs:isDefinedBy owc: ;

rdfs:range owc:Links .

**owc:offerings** a owl:ObjectProperty ;

rdfs:label “offerings” ;

dc:description “Service or online content offering for the resource targeted at OGC compliant clients. See OGC 14-055r2.” ;

dcterms:source “OGC 14-055r2”^^xsd:string ;

rdfs:domain owc:Properties ;

rdfs:isDefinedBy owc: ;

rdfs:range owc:Offering .

**owc:operations** a owl:ObjectProperty ;

rdfs:label “operations” ;

dcterms:source “OGC 14-055r2”^^xsd:string ;

rdfs:comment “Operations used to invoke the service.” ;

rdfs:domain owc:Offering ;

rdfs:isDefinedBy owc: ;

rdfs:range owc:Operation ;

rdfs:seeAlso <http://docs.opengeospatial.org/is/12-084r2/12-084r2.html#54> .

**atom:href** a owl:DatatypeProperty,

owl:FunctionalProperty ;

rdfs:label “href” ;

dc:description “URI describing the related resource. Is defined by OGC 14-055r2 §7.1.10.” ;

dcterms:source “OGC 14-055r2”^^xsd:string ;

rdfs:domain [ a owl:Class ;

owl:unionOf ( atom:Link owc:Operation ) ] ;

rdfs:isDefinedBy owc: ;

rdfs:range xsd:anyURI ;

owl:equivalentProperty rdf:about .

**atom:length** a owl:DatatypeProperty ;

rdfs:label “length” ;

dc:description “Hint about the content length (in bytes) of the representation that is expected to be returned when the value of href is dereferenced. Is defined by Atom (RFC4287).” ;

dcterms:source “RFC4287”^^xsd:string ;

rdfs:domain atom:Link ;

rdfs:isDefinedBy atom: ;

rdfs:range xsd:integer ;

rdfs:seeAlso <https://tools.ietf.org/html/rfc4287> .

**atom:type** a owl:DatatypeProperty,

owl:FunctionalProperty ;

rdfs:label “type” ;

dc:description “Hint about the type of the representation that is expected to be returned when the value of href is dereferenced.” ;

dcterms:source “OGC 17-003”^^xsd:string ;

rdfs:domain [ a owl:Class ;

owl:unionOf ( atom:Link owc:Operation ) ] ;

rdfs:isDefinedBy atom: ;

rdfs:range xsd:string ;

rdfs:seeAlso <https://tools.ietf.org/html/rfc4287> .

**owc:Links** a owl:Class ;

rdfs:label “Links” ;

dcterms:source “OGC 17-003, OGC 14-055r2”^^xsd:string ;

vann:example “””

{

“@context”: “https://www.opengis.net/eo-geojson/1.0”,

“type”: “Links”,

“data”: [

{

“href”: “http://tpm-ds.eo.esa.int/products/SEA\_GEC\_1P/1978/09/27/SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F.ZIP”,

“type”: “application/binary”,

“title”: “Download”

}

],

“previews”: [

{

“href”: “http://tpm-ds.eo.esa.int/metadata/SEA\_GEC\_1P/1978/09/27/SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F.BI.PNG”,

“type”: “image/png”,

“title”: “Quicklook”

}

],

“alternates”: [

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/atom%2Bxml&parentIdentifier=SEA\_GEC\_1P&uid=SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F”,

“type”: “application/atom+xml”,

“title”: “Atom format”

}

]

}

“””;

rdfs:comment “Contains references to related resources as hypermedia links. They include references to quicklooks, data download links or alternative representations of the metadata. Inherits properties defined by OGC 14-055r2.” ;

rdfs:isDefinedBy owc: .

**owc:Properties** a owl:Class ;

rdfs:label “Properties” ;

rdfs:comment “Object containing the properties of the OWS Context Feature.” ;

rdfs:isDefinedBy owc: ;

rdfs:seeAlso <https://tools.ietf.org/html/rfc7946> .

**owc:Offering** a owl:Class ;

rdfs:label “Offering” ;

dcterms:source “OGC 12-084r2, OGC 14-055r2”^^xsd:string ;

vann:example “””

{

“@context”: “https://www.opengis.net/eo-geojson/1.0”,

“type”: “Offering”,

“code”: “http://www.opengis.net/spec/owc-geojson/1.0/req/wcs”,

“operations”: [

{

“code”: “GetCapabilities”,

“method”: “GET”,

“type”: “application/xml”,

“href”: “http://fedeo.esa.int/geoserver/wcs?REQUEST=GetCapabilities&version=2.0.1&service=WCS”

},

{

“code”: “GetCoverage”,

“method”: “GET”,

“type”: “application/x-binary”,

“href”: http://fedeo.esa.int/geoserver/wcs?service=wcs&version=2.0.1&request=getcoverage&coverageid=ASA\_IMM\_1PNIPA20080308\_183226\_000001722066\_00371\_31487\_2902”

}

]

}

“””;

rdfs:comment “Service or inline content offering for the EO product intended to be consumed by OGC-compliant clients. Is defined by OGC 14-055r2.” ;

rdfs:isDefinedBy <http://docs.opengeospatial.org/is/12-084r2/12-084r2.html#54>,

owc: ;

rdfs:seeAlso <http://docs.opengeospatial.org/is/12-084r2/12-084r2.html#54> .

**owc:Operation** a owl:Class ;

rdfs:label “Operation” ;

dcterms:source “OGC 12-084r2, OGC 14-055r2”^^xsd:string ;

rdfs:comment “Defines the operation either to get the information or to get the capabilities. Is defined by OGC 14-055r2.” ;

rdfs:isDefinedBy <http://docs.opengeospatial.org/is/12-084r2/12-084r2.html#60>,

owc: ;

rdfs:seeAlso <http://docs.opengeospatial.org/is/12-084r2/12-084r2.html#60> .

**atom:Link** a owl:Class ;

rdfs:label “Link” ;

dcterms:source “RFC 4287, OGC 14-055r2”^^xsd:string ;

rdfs:comment “A link contains the properties of a hypermedia link to a resource identified by its URI.” ;

rdfs:isDefinedBy atom:,

<https://tools.ietf.org/html/rfc4287#section-4.2.7> ;

rdfs:seeAlso <https://tools.ietf.org/html/rfc4287#section-4.2.7> .

**owc:** a owl:Ontology ;

dc:contributor “John Taylor, CGI”^^xsd:string,

“Olivier Barois, European Space Agency”^^xsd:string ;

dc:creator “Yves Coene, Spacebel s.a.”^^xsd:string ;

dc:date “2018-11-08”^^xsd:string ;

dc:title “OGC 14-055r2 – OGC OWS Context Vocabulary” ;

dcterms:license “http://www.opengeospatial.org/ogc/software” ;

vann:preferredNamespacePrefix “owc” ;

vann:preferredNamespaceUri “http://www.opengis.net/ont/owc/1.0/” ;

void:vocabulary dcterms: ;

rdfs:comment “””This vocabulary defines the classes and properties required to model OWS Context classes and properties inherited by OGC 17-003.

The implementation is derived from the conceptual models defined in the OGC 14-055r2 document.”””^^xsd:string;

owl:versionInfo “1.0.0 D1”^^xsd:string .

1. EO Vocabulary Mapping (Normative)

C.1 Vocabulary to Models Mapping

The table below maps the JSON and EO Vocabulary Properties to the equivalent property in the XML encoding from OGC 10-157r4. It also maps the EO Properties to the equivalent property of the UMM-G Model [OR2], [OR3], [OR4].

The JSON property name included in column 1 corresponds to the JSON-LD property name included in column 2, compacted according to the normative JSON-LD context provided in annex B.2 of the current document.

| **JSON  Property** | **EO Vocabulary Property** | | **OGC 10-157r4 Xpath [OR1]** | | **UMM-G/UMM-Common/UMM-C Property [OR2], [OR3], [OR4]** | | **Comments** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| acquisitionDate | eop:acquisitionDate | | downlinkedTo/DownlinkInformation/ acquisitionDate | |  | |  |
| acquisitionInformation | eop:acquisitionInformation | |  | | UMM-G  Acquisition Information | | Table 5: Properties object properties |
| AcquisitionInformation | eop:AcquisitionInformation (Class) | |  | | UMM-G  Acquisition Information | | Table 14: AcquisitionInformation object properties |
| acquisitionParameters | eop:acquisitionParameters | |  | |  | | Table 14: AcquisitionInformation object properties |
| AcquisitionParameters | eop:AcquisitionParameters (Class) | |  | |  | | Table 18: AcquisitionParameters object properties |
| acquisitionStation | eop:acquisitionStation | | downlinkedTo/DownlinkInformation/ acquisitionStation | |  | | Table 18: AcquisitionParameters object properties |
| acquisitionSubType | eop:acquisitionSubType | | EarthObservationMetadata/ acquisitionSubType | | None identified | | Table 18: AcquisitionParameters object properties |
| acquisitionType | eop:acquisitionType | | EarthObservationMetadata/ acquisitionType | | None identified | | Table 18: AcquisitionParameters object properties |
| acrossTrack IncidenceAngle | eop:acrossTrack IncidenceAngle | | acquisitionParameters/ Acquisition/ acrossTrackIncidenceAngle | | None identified  UMM-G  Coverage Description / AdditionalAttribute | | Table 19: AcquisitionAngles object properties |
| additionalAttributes | eop:additionalAttributes | | EarthObservationMetadata/ vendorSpecific/SpecificInformation | | UMM-G  Data Identification / AdditionalAttributes / AdditionalAttribute/Name  Data Identification / AdditionalAttributes / AdditionalAttribute/Values/Value | | Table 9: Data Identification properties |
| alongTrack IncidenceAngle | eop:alongTrack IncidenceAngle | | acquisitionParameters/Acquisition/ alongTrackIncidenceAngle | | None identified  UMM-G  Coverage Description / AdditionalAttribute | | Table 19: AcquisitionAngles object properties |
| alternates [NR5] | iana:alternate | |  | |  | | Table 6: Links object properties |
| antennaLookDirection | eop:antennaLookDirection | | eop:EarthObservationEquipment/ eop:acquisitionParameters/  sar:Acquisition/ sar:antennaLookDirection | | UMM-G  Acquisition Information /Instrument (or Sensor)  UMM-C  Platform / Instrument / Characteristics | | Table 18: AcquisitionParameters object properties |
| archivingCenter | eop:archivingCenter | | archivedIn/ ArchivingInformation/archivingCenter | | UMM-G  AdditionalAttribute/  ArchiveLocation/distributionInformation | | Table 20: ProductInformation object properties |
| archivingDate | eop:archivingDate | | archivedIn/ ArchivingInformation/archivingDate | |  | | Table 20: ProductInformation object properties |
| ascendingNodeDate | eop:ascendingNodeDate | | EarthObservationEquipment/ acquisitionParameters/ Acquisition/ascendingNodeDate | | Spatial Information / Spatial Option 8 / PlatformOrbitInfo / EquatorCrossingDateTime | | Table 12: OrbitParameters object properties |
| ascendingNodeLongitude | eop:ascendingNodeLongitude | | acquisitionParameters/Acquisition/  ascendingNodeLongitude | | Spatial Information / Spatial Option 8 / PlatformOrbitInfo / EquatorCrossingLongitude | | Table 12: OrbitParameters object properties |
| asWKT | gsp:asWKT | | om:featureOfInterest / eop:Footprint | | Spatial Information / Spatial Extent | | JSON-LD alternative for gj:coordinates to avoid using multi-dimensional arrays. |
| Available | dct:available | |  | |  | | Table 9: Data Identification properties |
| availabilityTime | eop:availabilityTime | | om:resultTime/gml:TimeInstant/ gml:timePosition | | UMM-G  Data Quality Information / production Date Time/ ProductionDateTime | | Table 20: ProductInformation object properties |
| bbox | gj:bbox | |  | | UMM-G  Spatial Information /Spatial Option 4 – Bounding Box  Spatial Information / Spatial Option 5 – Bounding Box with Center Point  Or  UMM-C  SpatialExtent/HorizontalSpatialDomain/ Geometry/BoundingRectangles | | Table 4: EarthObservation object properties |
| beginningDateTime | ical:dtstart | | om:phenomenonTime/ gml:TimePeriod/ gml:beginPosition | | Temporal Information / TemporalExtent/RangeDateTime/ BeginningDateTime  Temporal Information / TemporalExtent/SingleDateTime  Temporal Information / TemporalExtent/PeriodicDateTime/ StartDate | | Table 13: TemporalInformation object properties |
| category | media:category | | eop:EarthObservationResult/ browse/BrowseInformation/type  eop:EarthObservationResult/ Product/ProductInformation/type  eop:EarthObservationResult/ mask/MaskInformation/type | |  | | Table 7: Link object properties |
| cloudCover | eop:cloudCover | | EarthObservationResult/ opt:EarthObservationResult/ opt:cloudCoverPercentage  atm:EarthObservationResult/ atm:cloudCoverPercentage  ssp:EarthObservationResult / ssp:cloudCoverPercentage | | Coverage Description / Cloud Cover | | Table 23: CoverageDescription object properties |
| completionTime FromAscendingNode | eop:completionTime FromAscendingNode | | acquisitionParameters/Acquisition/  completionTimeFromAscendingNode | | None identified  UMM-G  Coverage Description / AdditionalAttribute | | Table 18: AcquisitionParameters object properties |
| compositeType | eop:compositeType | | EarthObservationMetadata/ processing/ProcessingInformation/ compositeType | | None identified  UMM-G  Coverage Description / AdditionalAttribute | | Table 22: ProcessingInformation object properties  Type of composite product expressed as timeperiod that the composite product covers (e.g., P10D for a 10 day composite) |
| conformsTo | dct:conformsTo | | EarthObservationResult/ browse/BrowseInformation/ referenceSystemIdentifier  EarthObservationResult/ product/ProductInformation/ referenceSystemIdentifier  EarthObservationResult/ mask/MaskInformation/ referenceSystemIdentifier | | UMM-G  Coverage Description / AdditionalAttribute  Spatial Information / Tiling Identification System | | Table 7: Link object properties |
| coordinates | gj:coordinates | | EarthObservation/ om:featureOfInterest / eop:Footprint | | Spatial Information / Spatial Extent | | Table 10: Geometry object properties |
| created | dct:created | |  | | Data Identification / Data Date  (CREATE) | | Table 9: Data Identification properties |
| creationDate |  | |  | | Metadata Information / Metadata Date  (CREATE) | | Table 8: MetadataInformation properties |
| cycleNumber | eop:cycleNumber | | alt:Acquisition/  alt:cycleNumber | | UMM-C: TemporalExtent/PeriodicDateTime/ PeriodCycleDurationValue | | Table 18: AcquisitionParameters object properties |
| data [NR5] | iana:enclosure | | EarthObservationResult/ product/ProductInformation/ filename | | UMM-C  RelatedURL | | Table 6: Links object properties  This is the reference to the location of the product itself – so download link  The UMM-C RelatedURL element includes cases where the download link is provided |
| DataIdentification | eop:DataIdentification (Class) | |  | |  | | Has properties defined in Table 9: Data Identification properties. |
| Date | dct:date | | EarthObservation/ om:phenomenonTime/gml:TimePeriod | | UMM-C  TemporalExtent/RangeDateTime  UMM-G  Data Identification / Data Date [R] | | Table 9: Data Identification properties |
| description | dct:description | | EarthObservationEquipment/ instrument/Instrument/description | | UMM-C  Platform/Instrument/Characteristics/Description | | Table 16: Instrument object properties |
| discreteWavelengths | eop:discreteWavelength | | /om:procedure/ eop:EarthObservationEquipment/ sensor/Sensor/wavelengthInformation/ discreteWavelengths | |  | | Table 17: WavelengthInformation object properties |
| doi | eop:doi | | EarthObservationMetadata/ doi | | UMM-C:  Publication Reference  PublicationReference/DOI  UMM-G:  Data Identification / Universal Reference Identifier [R] | | Table 9: Data Identification properties |
| dopplerFrequency | eop:dopplerFrequency | | eop:EarthObservationEquipment/ eop:acquisitionParameters/ sar:Acquisition/ sar:dopplerFrequency | | UMM-G  Acquisition Information /Instrument (or Sensor)  UMM-C  Platform / Instrument / Characteristics | | Table 18: AcquisitionParameters object properties |
| endingDateTime | ical:dtend | | om:phenomenonTime/ gml:TimePeriod/ gml:endPosition | | Temporal Information / TemporalExtent/RangeDateTime/ endingDateTime  Temporal Information / TemporalExtent/SingleDateTime  Temporal Information / TemporalExtent/PeriodicDateTime/ EndDate | | Table 13: TemporalInformation object properties |
| endWavelength | eop:endWavelength | | /om:procedure/ eop:EarthObservationEquipment/ sensor/Sensor/wavelengthInformation/ WavelengthInformation/endWavelength | | UMM-C  Platform/Instrument/Characteristics  ../Name  ../Description  ../DataType  ../Unit  ../Value | | Table 17: WavelengthInformation object properties |
| expression | media:expression | | eop:EarthObservationResult/ browse/BrowseInformation  eop:EarthObservationResult/ Product/ProductInformation  eop:EarthObservationResult/ mask/MaskInformation | |  | | Table 7: Link object properties |
| FeatureCollection | gj:FeatureCollection (Class) | |  | |  | | Table 24: FeatureCollection object properties |
| features | gj:features | |  | |  | | Table 24: FeatureCollection object properties |
| format | dct:format | | EarthObservationMetadata/Processing/ ProcessingInformation/ nativeProductFormat | | UMM-G  Distribution Information / Distribution / (a) Data Format  Data Identification / Data format | | Table 22: ProcessingInformation object properties |
| geometry | gj:geometry | | EarthObservation/ om:featureOfInterest / eop:Footprint | | Spatial Information / Spatial Extent /  HorizontalSpatialDomain  Spatial Information / Spatial Option 1 – Point  Spatial Information / Spatial Option 2 – Line  Spatial Information / Spatial Option 3 – Polygon  Spatial Information / Spatial Option 6 – Polygon with Center Point  Spatial Information / Spatial Option 7 – Polygon with Holes | | Table 4: EarthObservation object properties |
| groundTrackUncertainty | eop:groundTrackUncertainty | | alt:ProcessingInformation/ alt:groundTrackUncertainty | | None identified  UMM-G  Coverage Description / AdditionalAttribute | | Table 18: AcquisitionParameters object properties |
| hasGeometry | gsp:hasGeometry | | om:featureOfInterest / eop:Footprint | | UMM-C  Spatial Information / Spatial Extent | | JSON-LD alternative for gj:geometry to avoid using multi-dimensional arrays. |
| highestLocation | | eop:maximumAltitude | | lmb:Footprint/ lmb:maximumAltitude | | UMM-C  Spatial Information / Spatial Extent / VerticalSpatialDomain | Table 11: Vertical Spatial Domain object properties |
| identifier | | dct:identifier | | EarthObservationMetadata/ identifier | | UMM-G  Data Identification / Producer Identifier | Table 9: Data Identification properties |
| illumination AzimuthAngle | | eop:illumination AzimuthAngle | | acquisitionParameters/Acquisition/ illuminationAzimuthAngle | | None identified  UMM-G  Coverage Description / AdditionalAttribute | Table 19: AcquisitionAngles object properties |
| illumination ElevationAngle | | eop :illumination ElevationAngle | | acquisitionParameters/Acquisition/ illuminationElevationAngle | | None identified  UMM-G  Coverage Description / AdditionalAttribute | Table 19: AcquisitionAngles object properties |
| illumination ZenithAngle | | eop:illumination ZenithAngle | | acquisitionParameters/Acquisition/ illuminationZeniththAngle | |  | Table 19: AcquisitionAngles object properties |
| incidenceAngle | | eop:incidenceAngle | | acquisitionParameters/Acquisition/ incidenceAngle | | None identified  UMM-G  Coverage Description / AdditionalAttribute | Table 19: AcquisitionAngles object properties |
| incidenceAngleVariation | | eop:incidenceAngleVariation | | eop:EarthObservationEquipment/ eop:acquisitionParameters/ sar:Acquisition/ sar:incidenceAngleVariation | | UMM-G  Acquisition Information /Instrument (or Sensor)  UMM-C  Platform / Instrument / Characteristics | Table 19: AcquisitionAngles object properties |
| Instrument | | eop:Instrument (Class) | | om:procedure | | Acquisition Information / Platform / Instrument (uuid) | Table 16: Instrument object properties |
| instrument | | eop:instrument | | om:procedure/ eop:EarthObservationEquipment/  alt:EarthObservationEquipment/ alt:instrument  ssp:EarthObservationEquipment/ ssp:instrument | | Acquisition Information / Platform / Instrument (uuid) | Table 14: AcquisitionInformation object properties |
| instrumentAzimuthAngle | | eop:instrumentAzimuthAngle | | acquisitionParameters/ Acquisition/ instrumentAzimuthAngle | | None identified  UMM-G  Coverage Description / AdditionalAttribute | Table 19: AcquisitionAngles object properties |
| instrumentElevationAngle | | eop:instrumentElevationAngle | | acquisitionParameters/ Acquisition/ instrumentElevationAngle | | None identified  UMM-G  Coverage Description / AdditionalAttribute | Table 19: AcquisitionAngles object properties |
| instrumentShortName | | eop:instrumentShortName | | om:procedure/ EarthObservationEquipment/ instrument/Instrument/shortName | | Acquisition Information / Platform / Instrument[[20]](#footnote-20) / ShortName (UMM-Common) | Table 16: Instrument object properties |
| instrumentZenithAngle | | eop:instrumentZenithAngle | | acquisitionParameters/ Acquisition/ instrumentZenithAngle | | None identified  UMM-G  Coverage Description / AdditionalAttribute | Table 19: AcquisitionAngles object properties |
| lang | | dct:language | |  | | Metadata Information / Metadata Language | Table 8: MetadataInformation properties |
| lastOrbitDirection | | eop:lastOrbitDirection | | EarthObservationEquipment/ acquisitionParameters/ Acquisition/ orbitDirection | | Spatial Information Spatial Option 8 / PlatformOrbitInfo/ | Table 12: OrbitParameters object properties |
| lastOrbitNumber | | eop:lastOrbitNumber | | EarthObservationEquipment/ acquisitionParameters/ Acquisition/ lastOrbitNumber | | Spatial Information / Spatial Option 8 / PlatformOrbitInfo/StopOrbitNumber | Table 12: OrbitParameters object properties |
| length [NR5] | | atom:length | | EarthObservationResult/ product/ProductInformation/ size | |  | Table 7: Link object properties |
| Link | | atom:link (Class) | | EarthObservationResult/ browse/BrowseInformation/filename  EarthObservationResult/ product/ProductInformation/ filename  EarthObservationResult/ mask/MaskInformation/ fileName | |  | Table 7: Link object properties |
| links | | owc:links | |  | |  | Table 5: Properties object properties |
| Links | | owc:Links (Class) | |  | |  | Table 6: Links object properties |
| locationUnit | | eop:altitudeUnit | | lmb:Footprint/ lmb:minimumAltitude  lmb:Footprint/ lmb:maximumAltitude  (gml:MeasureType) | | UMM-C  Spatial Information / Spatial Extent / VerticalSpatialDomain | Table 11: Vertical Spatial Domain object properties |
| lowestLocation | | eop:minimumAltitude | | lmb:Footprint/ lmb:minimumAltitude | | UMM-C  Spatial Information / Spatial Extent / VerticalSpatialDomain | Table 11: Vertical Spatial Domain object properties |
| maximum IncidenceAngle | eop:maximum IncidenceAngle | | | eop:EarthObservationEquipment/ eop:acquisitionParameters/ sar:Acquisition/ sar:maximumIncidenceAngle | | UMM-G  Acquisition Information /Instrument (or Sensor)  UMM-C  Platform / Instrument / Characteristics | Table 19: AcquisitionAngles object properties |
| measurementType | eop:measurementType | | | lmb:Sensor/ lmb:measurementType | |  | Table 18: AcquisitionParameters object properties |
| minimum IncidenceAngle | eop:minimum IncidenceAngle | | | eop:EarthObservationEquipment/ eop:acquisitionParameters/ sar:Acquisition/ sar:minimumIncidenceAngle | | UMM-G  Acquisition Information /Instrument (or Sensor)  UMM-C  Platform / Instrument / Characteristics | Table 19: AcquisitionAngles object properties |
| operationalMode | eop:operationalMode | | | EarthObservationEquipment/ sensor/Sensor/operationalMode | | UMM-C  Platform/Instrument/OperationalMode | Table 18: AcquisitionParameters object properties |
| orbitDirection | eop:orbitDirection | | | EarthObservationEquipment/ acquisitionParameters/ Acquisition/ orbitDirection | | Spatial Information Spatial Option 8 / PlatformOrbitInfo | Table 12: OrbitParameters object properties |
| orbitDuration | eop:orbitDuration | | | EarthObservationEquipment/ acquisitionParameters/Acquisition/ orbitDuration | | UMM-C  SpatialExtent/OrbitParameters/Period | Table 12: OrbitParameters object properties |
| orbitNumber | eop:orbitNumber | | | EarthObservationEquipment/ acquisitionParameters/Acquisition/ orbitNumber | | Spatial Information / Spatial Option 8 / PlatformOrbitInfo/OrbitNumber  Spatial Information Spatial Option 8 / PlatformOrbitInfo/StartOrbitNumber | Table 12: OrbitParameters object properties |
| orbitType | eop:orbitType | | | EarthObservationEquipment/ platform/Platform/orbitType | | None identified  UMM-G  Coverage Description / AdditionalAttribute | Table 15: Platform object properties |
| parentIdentifier | eop:parentIdentifier | | | EarthObservationMetadata/ parentIdentifier | | Data Identification / Parent Collection Identifier [R]  e.g., (a) ShortName | Table 9: Data Identification properties |
| pitch | eop:pitch | | | EarthObservationEquipment/ acquisitionParameters/ Acquisition/pitch | | None identified  UMM-G  Coverage Description / AdditionalAttribute | Table 19: AcquisitionAngles object properties |
| Platform | eop:Platform (Class) | | | om:procedure  EarthObservationEquipment | |  | Table 15: Platform object properties |
| platform | eop:platform | | | om:procedure/ eop:EarthObservationEquipment/  alt:EarthObservationEquipment/ alt:platform  ssp:EarthObservationEquipment/ ssp:platform | | UMM-G  Acquisition Information / Platform | Table 14: AcquisitionInformation object properties |
| platformSerialIdentifier | eop:platformSerialIdentifier | | | EarthObservationEquipment/ platform/Platform/serialIdentifier | |  | Table 15: Platform object properties |
| platformShortName | eop:platformShortName | | | EarthObservationEquipment/ platform/Platform/shortName | | Acquisition Information / Platform / ShortName (UMM-Common ) | Table 15: Platform object properties |
| polarisationChannels | eop:polarisationChannels | | | eop:EarthObservationEquipment/ eop:acquisitionParameters/ sar:Acquisition/ sar:polarisationChannels | | UMM-G  Acquisition Information /Instrument (or Sensor)  UMM-C  Platform / Instrument / Characteristics | Table 18: AcquisitionParameters object properties |
| polarisationMode | eop:polarisationMode | | | eop:EarthObservationEquipment/ eop:acquisitionParameters/ sar:Acquisition/ sar:polarisationMode | | UMM-G  Acquisition Information /Instrument (or Sensor)  UMM-C  Platform / Instrument / Characteristics | Table 18: AcquisitionParameters object properties |
| previews [NR5] | iana:icon | | | EarthObservationResult/ browse/BrowseInformation/ filename | | Data Identification / Browse Graphic | Table 6: Links object properties |
| processingCenter | eop:processingCenter | | | EarthObservationMetadata/ processing/ ProcessingInformation/ processingCenter | | Data Identification / Processing Center (Part of UMM-C) | Table 22: ProcessingInformation object properties |
| processingDate | eop:processingDate | | | EarthObservationMetadata/ processing/ ProcessingInformation/ processingDate | | Data Quality Information / Production Date Time | Table 22: ProcessingInformation object properties |
| processingLevel | eop:processingLevel | | | EarthObservationMetadata/ processing/ProcessingInformation/ processingLevel | | Data Identification / Processing Level (Part of UMM-C) | Table 22: ProcessingInformation object properties |
| processingMethod | eop:processingMethod | | | EarthObservationMetaData/ processing/ProcessingInformation/ processingMethod | | UMM-G  Data Quality Information  Product Generation Executive (PGE) Information  PGEVersionClass/PGEName | Table 22: ProcessingInformation object properties |
| processingMethodVersion | eop:processingMethodVersion | | | EarthObservationMetaData/ processing/ProcessingInformation/ processingMethodVersion | | UMM-G  Data Quality Information  Product Generation Executive (PGE) Information  PGEVersionClass/PGEVersion | Table 22: ProcessingInformation object properties |
| processingMode | eop:processingMode | | | EarthObservationMetaData/ processing/ProcessingInformation/ processingMode | |  | Table 22: ProcessingInformation object properties |
| processorName | eop:processorName | | | EarthObservationMetadata/ processing/ ProcessingInformation/ processorName | | UMM-G  Data Quality Information  Product Generation Executive (PGE) Information  PGEVersionClass/PGEName | Table 22: ProcessingInformation object properties |
| processorVersion | eop:processorVersion | | | EarthObservationMetadata/ processing/ ProcessingInformation/ processorVersion | | UMM-G  Data Quality Information  Product Generation Executive (PGE) Information  PGEVersionClass/PGEVersion | Table 22: ProcessingInformation object properties |
| productContentsType | eop:productContentsType | | | alt:ProcessingInformation/ alt:productContentsType | | None identified  UMM-G  Data Identification / AdditionalAttribute | Table 22: ProcessingInformation object properties |
| productGroupId | eop:productGroupId | | | EarthObservationMetadata/ productGrouptId | | UMM-C: Entry Title  UMM-G: Data Quality Information / Element Specification / reprocessing Lineage / Element Specification | Table 20: ProductInformation object properties |
| productInformation | eop:productInformation | | |  | |  | Table 5: Properties object properties |
| ProductInformation | eop:ProductInformation (Class) | | |  | |  | Table 20: ProductInformation object properties |
| productType | eop:productType | | | EarthObservationMetadata/ productType | | UMM-C: Entry Title  UMM-G: Data Quality Information / Element Specification / reprocessing Lineage / Element Specification | Table 20: ProductInformation object properties |
| productVersion | eop:productVersion | | |  | | Data Identification / Local Version Identifier | Table 20: ProductInformation object properties |
| profiles | iana:profile | | |  | |  |  |
| properties | gj:properties | | |  | |  | Table 4: EarthObservation object properties |
| Properties | gj:Properties (Class) | | |  | |  | Table 5: Properties object properties. |
| published | dct:issued | | |  | | Metadata Information / Metadata Date [R]  (CREATE) | Table 8: MetadataInformation properties |
| qualityDegradation | eop:qualityDegradation | | | EarthObservationMetadata/ productQualityDegradation | | None identified | Table 21: QualityInformation object properties |
| qualityDe:w!gradation QuotationMode | eop:qualityDegradation QuotationMode | | | EarthObservationMetadata/ productQualityDegradation QuotationMode | | None identified | Table 21: QualityInformation object properties |
| qualityDegradationTag | eop:qualityDegradationTag | | | EarthObservationMetadata/ productQualityDegradationTag | |  | Table 21: QualityInformation object properties |
| qualityInformation | eop:qualityInformation | | |  | |  | Table 20: ProductInformation object properties |
| QualityInformation | eop:QualityInformation (Class) | | |  | |  | Table 21: QualityInformation object properties |
| qualityReport | iana:describedby | | | EarthObservationMetadata/ productQualityReportURL | |  | Table 6: Links object properties |
| qualityStatus | eop:qualityStatus | | | EarthObservationMetadata/ productQualityStatus | | None identified | Table 21: QualityInformation object properties |
| referenceSystemIdentifier | eop:referenceSystemIdentifier | | | product/ProductInformation/ referenceSystemIdentifier | | UMM-C  Spatial Extent /  HorizontalSpatialDomain/Geometry/CoordinateSystem  Or  GranuleSpatialRepresentation | Table 20: ProductInformation object properties |
| related | iana:related | | |  | |  | Table 6: Links object properties |
| relativeOrbitNumber | eop:relativeOrbitNumber | | | alt:Acquisition/alt:relativePassNumber | | None identified  UMM-G  Coverage Description / AdditionalAttribute | Table 18: AcquisitionParameters object properties |
| resolution | eop:resolution | | | EarthObservationEquipment/ sensor/Sensor/resolution | | UMM-C  Platform/Instrument/Characteristics/Unit | Table 18: AcquisitionParameters object properties |
| roll | eop:roll | | | acquisitionParameters/ Acquisition/roll | | None identified  UMM-G  Coverage Description / AdditionalAttribute | Table 19: AcquisitionAngles object properties |
| samplingRates | eop:samplingRate | | | alt:ProcessingInformation/ alt: samplingRate | |  | Table 18: AcquisitionParameters object properties |
| sensorType | eop:sensorType | | | EarthObservationEquipment/ sensor/Sensor/sensorType | | UMM-Common  Acquisition Information / Platform/Instrument/Technique | Table 16: Instrument object properties |
| size | eop:size | | | product/ ProductInformation/ size | | Distribution Information / Distribution / (b) File Size | Table 20: ProductInformation object properties |
| snowCover | eop:snowCover | | | opt:EarthObservationResult/ opt:snowCoverPercentage  atm:EarthObservationResult/ atm:snowCoverPercentage  ssp:EarthObservationResult / ssp:snowCoverPercentage | |  | Table 23: CoverageDescription object properties |
| spectralRange | eop:spectralRange | | | /om:procedure/ eop:EarthObservationEquipment/ sensor/Sensor/wavelengthInformation/ WavelengthInformation/spectralRange | | UMM-C  Platform/Instrument/Characteristics  ../Name  ../Description  ../DataType  ../Unit  ../Value | Table 17: WavelengthInformation object properties |
| startTimeFrom AscendingNode | eop:startTimeFrom AscendingNode | | | acquisitionParameters/ Acquisition/ startTimeFromAscendingNode | | None identified  UMM-G  Coverage Description / AdditionalAttribute | Table 18: AcquisitionParameters object properties |
| startWavelength | eop:startWavelength | | | /om:procedure/ eop:EarthObservationEquipment/ sensor/Sensor/wavelengthInformation/ WavelengthInformation/startWavelength | | UMM-C  Platform/Instrument/Characteristics  ../Name  ../Description  ../DataType  ../Unit  ../Value | Table 17: WavelengthInformation object properties |
| status | eop:status | | | EarthObservationMetadata/ eop:status | | UMM-C  Data Identification/Collection Progress  UMM-G  Coverage Description / AdditionalAttribute | Table 5: Properties object properties |
| statusDetail | eop:statusDetail | | | EarthObservationMetaData/ statusDetail | | UMM-C  Platform/Instrument/Characteristics  ../Name  ../Description  ../DataType  ../Unit  ../Value | Table 20: ProductInformation object properties |
| statusSubType | eop:statusSubType | | | EarthObservationMetaData/ statusSubType | | UMM-C  Platform/Instrument/Characteristics  ../Name  ../Description  ../DataType  ../Unit  ../Value | Table 20: ProductInformation object properties |
| swathIdentifier | eop:swathIdentifier | | | EarthObservationEquipment/ sensor/Sensor/swathIdentifier | | None identified  UMM-G  Coverage Description / AdditionalAttribute | Table 18: AcquisitionParameters object properties |
| tileId | eop:tileId | | | N/A | | UMM-G  AdditionalAttribute/  TileID, geographicIdentifier | Table 18: AcquisitionParameters object properties |
| timeliness | eop:timeliness | | | product/ ProductInformation/timeliness | | None identified  UMM-G  Coverage Description / AdditionalAttribute | Table 20: ProductInformation object properties |
| title | dct:title | | | E.g., EarthObservationMetadata/ identifier | | UMM-G  Data Identification / Producer Identifier  Data Identification / Universal Reference Identifier | Table 7: Link object properties  Table 9: Data Identification properties |
| type [NR5] | atom:type | | |  | |  | Table 7: Link object properties |
| up | iana:up | | |  | |  | Table 6: Links object properties |
| updated | dct:modified | | | EarthObservation/om:resultTime/ gml:TimeInstant/ gml:timePosition  /eop:metaDataProperty/ eop:EarthObservationMetaData/ eop:modificationDate  EarthObservationMetadata/ creationDate | | Metadata Information / Metadata Date [R]  (UPDATE) | Table 8: MetadataInformation properties |
| version | eop:version | | | product/ProductInformation/ version | | UMM-G  Local Version Identifier/LocalVersionId  Or  UMM-C  Resource Citation / Version | Table 20: ProductInformation object properties |
| verticalResolution | eop:verticalResolution | | | atm:EarthObservationResult/ atm:dataLayers/ atm:DataLayer/ atm:verticalResolution  lmb:Acquisition/ lmb:verticalResolution | | UMM-C  Platform/Instrument/Characteristics/Unit | Table 18: AcquisitionParameters object properties |
| via [NR5] | iana:via | | | ssp:EarthObservationMetaData/ ssp:derivedFrom | |  | Table 6: Links object properties |
| WavelengthInformation | eop:WavelengthInformation (Class) | | | /om:procedure/ eop:EarthObservationEquipment/ sensor/Sensor/wavelengthInformation/ WavelengthInformation | | UMM-C  Platform/Instrument/Characteristics  ../Name | Table 17: WavelengthInformation object properties |
| wavelengthResolution | eop:wavelengthResolution | | | /om:procedure/ eop:EarthObservationEquipment/ sensor/Sensor/wavelengthInformation/ WavelengthInformation/ wavelengthResolution | | UMM-C  Platform/Instrument/Characteristics  ../Name | Table 17: WavelengthInformation object properties |
| wavelengths | eop:wavelengths | | | /om:procedure/ eop:EarthObservationEquipment/ sensor/Sensor/wavelengthInformation | | UMM-C  Platform/Instrument/Characteristics  ../Name | Table 18: AcquisitionParameters object properties |
| wrsLatitudeGrid | eop:wrsLatitudeGrid | | | /om:procedure/ eop:EarthObservationEquipment/ eop:acquisitionParameters/ eop:Acquisition/ eop:wrsLatitudeGrid | | UMM-C  Tiling Identification System  TilingIdentificationSystem/Coordinate2  Also there are  UMM-G  AdditionalAttribute/  WRSPath geographicIdentifier | Table 18: AcquisitionParameters object properties |
| wrsLongitudeGrid | eop:wrsLongitudeGrid | | | /om:procedure/ eop:EarthObservationEquipment/ eop:acquisitionParameters/ eop:Acquisition/eop:wrsLongitudeGrid | | UMM-C  Tiling Identification System  TilingIdentificationSystem/Coordinate1  UMM-G  AdditionalAttribute/  WRSRow, geographicIdentifier | Table 18: AcquisitionParameters object properties |
| yaw | eop:yaw | | | acquisitionParameters/  Acquisition/yaw | | None identified  UMM-G  Coverage Description / AdditionalAttribute | Table 19: AcquisitionAngles object properties |
| ZZZ |  | | | EarthObservationMetadata/ vendorSpecific/SpecificInformation | | Acquisition Information / Platform / Characteristics (UMM-Common ) |  |
| ZZZ |  | | | EarthObservationMetadata/ vendorSpecific/SpecificInformation | | Acquisition Information / Platform / Instrument / Characteristics (UMM-Common) |  |
| ZZZ |  | | |  | | Acquisition Information / Platform / Instrument / LongName (UMM-Common) |  |
| ZZZ |  | | |  | | Acquisition Information / Platform / Instrument / Technique (UMM-Common) |  |
| ZZZ |  | | |  | | Acquisition Information / Platform / LongName (UMM-Common ) |  |
| ZZZ |  | | |  | | Acquisition Information / Platform / Type (UMM-Common ) |  |
| ZZZ |  | | |  | | Acquisition Information / Project |  |
| ZZZ |  | | | EarthObservationMetadata/ vendorSpecific/SpecificInformation | | Coverage Description / Day Night Flag |  |
| ZZZ |  | | |  | | Distribution Information / Related URL |  |
| ZZZ |  | | |  | | Spatial Information / Spatial Extent /  OrbitParameters |  |
| ZZZ |  | | |  | | Spatial Information / Spatial Extent /  Zone Identifier |  |
| ZZZ |  | | | alt:Acquisition/alt:isSegment | |  |  |
| ZZZ |  | | | alt:Acquisition/alt:relativePassNumber | |  |  |
| ZZZ |  | | | alt:EarthObservationEquipment/ alt:auxiliaryInstrument | |  |  |
| ZZZ |  | | | alt:EarthObservationEquipment/ alt:auxiliaryInstrument/ alt:instrumentType | |  |  |
| ZZZ |  | | | alt:Footprint/alt:nominalTrack | |  |  |
| ZZZ |  | | | alt:ProcessingInformation/ alt:groundTrackUncertainty | |  |  |
| ZZZ |  | | | alt:ProcessingInformation/ alt:productContentsType | |  |  |
| ZZZ |  | | | archivedIn/ArchivingInformation/ archivingIdentifier | |  |  |
| ZZZ |  | | | atm:EarthObservationResult/ atm:dataLayers/ atm:DataLayer/ atm:algorithmName | |  |  |
| ZZZ |  | | | atm:EarthObservationResult/ atm:dataLayers/ atm:DataLayer/ atm:algorithmVersion | |  |  |
| ZZZ |  | | | atm:EarthObservationResult/ atm:dataLayers/ atm:DataLayer/ atm:speciesError | |  |  |
| ZZZ |  | | | atm:EarthObservationResult/ atm:dataLayers/ atm:DataLayer/ atm:species | |  |  |
| ZZZ |  | | | atm:EarthObservationResult/ atm:dataLayers/ atm:DataLayer/ atm:unit | |  |  |
| ZZZ |  | | | atm:EarthObservationResult/ atm:dataLayers/ atm:DataLayer/ atm:verticalRange | |  |  |
| ZZZ |  | | | EarthObservationMetadata/ composedOf | |  | Table 6: Links object properties  atom:section (RFC5988) |
| ZZZ |  | | | EarthObservationMetadata/ histograms | |  |  |
| ZZZ |  | | | EarthObservationMetadata/ linkedWith | |  | Table 6: Links object properties  atom:related (RFC5988) |
| ZZZ |  | | | EarthObservationMetadata/ productGroupId | |  |  |
| ZZZ |  | | | EarthObservationMetadata/ subsetOf | |  | Table 6: Links object properties  atom:subsection (RFC5988) |
| ZZZ |  | | | EarthObservationMetadata/Processing/ ProcessingInformation/ auxiliaryDataSetFileName | |  |  |
| ZZZ |  | | | EarthObservationResult/ opt:EarthObservationResult/ opt:cloudCoverPercentage AssessmentConfidence | |  |  |
| ZZZ |  | | | EarthObservationResult/ opt:EarthObservationResult/ opt:cloudCoverPercentage QuotationMode | |  |  |
| ZZZ |  | | | EarthObservationResult/coverage | |  |  |
| ZZZ |  | | | EarthObservationResult/parameter/ ParameterInformation/phenomenon | |  |  |
| ZZZ |  | | | EarthObservationResult/parameter/ ParameterInformation/unitOfMeasure | |  |  |
| ZZZ |  | | | lmb:Acquisition/ lmb:observationMode | |  |  |
| ZZZ |  | | | lmb:Footprint/ lmb:nominalTrack | |  |  |
| ZZZ |  | | | lmb:Footprint/ lmb:occultationPoints | |  |  |
| ZZZ |  | | | om:procedure/ EarthObservationEquipment/ instrument/Instrument/instrumentType | |  |  |
| ZZZ |  | | | opt:EarthObservationResult/ opt:snowCoverPercentage AssessmentConfidence | |  |  |
| ZZZ |  | | | opt:EarthObservationResult/ opt:snowCoverPercentage QuotationMode | |  |  |
| ZZZ |  | | | ssp:EarthObservationMetaData/ ssp: nominalDate | |  |  |
| ZZZ |  | | | ssp:Footprint/ gml:locationName | |  |  |

1. Encoding Examples (Non-Normative)

Extracts of the following examples were used in the body of the document. The current Annex includes the complete examples in their original metadata format and in the proposed encodings.

The following tools were very useful to improve readability and check the examples:

* XMLSpy (<http://www.altova.com>)
* <http://json-ld.org/playground/>.
* <http://rdf-translator.appspot.com/>
* <http://geojsonlint.com/>
* <http://jsonpath.com/>

D.1 Metadata Examples

D.1.1 Example 1: Seasat (Radar)

D.1.1.1 OGC 10-157r4

<?xml version=”1.0” encoding=”UTF-8”?>

<sar:EarthObservation xmlns:sar=”http://www.opengis.net/sar/2.0” xmlns:gml=”http://www.opengis.net/gml/3.2” xmlns:eop=”http://www.opengis.net/eop/2.0” xmlns:om=”http://www.opengis.net/om/2.0” xmlns:ows=”http://www.opengis.net/ows/2.0” xmlns:xlink=”http://www.w3.org/1999/xlink” xmlns:xsi=”http://www.w3.org/2001/XMLSchema-instance” gml:id=”ID\_64dd0a6f-72bd-40c9-a8cd-10fe33c6516b” xsi:schemaLocation=”http://www.opengis.net/sar/2.0 https://svn.opengeospatial.org/ogc-projects/cite/scripts/wcseo/1.0/tags/r1/resources/omeo/sar.xsd”>

<om:phenomenonTime>

<gml:TimePeriod gml:id=”tp\_64dd0a6f-72bd-40c9-a8cd-10fe33c6516b”>

<gml:beginPosition>1978-09-27T01:04:30Z</gml:beginPosition>

<gml :endPosition>1978-09-27T01 :04 :45Z</gml :endPosition>

</gml:TimePeriod>

</om:phenomenonTime>

<om:resultTime>

<gml:TimeInstant gml:id=”archivingdate\_64dd0a6f-72bd-40c9-a8cd-10fe33c6516b”>

<gml :timePosition>2014-10-04T04 :19 :17Z</gml :timePosition>

</gml:TimeInstant>

</om:resultTime>

<om:procedure>

<eop:EarthObservationEquipment gml:id=”eoe\_64dd0a6f-72bd-40c9-a8cd-10fe33c6516b”>

<eop:platform>

<eop:Platform>

<eop:shortName>Seasat</eop:shortName>

<eop:serialIdentifier>1</eop:serialIdentifier>

</eop:Platform>

</eop:platform>

<eop:instrument>

<eop:Instrument>

<eop:shortName>SAR</eop:shortName>

</eop :Instrument>

</eop :instrument>

<eop :sensor>

<eop :Sensor>

<eop :sensorType>RADAR</eop :sensorType>

<eop:operationalMode>IM</eop:operationalMode>

</eop :Sensor>

</eop :sensor>

<eop :acquisitionParameters>

<sar :Acquisition>

<eop:orbitNumber>1316</eop:orbitNumber>

<eop:orbitDirection>DESCENDING</eop:orbitDirection>

<sar :polarisationMode>S</sar :polarisationMode>

<sar :polarisationChannels>HH</sar :polarisationChannels>

<sar :antennaLookDirection>RIGHT</sar :antennaLookDirection>

<sar :minimumIncidenceAngle uom= »deg »>19.6</sar :minimumIncidenceAngle>

<sar :maximumIncidenceAngle uom= »deg »>9.6</sar :maximumIncidenceAngle>

<sar :incidenceAngleVariation uom= »deg »>9.6</sar :incidenceAngleVariation>

</sar:Acquisition>

</eop:acquisitionParameters>

</eop:EarthObservationEquipment>

</om:procedure>

<om:observedProperty nilReason=”inapplicable”/>

<om:featureOfInterest>

<eop:Footprint gml:id=”fp\_64dd0a6f-72bd-40c9-a8cd-10fe33c6516b”>

<eop:multiExtentOf>

<gml:MultiSurface gml:id=”ms\_64dd0a6f-72bd-40c9-a8cd-10fe33c6516b” srsName=”EPSG:4326”>

<gml:surfaceMembers>

<gml:Polygon gml:id=”fppoly\_64dd0a6f-72bd-40c9-a8cd-10fe33c6516b”>

<gml:exterior>

<gml:LinearRing>

<gml:posList>63.261372 -2.682513 61.997604 -2.695740 61.965195 0.005087 63.227173 0.135472 63.261372 -2.682513</gml:posList>

</gml:LinearRing>

</gml:exterior>

</gml:Polygon>

</gml:surfaceMembers>

</gml:MultiSurface>

</eop:multiExtentOf>

</eop:Footprint>

</om:featureOfInterest>

<om:result>

<eop:EarthObservationResult gml:id=”eor\_64dd0a6f-72bd-40c9-a8cd-10fe33c6516b”>

<eop:browse>

<eop:BrowseInformation>

<eop:type>QUICKLOOK</eop:type>

<eop:referenceSystemIdentifier codeSpace=”EPSG”>epsg:4326</eop:referenceSystemIdentifier>

<eop:fileName>

<ows:ServiceReference xlink:href=”http://tpm-ds.eo.esa.int/metadata/SEA\_GEC\_1P/1978/09/27/SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F.BI.PNG”>

<ows:RequestMessage/>

</ows:ServiceReference>

</eop:fileName>

</eop:BrowseInformation>

</eop:browse>

<eop:product>

<eop:ProductInformation>

<eop:fileName>

<ows:ServiceReference xlink:href=”http://tpm-ds.eo.esa.int/products/SEA\_GEC\_1P/1978/09/27/SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F.ZIP”>

<ows:RequestMessage xlmns=”http://www.opengis.net/ows/2.0”/>

</ows:ServiceReference>

</eop:fileName>

<eop:version>1.0</eop:version>

<eop:size uom=”bytes”>255211520</eop:size>

</eop:ProductInformation>

</eop:product>

</eop:EarthObservationResult>

</om:result>

<eop:metaDataProperty>

<eop:EarthObservationMetaData>

<eop :identifier>SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F</eop :identifier>

<eop :parentIdentifier>SEA\_GEC\_1P</eop :parentIdentifier>

<eop :acquisitionType>NOMINAL</eop :acquisitionType>

<eop :acquisitionSubType>DEFAULT</eop :acquisitionSubType>

<eop:productType>SEA\_GEC\_1P</eop:productType>

<eop:status>ARCHIVED</eop:status>

<eop:processing>

<eop:ProcessingInformation/>

</eop:processing>

</eop:EarthObservationMetaData>

</eop:metaDataProperty>

</sar:EarthObservation>

D.1.1.2 GeoJSON

{

“type”: “Feature”,

“id”: “http://fedeo.esa.int/opensearch/request/?parentIdentifier=SEA\_GEC\_1P&uid=SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F”,

“bbox”: [

-2.69574,

61.965195,

0.135472,

63.261372

],

“geometry”: {

“coordinates”: [

[

[

-2.682513,

63.261372

],

[

-2.69574,

61.997604

],

[

0.005087,

61.965195

],

[

0.135472,

63.227173

],

[

-2.682513,

63.261372

]

]

],

“type”: “Polygon”

},

“properties”: {

“status”: “ARCHIVED”,

« parentIdentifier » : « SEA\_GEC\_1P »,

« title » : « SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F »,

« identifier » : « SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F »,

« doi » : « 10.15489/mf87c2zjgo59 »,

« date » : « 2016-07-02T18 :13 :41.34Z/2016-07-02T18 :14 :06.34Z »,

“updated”: “2017-01-26T11:30:18Z”,

“links”: {

“data”: [

{

“href”: “http://tpm-ds.eo.esa.int/products/SEA\_GEC\_1P/1978/09/27/SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F.ZIP”,

“type”: “application/binary”,

“title”: “Download”

}

],

“previews”: [

{

“href”: “http://tpm-ds.eo.esa.int/metadata/SEA\_GEC\_1P/1978/09/27/SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F.BI.PNG”,

“type”: “image/png”,

“title”: “Quicklook”,

“category”: “QUICKLOOK”,

“expression”: “sample”,

“conformsTo”: “http://www.opengis.net.def/crs/EPSG/0/4326”

}

],

“alternates”: [

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/atom%2Bxml&parentIdentifier=SEA\_GEC\_1P&uid=SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F”,

“type”: “application/atom+xml”,

“title”: “Atom format”

}

]

},

“acquisitionInformation”: [

{

“platform”: {

“id”: “http://gcmdservices.gsfc.nasa.gov/kms/concept/1bffe898-f4a2-458e-92c5-cd7c9c1cd5f0”,

“platformShortName”: “Seasat”,

“platformSerialIdentifier”: “1”

},

“instrument”: {

“id”: “http://gcmdservices.gsfc.nasa.gov/kms/concept/a37282d4-322c-4dd0-8edc-36099b9b586c”,

“sensorType”: “RADAR”,

“instrumentShortName”: “SAR”

},

“acquisitionParameters”: {

“operationalMode”: “IM”,

“polarisationMode”: “S”,

“polarisationChannels”: “HH”,

“beginningDateTime”: “1978-09-27T01:04:30Z”,

“endingDateTime”: “1978-09-27T01:04:45Z”,

“acquisitionType”: “NOMINAL”,

“acquisitionSubType”: “DEFAULT”,

“orbitNumber”: 1316,

“orbitDirection”: “DESCENDING”,

“antennaLookDirection”: “RIGHT”,

“acquisitionAngles”: {

“minimumIncidenceAngle”: 19.6,

“maximumIncidenceAngle”: 9.6,

“incidenceAngleVariation”: 9.6

}

}

}

],

“productInformation”: {

“productType”: “SEA\_GEC\_1P”,

“size”: 255211520,

“availabilityTime”: “1978-09-27T01:04:45Z”

}

}

}

D.1.1.3 JSON-LD (Compacted)

{

***“@context”: “http://schemas.opengis.net/eo-geojson/1.0/eo-geojson.jsonld”,***

“type”: “Feature”,

“id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/geo%2Bjson&parentIdentifier=EOP:ESA:OADS:SEA\_GEC\_1P&uid=SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F”,

“geometry”: {

“type”: “Polygon”,

“coordinates”: [

[

[

-2.682513,

63.261372

],

[

-2.69574,

61.997604

],

[

0.005087,

61.965195

],

[

0.135472,

63.227173

],

[

-2.682513,

63.261372

]

]

]

},

“properties”: {

“status”: “ARCHIVED”,

« parentIdentifier » : « SEA\_GEC\_1P »,

« title » : « SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F »,

« identifier » : « SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F »,

« date » : « 1978-09-27T01 :04 :30Z/1978-09-27T01 :04 :45Z »,

« updated » : « 2017-04-11T13 :36 :16Z »,

“links”: {

“alternates”: [

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/atom%2Bxml&parentIdentifier=EOP:ESA:OADS:SEA\_GEC\_1P&uid=SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F&recordSchema=server-choice”,

“type”: “application/atom+xml”,

“title”: “Atom format”

},

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/gml%2Bxml&parentIdentifier=EOP:ESA:OADS:SEA\_GEC\_1P&uid=SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F&recordSchema=om10”,

“type”: “application/gml+xml;profile=http://www.opengis.net/spec/EOMPOM/1.0”,

“title”: “O&M metadata”

},

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/gml%2Bxml&parentIdentifier=EOP:ESA:OADS:SEA\_GEC\_1P&uid=SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F&recordSchema=om”,

“type”: “application/gml+xml;profile=http://www.opengis.net/spec/EOMPOM/1.1”,

“title”: “O&M 1.1 metadata”

},

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/rdf%2Bxml&parentIdentifier=EOP:ESA:OADS:SEA\_GEC\_1P&uid=SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F&recordSchema=server-choice”,

“type”: “application/rdf+xml”,

“title”: “RDF/XML format”

},

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/ld%2Bjson&parentIdentifier=EOP:ESA:OADS:SEA\_GEC\_1P&uid=SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F&recordSchema=server-choice”,

“type”: “application/ld+json”,

“title”: “JSON-LD format”

},

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=text/turtle&parentIdentifier=EOP:ESA:OADS:SEA\_GEC\_1P&uid=SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F&recordSchema=server-choice”,

“type”: “text/turtle”,

“title”: “Turtle format”

}

],

“data”: [

{

“href”: “http://tpm-ds.eo.esa.int/products/SEA\_GEC\_1P/1978/09/27/SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F.ZIP”,

“type”: “application/x-binary”,

“title”: “Download”

}

],

“previews”: [

{

“href”: “http://tpm-ds.eo.esa.int/metadata/SEA\_GEC\_1P/1978/09/27/SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F.BI.PNG”,

“type”: “image/png”,

“title”: “Quicklook”,

“category”: “QUICKLOOK”,

“expression”: “sample”,

“conformsTo”: “http://www.opengis.net.def/crs/EPSG/0/4326”

}

],

“up”: [

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/atom%2Bxml&uid=SEA\_GEC\_1P&recordSchema=iso”,

“type”: “application/atom+xml”,

“title”: “Up”

}

]

},

« acquisitionInformation » : [

{

« platform » : {

« @id » : « http ://gcmdservices.gsfc.nasa.gov/kms/concept/1bffe898-f4a2-458e-92c5-cd7c9c1cd5f0 »,

“platform”: “Seasat”,

“platformSerialIdentifier”: “1”

},

“instrument”: {

“@id”: “http://gcmdservices.gsfc.nasa.gov/kms/concept/a37282d4-322c-4dd0-8edc-36099b9b586c”,

“instrumentShortName”: “SAR”,

“sensorType”: “RADAR”

},

“acquisitionParameters”: {

“operationalMode”: “IM”,

“polarisationMode”: “S”,

“polarisationChannels”: “HH”,

“beginningDateTime”: “1978-09-27T01:04:30Z”,

“endingDateTime”: “1978-09-27T01:04:45Z”,

“orbitDirection”: “DESCENDING”,

“orbitNumber”: 1316,

« acquisitionType » : « NOMINAL »,

« acquisitionSubType » : « DEFAULT »,

« wrsLongitudeGrid » : « 0 »,

« antennaLookDirection » : « RIGHT »,

« acquisitionAngles » : {

« minimumIncidenceAngle » : 19.6,

« maximumIncidenceAngle » : 29.2,

« incidenceAngleVariation » : 9.6

}

}

}

],

« productInformation » : {

« productType » : « SEA\_GEC\_1P »,

« size » : 255211520,

« availabilityTime » : « 2014-10-04T04 :19 :17Z »,

« referenceSystemIdentifier » : « epsg :4326 »

}

}

}

D.1.1.4 JSON-LD (Expanded)

{

“@context”: {

“eop”: “http://www.opengis.net/ont/eo-geojson/1.0/”,

“xsd”: “http://www.w3.org/2001/XMLSchema#”,

“dct”: “http://purl.org/dc/terms/”,

“atom”: “http://www.w3.org/2005/Atom/”,

“iana”: “http://www.iana.org/assignments/relation/”,

“owc”: “http://www.opengis.net/ont/owc/1.0/”,

“gj”: “https://purl.org/geojson/vocab#”,

“gsp”: “http://www.opengis.net/ont/geosparql#”,

“ical”: “http://www.w3.org/2002/12/cal/ical#”,

“media”: “http://search.yahoo.com/mrss/”

},

“@id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/geo%2Bjson&parentIdentifier=EOP:ESA:OADS:SEA\_GEC\_1P&uid=SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F”,

“@type”: [

“gj:Feature”,

“gsp:Feature”,

“eop:EarthObservation”

],

“gj:bbox”: {

“@list”: [

-2.69574,

61.965195,

0.135472,

63.261372

]

},

“gsp:hasGeometry”: {

“gsp:asWKT”: “Polygon((-2.682513, 63.261372, -2.695740, 61.997604, 0.005087, 61.965195, 0.135472, 63.227173, -2.682513, 63.261372))”,

“@type”: “gsp:Geometry”

},

“gj:geometry”: {

« @type » : « gj :Polygon »,

« gj :coordinates » : [

-2.682513,

63.261372,

-2.69574,

61.997604,

0.005087,

61.965195,

0.135472,

63.227173,

-2.682513,

63.261372

]

},

« gj :properties » : {

« @type » : « gj :Properties »,

« dct :date » : « 1978-09-27T01 :04 :30Z/1978-09-27T01 :04 :45Z »,

« dct :modified » : « 2017-04-11T13 :36 :16Z »,

« dct :title » : « SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F »,

« dct :identifier » : « SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F »,

« eop :acquisitionInformation » : {

« @type » : « eop :AcquisitionInformation »,

“eop:acquisitionParameters”: {

“@type”: “eop:AcquisitionParameters”,

“eop:operationalMode”: “IM”,

« eop :polarisationChannels » : {

« @id » : « eop :PolarisationChannels/HH »

},

« eop :polarisationMode » : {

« @id » : « eop :PolarisationMode/S »

},

« eop :acquisitionAngles » : {

« @type » : « eop :AcquisitionAngles »,

« eop :incidenceAngleVariation » : 9.6,

« eop :maximumIncidenceAngle » : 29.2,

« eop :minimumIncidenceAngle » : 19.6

},

« eop :acquisitionSubType » : « DEFAULT »,

« eop :acquisitionType » : {

« @id » : « eop :AcquisitionType/NOMINAL »

},

“eop:antennaLookDirection”: {

“@id”: “eop:RIGHT”

},

“eop:orbitDirection”: {

“@id”: “eop:DESCENDING”

},

“eop:orbitNumber”: 1316,

“eop:wrsLongitudeGrid”: “0”,

“ical:dtend”: “1978-09-27T01:04:45Z”,

“ical:dtstart”: “1978-09-27T01:04:30Z”

},

“eop:instrument”: {

“@id”: “http://gcmdservices.gsfc.nasa.gov/kms/concept/a37282d4-322c-4dd0-8edc-36099b9b586c”,

“@type”: “eop:Instrument”,

“eop:instrumentShortName”: “SAR”,

“eop:sensorType”: {

“@id”: “eop:RADAR”

}

},

“eop:platform”: {

“@id”: “http://gcmdservices.gsfc.nasa.gov/kms/concept/1bffe898-f4a2-458e-92c5-cd7c9c1cd5f0”,

“@type”: “eop:Platform”,

“eop:platform”: “Seasat”,

“eop:platformSerialIdentifier”: “1”

}

},

“eop:parentIdentifier”: “SEA\_GEC\_1P”,

“eop:productInformation”: {

“@type”: “eop:ProductInformation”,

“eop:availabilityTime”: “2014-10-04T04:19:17Z”,

“eop:productType”: “SEA\_GEC\_1P”,

“eop:referenceSystemIdentifier”: “http://www.opengis.net.def/crs/EPSG/0/4326”,

“eop:size”: 255211520

},

“eop:status”: {

“@id”: “eop:ARCHIVED”

},

“owc:links”: {

“@type”: “owc:Links”,

“iana:alternate”: [

{

“@id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/atom%2Bxml&parentIdentifier=EOP:ESA:OADS:SEA\_GEC\_1P&uid=SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F&recordSchema=server-choice”,

“@type”: “atom:link”,

“dct:title”: “Atom format”,

“atom:type”: “application/atom+xml”

},

{

“@id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/gml%2Bxml&parentIdentifier=EOP:ESA:OADS:SEA\_GEC\_1P&uid=SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F&recordSchema=om10”,

“@type”: “atom:link”,

“dct:title”: “O&M metadata”,

“atom:type”: “application/gml+xml;profile=http://www.opengis.net/spec/EOMPOM/1.0”

},

{

“@id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/gml%2Bxml&parentIdentifier=EOP:ESA:OADS:SEA\_GEC\_1P&uid=SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F&recordSchema=om”,

“@type”: “atom:link”,

“dct:title”: “O&M 1.1 metadata”,

“atom:type”: “application/gml+xml;profile=http://www.opengis.net/spec/EOMPOM/1.1”

},

{

“@id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/rdf%2Bxml&parentIdentifier=EOP:ESA:OADS:SEA\_GEC\_1P&uid=SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F&recordSchema=server-choice”,

“@type”: “atom:link”,

“dct:title”: “RDF/XML format”,

“atom:type”: “application/rdf+xml”

},

{

“@id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/ld%2Bjson&parentIdentifier=EOP:ESA:OADS:SEA\_GEC\_1P&uid=SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F&recordSchema=server-choice”,

“@type”: “atom:link”,

“dct:title”: “JSON-LD format”,

“atom:type”: “application/ld+json”

},

{

“@id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=text/turtle&parentIdentifier=EOP:ESA:OADS:SEA\_GEC\_1P&uid=SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F&recordSchema=server-choice”,

“@type”: “atom:link”,

“dct:title”: “Turtle format”,

“atom:type”: “text/turtle”

}

],

“iana:enclosure”: {

“@id”: “http://tpm-ds.eo.esa.int/products/SEA\_GEC\_1P/1978/09/27/SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F.ZIP”,

“@type”: “atom:link”,

“dct:title”: “Download”,

“atom:type”: “application/x-binary”

},

“iana:icon”: {

“@id”: “http://tpm-ds.eo.esa.int/metadata/SEA\_GEC\_1P/1978/09/27/SE1\_OPER\_SEA\_GEC\_1P\_19780927T010430\_19780927T010445\_001316\_0000\_2267\_9B4F.BI.PNG”,

“@type”: “atom:link”,

“dct:title”: “Quicklook”,

“atom:type”: “image/png”,

“dct:conformsTo”: “http://www.opengis.net.def/crs/EPSG/0/4326”,

“media:category”: {

“@id”: “eop:QUICKLOOK”,

“@type”: “media:Category”

},

“media:expression”: “sample”

},

“iana:up”: {

“@id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/atom%2Bxml&uid=SEA\_GEC\_1P&recordSchema=iso”,

“@type”: “atom:link”,

“dct:title”: “Up”,

“atom:type”: “application/atom+xml”

}

}

}

}

D.1.2 Example 2: Landsat (Optical)

D.1.2.1 OGC 10-157r4

<?xml version=”1.0” encoding=”UTF-8”?>

<opt:EarthObservation xmlns:opt=”http://www.opengis.net/opt/2.1” xmlns:gml=”http://www.opengis.net/gml/3.2” xmlns:alt=”http://www.opengis.net/alt/2.1” xmlns:atm=”http://www.opengis.net/atm/2.1” xmlns:eop=”http://www.opengis.net/eop/2.1” xmlns:lmb=”http://www.opengis.net/lmb/2.1” xmlns:om=”http://www.opengis.net/om/2.0” xmlns:opensearch=”http://a9.com/-/spec/opensearch/1.1/” xmlns:ows=”http://www.opengis.net/ows/2.0” xmlns:sar=”http://www.opengis.net/sar/2.1” xmlns:ssp=”http://www.opengis.net/ssp/2.1” xmlns:stl=”http://pisa.intecs.it/stl” xmlns:swe=”http://www.opengis.net/swe/1.0” xmlns:xlink=”http://www.w3.org/1999/xlink” xmlns:xsi=”http://www.w3.org/2001/XMLSchema-instance” gml:id=”ID\_73e3e096-6446-4bc1-bc0e-12528b96d85a”>

<om:phenomenonTime>

<gml:TimePeriod gml:id=”tp\_73e3e096-6446-4bc1-bc0e-12528b96d85a”>

<gml:beginPosition>2000-01-07T11:12:29Z</gml:beginPosition>

<gml :endPosition>2000-01-07T11 :12 :58Z</gml :endPosition>

</gml:TimePeriod>

</om:phenomenonTime>

<om:resultTime>

<gml:TimeInstant gml:id=”archivingdate\_73e3e096-6446-4bc1-bc0e-12528b96d85a”>

<gml :timePosition>2000-01-07T11 :12 :58Z</gml :timePosition>

</gml:TimeInstant>

</om:resultTime>

<om:procedure>

<eop:EarthObservationEquipment gml:id=”eoe\_73e3e096-6446-4bc1-bc0e-12528b96d85a”>

<eop:platform>

<eop:Platform>

<eop:shortName>Landsat</eop:shortName>

<eop:serialIdentifier>7</eop:serialIdentifier>

</eop:Platform>

</eop:platform>

<eop:instrument>

<eop:Instrument>

<eop:shortName>ETM</eop:shortName>

</eop :Instrument>

</eop :instrument>

<eop :sensor>

<eop :Sensor>

<eop :sensorType>OPTICAL</eop :sensorType>

<eop :operationalMode codeSpace= »urn :eop :PHR :sensorMode »>IM</eop :operationalMode>

</eop :Sensor>

</eop :sensor>

<eop:acquisitionParameters>

<eop:Acquisition>

<eop:orbitNumber>3886</eop:orbitNumber>

<eop:orbitDirection>DESCENDING</eop:orbitDirection>

<eop:wrsLongitudeGrid codeSpace=”EPSG”>205</eop:wrsLongitudeGrid>

<eop:wrsLatitudeGrid codeSpace=”EPSG”>31</eop:wrsLatitudeGrid>

<eop:illuminationAzimuthAngle uom=”deg”>157.128</eop:illuminationAzimuthAngle>

<eop:illuminationZenithAngle uom=”deg”>67.5922</eop:illuminationZenithAngle>

<eop:illuminationElevationAngle uom=”deg”>22.4078</eop:illuminationElevationAngle>

</eop:Acquisition>

</eop:acquisitionParameters>

</eop:EarthObservationEquipment>

</om:procedure>

<om:observedProperty nilReason=”inapplicable”/>

<om:featureOfInterest>

<eop:Footprint gml:id=”fp\_73e3e096-6446-4bc1-bc0e-12528b96d85a”>

<eop:multiExtentOf>

<gml:MultiSurface gml:id=”ms\_73e3e096-6446-4bc1-bc0e-12528b96d85a” srsName=”EPSG:4326”>

<gml:surfaceMembers>

<gml:Polygon gml:id=”fppoly\_73e3e096-6446-4bc1-bc0e-12528b96d85a”>

<gml:exterior>

<gml:LinearRing>

<gml:posList>42.7054 -10.9168 42.7186 -8.19013 40.7994 -8.21391 40.7871 -10.8605 42.7054 -10.9168</gml:posList>

</gml:LinearRing>

</gml:exterior>

</gml:Polygon>

</gml:surfaceMembers>

</gml:MultiSurface>

</eop:multiExtentOf>

</eop:Footprint>

</om:featureOfInterest>

<om:result>

<opt:EarthObservationResult gml:id=”eor\_73e3e096-6446-4bc1-bc0e-12528b96d85a”>

<eop:browse>

<eop:BrowseInformation>

<eop:type>QUICKLOOK</eop:type>

<eop:referenceSystemIdentifier codeSpace=”EPSG”>epsg:4326</eop:referenceSystemIdentifier>

<eop:fileName>

<ows:ServiceReference xlink:href=”http://landsat-ds.eo.esa.int/metadata/LANDSAT\_ETM/2000/01/07/LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261.BP.PNG”>

<ows:RequestMessage/>

</ows:ServiceReference>

</eop:fileName>

</eop:BrowseInformation>

</eop:browse>

<eop:browse>

<eop:BrowseInformation>

<eop:type>THUMBNAIL</eop:type>

<eop:referenceSystemIdentifier codeSpace=”EPSG”>epsg:4326</eop:referenceSystemIdentifier>

<eop:fileName>

<ows:ServiceReference xlink:href=”http://landsat-ds.eo.esa.int/metadata/LANDSAT\_ETM/2000/01/07/LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261.JPG”>

<ows:RequestMessage/>

</ows:ServiceReference>

</eop:fileName>

</eop:BrowseInformation>

</eop:browse>

<eop:product>

<eop:ProductInformation>

<eop:fileName>

<ows:ServiceReference xlink:href=”http://landsat-ds.eo.esa.int/products/LANDSAT\_ETM/2000/01/07/LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261.ZIP”>

<ows:RequestMessage/>

</ows:ServiceReference>

</eop:fileName>

<eop:version>1.0</eop:version>

<eop:size uom=”kb”>165773162</eop:size>

</eop:ProductInformation>

</eop:product>

<opt:cloudCoverPercentage uom=”%”>0</opt:cloudCoverPercentage>

</opt:EarthObservationResult>

</om:result>

<eop:metaDataProperty>

<eop:EarthObservationMetaData>

<eop :identifier>LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261</eop :identifier>

<eop :parentIdentifier>LANDSAT.ETM.GTC</eop :parentIdentifier>

<eop :acquisitionType>NOMINAL</eop :acquisitionType>

<eop :acquisitionSubType>DEFAULT</eop :acquisitionSubType>

<eop:productType>ETM\_GTC\_1P</eop:productType>

<eop:status>ARCHIVED</eop:status>

<eop:productQualityDegradation uom=”%”>0</eop:productQualityDegradation>

<eop:processing>

<eop:ProcessingInformation>

<eop:processingMode>NOMINAL</eop:processingMode>

</eop:ProcessingInformation>

</eop:processing>

</eop:EarthObservationMetaData>

</eop:metaDataProperty>

</opt:EarthObservation>

D.1.2.2 GeoJSON

{

“type”: “Feature”,

“id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/geo%2Bjson&parentIdentifier=EOP:ESA:OADS:LANDSAT.ETM.GTC&uid=LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261”,

“bbox” : [ -10.9168, 40.7871, -8.19013, 42.7186 ],

“geometry”: {

“type”: “Polygon”,

“coordinates”: [

[

[

-10.9168,

42.7054

],

[

-10.8605,

40.7871

],

[

-8.21391,

40.7994

],

[

-8.19013,

42.7186

],

[

-10.9168,

42.7054

]

]

]

},

“properties”: {

“status”: “ARCHIVED”,

« parentIdentifier » : « LANDSAT.ETM.GTC »,

« title » : « LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261 »,

« identifier » : « LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261 »,

« date » : « 2000-01-07T11 :12 :29Z/2000-01-07T11 :12 :58Z »,

« updated » : « 2017-04-11T11 :21 :45Z »,

“links”: {

“alternates”: [

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/atom%2Bxml&parentIdentifier=EOP:ESA:OADS:LANDSAT.ETM.GTC&uid=LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261&recordSchema=server-choice”,

“type”: “application/atom+xml”,

“title”: “Atom format”

},

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/gml%2Bxml&parentIdentifier=EOP:ESA:OADS:LANDSAT.ETM.GTC&uid=LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261&recordSchema=om10”,

“type”: “application/gml+xml;profile=http://www.opengis.net/spec/EOMPOM/1.0”,

“title”: “O&M metadata”

},

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/gml%2Bxml&parentIdentifier=EOP:ESA:OADS:LANDSAT.ETM.GTC&uid=LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261&recordSchema=om”,

“type”: “application/gml+xml;profile=http://www.opengis.net/spec/EOMPOM/1.1”,

“title”: “O&M 1.1 metadata”

},

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/rdf%2Bxml&parentIdentifier=EOP:ESA:OADS:LANDSAT.ETM.GTC&uid=LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261&recordSchema=server-choice”,

“type”: “application/rdf+xml”,

“title”: “RDF/XML format”

},

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/ld%2Bjson&parentIdentifier=EOP:ESA:OADS:LANDSAT.ETM.GTC&uid=LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261&recordSchema=server-choice”,

“type”: “application/ld+json”,

“title”: “JSON-LD format”

},

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=text/turtle&parentIdentifier=EOP:ESA:OADS:LANDSAT.ETM.GTC&uid=LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261&recordSchema=server-choice”,

“type”: “text/turtle”,

“title”: “Turtle format”

}

],

“data”: [

{

“href”: “http://landsat-ds.eo.esa.int/products/LANDSAT\_ETM/2000/01/07/LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261.ZIP”,

“type”: “application/x-binary”,

“title”: “Download”

}

],

“previews”: [

{

“href”: “http://landsat-ds.eo.esa.int/metadata/LANDSAT\_ETM/2000/01/07/LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261.BP.PNG”,

“type”: “image/png”,

“title”: “Quicklook”

}

],

“up”: [

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/atom%2Bxml&uid=LANDSAT.ETM.GTC&recordSchema=iso”,

“type”: “application/atom+xml”,

“title”: “Up”

}

]

},

“acquisitionInformation”: [

{

“platform”: {

“id”: “http://gcmdservices.gsfc.nasa.gov/kms/concept/c7a09e9f-3c99-4b31-a521-313c379ba2b4”,

“platform”: “Landsat”,

“platformSerialIdentifier”: “7”

},

“instrument”: {

“id”: “http://gcmdservices.gsfc.nasa.gov/kms/concept/4dbe7764-a2ea-4a19-b754-696c35ac3205”,

“instrumentShortName”: “ETM”,

“sensorType”: “OPTICAL”

},

“acquisitionParameters”: {

“operationalMode”: “IM”,

“beginningDateTime”: “2000-01-07T11:12:29Z”,

“endingDateTime”: “2000-01-07T11:12:58Z”,

“orbitDirection”: “DESCENDING”,

“orbitNumber”: 3886,

“acquisitionType”: “NOMINAL”,

“acquisitionSubType”: “DEFAULT”,

“wrsLongitudeGrid”: “205”,

“wrsLatitudeGrid”: “31”

}

}

],

“productInformation”: {

“productType”: “ETM\_GTC\_1P”,

“size”: 165773162,

“availabilityTime”: “2000-01-07T11:12:58Z”,

“referenceSystemIdentifier”: “epsg:4326”,

“cloudCover”: 0

}

}

}

D.1.2.3 JSON-LD (Compacted)

{

***“@context”: “http://schemas.opengis.net/eo-geojson/1.0/eo-geojson.jsonld”,***

“type”: “Feature”,

“id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/geo%2Bjson&parentIdentifier=EOP:ESA:OADS:LANDSAT.ETM.GTC&uid=LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261”,

“geometry”: {

“type”: “Polygon”,

“coordinates”: [

[

[

-10.9168,

42.7054

],

[

-10.8605,

40.7871

],

[

-8.21391,

40.7994

],

[

-8.19013,

42.7186

],

[

-10.9168,

42.7054

]

]

]

},

“properties”: {

“status”: “ARCHIVED”,

« parentIdentifier » : « LANDSAT.ETM.GTC »,

« title » : « LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261 »,

« identifier » : « LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261 »,

« date » : « 2000-01-07T11 :12 :29Z/2000-01-07T11 :12 :58Z »,

« updated » : « 2017-04-11T11 :21 :45Z »,

“links”: {

“alternates”: [

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/atom%2Bxml&parentIdentifier=EOP:ESA:OADS:LANDSAT.ETM.GTC&uid=LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261&recordSchema=server-choice”,

“type”: “application/atom+xml”,

“title”: “Atom format”

},

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/gml%2Bxml&parentIdentifier=EOP:ESA:OADS:LANDSAT.ETM.GTC&uid=LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261&recordSchema=om10”,

“type”: “application/gml+xml;profile=http://www.opengis.net/spec/EOMPOM/1.0”,

“title”: “O&M metadata”

},

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/gml%2Bxml&parentIdentifier=EOP:ESA:OADS:LANDSAT.ETM.GTC&uid=LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261&recordSchema=om”,

“type”: “application/gml+xml;profile=http://www.opengis.net/spec/EOMPOM/1.1”,

“title”: “O&M 1.1 metadata”

},

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/rdf%2Bxml&parentIdentifier=EOP:ESA:OADS:LANDSAT.ETM.GTC&uid=LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261&recordSchema=server-choice”,

“type”: “application/rdf+xml”,

“title”: “RDF/XML format”

},

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/ld%2Bjson&parentIdentifier=EOP:ESA:OADS:LANDSAT.ETM.GTC&uid=LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261&recordSchema=server-choice”,

“type”: “application/ld+json”,

“title”: “JSON-LD format”

},

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=text/turtle&parentIdentifier=EOP:ESA:OADS:LANDSAT.ETM.GTC&uid=LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261&recordSchema=server-choice”,

“type”: “text/turtle”,

“title”: “Turtle format”

}

],

“data”: [

{

“href”: “http://landsat-ds.eo.esa.int/products/LANDSAT\_ETM/2000/01/07/LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261.ZIP”,

“type”: “application/x-binary”,

“title”: “Download”

}

],

“previews”: [

{

“href”: “http://landsat-ds.eo.esa.int/metadata/LANDSAT\_ETM/2000/01/07/LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261.BP.PNG”,

“type”: “image/png”,

“title”: “Quicklook”

}

],

“up”: [

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/atom%2Bxml&uid=LANDSAT.ETM.GTC&recordSchema=iso”,

“type”: “application/atom+xml”,

“title”: “Up”

}

]

},

“acquisitionInformation”: [

{

“platform”: {

“id”: “http://gcmdservices.gsfc.nasa.gov/kms/concept/c7a09e9f-3c99-4b31-a521-313c379ba2b4”,

“platformShortName”: “Landsat”,

“platformSerialIdentifier”: “7”

},

“instrument”: {

“id”: “http://gcmdservices.gsfc.nasa.gov/kms/concept/4dbe7764-a2ea-4a19-b754-696c35ac3205”,

“instrumentShortName”: “ETM”,

“sensorType”: “OPTICAL”

},

“acquisitionParameters”: {

“operationalMode”: “IM”,

“beginningDateTime”: “2000-01-07T11:12:29Z”,

“endingDateTime”: “2000-01-07T11:12:58Z”,

“orbitDirection”: “DESCENDING”,

“orbitNumber”: 3886,

“acquisitionType”: “NOMINAL”,

“acquisitionSubType”: “DEFAULT”,

“wrsLongitudeGrid”: “205”,

“wrsLatitudeGrid”: “31”

}

}

],

“productInformation”: {

“productType”: “ETM\_GTC\_1P”,

“size”: 165773162,

“availabilityTime”: “2000-01-07T11:12:58Z”,

“referenceSystemIdentifier”: “epsg:4326”,

“cloudCover”: 0

}

}

}

D.1.2.4 JSON-LD (Expanded)

{

“@context”: {

“eop”: “http://www.opengis.net/ont/eo-geojson/1.0/”,

“xsd”: “http://www.w3.org/2001/XMLSchema#”,

“dct”: “http://purl.org/dc/terms/”,

“atom”: “http://www.w3.org/2005/Atom/”,

“iana”: “http://www.iana.org/assignments/relation/”,

“owc”: “http://www.opengis.net/ont/owc/1.0/”,

“gj”: “https://purl.org/geojson/vocab#”,

“gsp”: “http://www.opengis.net/ont/geosparql#”,

“ical”: “http://www.w3.org/2002/12/cal/ical#”,

“media”: “http://search.yahoo.com/mrss/”

},

“@id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/geo%2Bjson&parentIdentifier=EOP:ESA:OADS:LANDSAT.ETM.GTC&uid=LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261”,

“@type”: [

“gj:Feature”,

“eop:EarthObservation”

],

“gj:geometry”: {

“@type”: “gj:Polygon”,

« gj :coordinates » : [

-8.19013,

42.7186,

-8.21391,

40.7994,

-10.8605,

40.7871,

-10.9168,

42.7054,

-10.9168,

42.7054

]

},

« gj :properties » : {

« @type » : « gj :Properties »,

« dct :date » : « 2000-01-07T11 :12 :29Z/2000-01-07T11 :12 :58Z »,

« dct :modified » : « 2017-04-11T11 :21 :45Z »,

« dct :title » : « LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261 »,

« dct :identifier » : « LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261 »,

« eop :acquisitionInformation » : {

« @type » : « eop :AcquisitionInformation »,

“eop:acquisitionParameters”: {

“eop:operationalMode”: “IM”,

« @type » : « eop :AcquisitionParameters »,

« eop :acquisitionSubType » : « DEFAULT »,

« eop :acquisitionType » : {

« @id » : « eop :AcquisitionType/NOMINAL »

},

“eop:wrsLatitudeGrid”: “31”,

“eop:orbitDirection”: {

“@id”: “eop:DESCENDING”

},

“eop:orbitNumber”: 3886,

“eop:wrsLongitudeGrid”: “205”,

“ical:dtend”: “2000-01-07T11:12:58Z”,

“ical:dtstart”: “2000-01-07T11:12:29Z”

},

“eop:instrument”: {

“@id”: “http://gcmdservices.gsfc.nasa.gov/kms/concept/4dbe7764-a2ea-4a19-b754-696c35ac3205”,

“@type”: “eop:Instrument”,

“eop:instrumentShortName”: “ETM”,

“eop:sensorType”: {

“@id”: “eop:OPTICAL”

}

},

“eop:platform”: {

“@id”: “http://gcmdservices.gsfc.nasa.gov/kms/concept/c7a09e9f-3c99-4b31-a521-313c379ba2b4”,

“@type”: “eop:Platform”,

“eop:platform”: “Landsat”,

“eop:platformSerialIdentifier”: “7”

}

},

“eop:parentIdentifier”: “LANDSAT.ETM.GTC”,

“eop:productInformation”: {

“@type”: “eop:ProductInformation”,

“eop:availabilityTime”: “2000-01-07T11:12:58Z”,

“eop:productType”: “ETM\_GTC\_1P”,

“eop:referenceSystemIdentifier”: “http://www.opengis.net.def/crs/EPSG/0/4326”,

“eop:size”: 165773162,

“eop:cloudCover”: 0

},

“eop:status”: {

“@id”: “eop:ARCHIVED”

},

“owc:links”: {

“@type”: “owc:Links”,

“iana:alternate”: [

{

“@id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/atom%2Bxml&parentIdentifier=EOP:ESA:OADS:LANDSAT.ETM.GTC&uid=LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261&recordSchema=server-choice”,

“@type”: “atom:link”,

“dct:title”: “Atom format”,

“atom:type”: “application/atom+xml”

},

{

“@id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/gml%2Bxml&parentIdentifier=EOP:ESA:OADS:LANDSAT.ETM.GTC&uid=LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261&recordSchema=om10”,

“@type”: “atom:link”,

“dct:title”: “O&M metadata”,

“atom:type”: “application/gml+xml;profile=http://www.opengis.net/spec/EOMPOM/1.0”

},

{

“@id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/gml%2Bxml&parentIdentifier=EOP:ESA:OADS:LANDSAT.ETM.GTC&uid=LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261&recordSchema=om”,

“@type”: “atom:link”,

“dct:title”: “O&M 1.1 metadata”,

“atom:type”: “application/gml+xml;profile=http://www.opengis.net/spec/EOMPOM/1.1”

},

{

“@id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/rdf%2Bxml&parentIdentifier=EOP:ESA:OADS:LANDSAT.ETM.GTC&uid=LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261&recordSchema=server-choice”,

“@type”: “atom:link”,

“dct:title”: “RDF/XML format”,

“atom:type”: “application/rdf+xml”

},

{

“@id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/ld%2Bjson&parentIdentifier=EOP:ESA:OADS:LANDSAT.ETM.GTC&uid=LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261&recordSchema=server-choice”,

“@type”: “atom:link”,

“dct:title”: “JSON-LD format”,

“atom:type”: “application/ld+json”

},

{

“@id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=text/turtle&parentIdentifier=EOP:ESA:OADS:LANDSAT.ETM.GTC&uid=LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261&recordSchema=server-choice”,

“@type”: “atom:link”,

“dct:title”: “Turtle format”,

“atom:type”: “text/turtle”

}

],

“iana:enclosure”: {

“@id”: “http://landsat-ds.eo.esa.int/products/LANDSAT\_ETM/2000/01/07/LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261.ZIP”,

“@type”: “atom:link”,

“dct:title”: “Download”,

“atom:type”: “application/x-binary”

},

“iana:icon”: {

“@id”: “http://landsat-ds.eo.esa.int/metadata/LANDSAT\_ETM/2000/01/07/LS07\_RMPS\_ETM\_GTC\_1P\_20000107T111229\_20000107T111258\_003886\_0205\_0031\_9261.BP.PNG”,

“@type”: “atom:link”,

“dct:title”: “Quicklook”,

“atom:type”: “image/png”,

“media:category”: {

“@id”: “eop:QUICKLOOK”,

“@type”: “media:Category”

}

},

“iana:up”: {

“@id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/atom%2Bxml&uid=LANDSAT.ETM.GTC&recordSchema=iso”,

“@type”: “atom:link”,

“dct:title”: “Up”,

“atom:type”: “application/atom+xml”

}

}

}

}

D.1.3 Example 3: Cryosat-2 (Altimetric)

D.1.3.1 OGC 10-157r4

<?xml version=”1.0” encoding=”UTF-8”?>

<alt:EarthObservation xmlns:alt=”http://www.opengis.net/alt/2.1” xmlns:gml=”http://www.opengis.net/gml/3.2” xmlns:atom=”http://www.w3.org/2005/Atom” xmlns:dc=”http://purl.org/dc/elements/1.1/” xmlns:eo=”http://a9.com/-/opensearch/extensions/eo/1.0/” xmlns:eop=”http://www.opengis.net/eop/2.1” xmlns:fo=”http://www.w3.org/1999/XSL/Format” xmlns:geo=”http://a9.com/-/opensearch/extensions/geo/1.0/” xmlns:georss=”http://www.georss.org/georss” xmlns:om=”http://www.opengis.net/om/2.0” xmlns:os=”http://a9.com/-/spec/opensearch/1.1/” xmlns:ows=”http://www.opengis.net/ows/2.0” xmlns:semantic=”http://a9.com/-/opensearch/extensions/semantic/1.0/” xmlns:sru=”http://a9.com/-/opensearch/extensions/sru/2.0/” xmlns:swe=”http://www.opengis.net/swe/1.0” xmlns:time=”http://a9.com/-/opensearch/extensions/time/1.0/” xmlns:xlink=”http://www.w3.org/1999/xlink” xmlns:xsi=”http://www.w3.org/2001/XMLSchema-instance” gml:id=”CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001\_1”>

<om:phenomenonTime>

<gml:TimePeriod gml:id=”CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001\_2”>

<gml:beginPosition>2010-07-22T12:05:23Z</gml:beginPosition>

<gml :endPosition>2010-07-22T13 :44 :36Z</gml :endPosition>

</gml:TimePeriod>

</om:phenomenonTime>

<om:resultTime>

<gml :TimeInstant gml :id= »CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001\_3 »>

<gml :timePosition>2016-03-09T16 :39 :40Z</gml :timePosition>

</gml:TimeInstant>

</om:resultTime>

<om:procedure>

<alt:EarthObservationEquipment gml:id=”CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001\_4”>

<eop:platform>

<eop:Platform>

<eop:shortName>Cryosat</eop:shortName>

<eop:serialIdentifier>2</eop:serialIdentifier>

</eop:Platform>

</eop:platform>

<eop:instrument>

<eop:Instrument>

<eop:shortName>SIRAL</eop:shortName>

</eop :Instrument>

</eop :instrument>

<eop :sensor>

<eop:Sensor>

<eop:sensorType>ALTIMETRIC</eop:sensorType>

<eop:operationalMode/>

</eop:Sensor>

</eop:sensor>

<eop:acquisitionParameters>

<alt:Acquisition>

<eop:orbitNumber>001523</eop:orbitNumber>

<eop:lastOrbitNumber>001523</eop:lastOrbitNumber>

<eop:orbitDirection>ASCENDING</eop:orbitDirection>

<eop:ascendingNodeDate>2010-07-22T12:04:49Z</eop:ascendingNodeDate>

<eop:ascendingNodeLongitude uom=”deg”>-169.101978</eop:ascendingNodeLongitude>

<eop:startTimeFromAscendingNode uom=”ms”>0000.761548</eop:startTimeFromAscendingNode>

<eop:completionTimeFromAscendingNode uom=”ms”>5953.440918</eop:completionTimeFromAscendingNode>

</alt:Acquisition>

</eop:acquisitionParameters>

</alt:EarthObservationEquipment>

</om:procedure>

<om:observedProperty nilReason=”inapplicable” xsi:nil=”true”/>

<om:featureOfInterest>

<alt:Footprint gml:id=”CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001\_5”>

<eop:multiExtentOf/>

<alt:nominalTrack>

<gml :MultiCurve gml :id= »CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001\_6 »>

<gml:curveMember>

<gml:LineString gml:id=”CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001\_7” srsName=”EPSG:4326”>

<gml:posList>0.046332 -169.106794 -0.004573 166.040236</gml:posList>

</gml:LineString>

</gml:curveMember>

</gml:MultiCurve>

</alt:nominalTrack>

</alt:Footprint>

</om:featureOfInterest>

<om:result>

<eop:EarthObservationResult gml:id=”CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001\_8”>

<eop:product>

<eop:ProductInformation>

<eop:fileName>

<ows:ServiceReference xlink:href=”ftp://science-pds.cryosat.esa.int//SIR\_GDR/2010/07/CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001.DBL”>

<ows:RequestMessage xlmns=”http://www.opengis.net/ows/2.0”/>

</ows:ServiceReference>

</eop:fileName>

<eop:version>C001</eop:version>

<eop:size uom=”bytes”>000000000000008612306</eop:size>

</eop:ProductInformation>

</eop:product>

</eop:EarthObservationResult>

</om:result>

<eop:metaDataProperty>

<eop:EarthObservationMetaData>

<eop :identifier>CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001</eop :identifier>

<eop :parentIdentifier>CR2\_SIR</eop :parentIdentifier>

<eop :acquisitionType>NOMINAL</eop :acquisitionType>

<eop :productType>SIR\_GDR\_2\_</eop :productType>

<eop :status>ARCHIVED</eop :status>

<eop:downlinkedTo>

<eop:DownlinkInformation>

<eop:acquisitionStation>KS</eop:acquisitionStation>

</eop:DownlinkInformation>

</eop:downlinkedTo>

<eop:productQualityDegradationQuotationMode>AUTOMATIC</eop:productQualityDegradationQuotationMode>

<eop:productQualityStatus>DEGRADED</eop:productQualityStatus>

<eop:productQualityReportURL>CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001.QR.XML</eop:productQualityReportURL>

<eop:processing>

<alt:ProcessingInformation>

<eop:processingCenter>PDS</eop:processingCenter>

<eop:processingDate>2016-03-09T16:39:40Z</eop:processingDate>

<eop:processorVersion>3.1</eop:processorVersion>

<eop:shortName>2</eop:shortName>

</alt:ProcessingInformation>

</eop:processing>

<eop:vendorSpecific>

<eop:SpecificInformation>

<eop:localAttribute>missionPhase</eop:localAttribute>

<eop:localValue>1</eop:localValue>

</eop:SpecificInformation>

</eop:vendorSpecific>

</eop:EarthObservationMetaData>

</eop:metaDataProperty>

</alt:EarthObservation>

D.1.3.2 GeoJSON

{

“type”: “Feature”,

“id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/geo%2Bjson&parentIdentifier=EOP:ESA:CRYOSAT:CR2\_SIR&uid=CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001”,

“bbox”: [

-0.004573,

-169.106794,

0.046332,

166.040236

],

“geometry”: {

“type”: “LineString”,

“coordinates”: [

[

-169.106794,

0.046332

],

[

166.040236,

-0.004573

]

]

},

“properties”: {

“status”: “ARCHIVED”,

“parentIdentifier”: “CR2\_SIR”,

« title » : « CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001 »,

« identifier » : « CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001 »,

« date » : « 2010-07-22T12 :05 :23Z/2010-07-22T13 :44 :36Z »,

« updated » : « 2017-04-11T14 :37 :41Z »,

“links”: {

“alternates”: [

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/atom%2Bxml&parentIdentifier=EOP:ESA:CRYOSAT:CR2\_SIR&uid=CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001&recordSchema=server-choice”,

“type”: “application/atom+xml”,

“title”: “Atom format”

},

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/gml%2Bxml&parentIdentifier=EOP:ESA:CRYOSAT:CR2\_SIR&uid=CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001&recordSchema=om10”,

“type”: “application/gml+xml;profile=http://www.opengis.net/spec/EOMPOM/1.0”,

“title”: “O&M metadata”

},

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/gml%2Bxml&parentIdentifier=EOP:ESA:CRYOSAT:CR2\_SIR&uid=CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001&recordSchema=om”,

“type”: “application/gml+xml;profile=http://www.opengis.net/spec/EOMPOM/1.1”,

“title”: “O&M 1.1 metadata”

},

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/rdf%2Bxml&parentIdentifier=EOP:ESA:CRYOSAT:CR2\_SIR&uid=CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001&recordSchema=server-choice”,

“type”: “application/rdf+xml”,

“title”: “RDF/XML format”

},

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/ld%2Bjson&parentIdentifier=EOP:ESA:CRYOSAT:CR2\_SIR&uid=CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001&recordSchema=server-choice”,

“type”: “application/ld+json”,

“title”: “JSON-LD format”

},

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=text/turtle&parentIdentifier=EOP:ESA:CRYOSAT:CR2\_SIR&uid=CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001&recordSchema=server-choice”,

“type”: “text/turtle”,

“title”: “Turtle format”

}

],

“data”: [

{

“href”: “ftp://science-pds.cryosat.esa.int//SIR\_GDR/2010/07/CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001.DBL”,

“type”: “application/x-binary”,

“title”: “Download”

}

],

“via”: [

{

“href”: “ftp://science-pds.cryosat.esa.int//SIR\_GDR/2010/07/CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001.HDR”,

“type”: “application/xml”,

“title”: “Via”

}

],

“up”: [

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/atom%2Bxml&uid=CR2\_SIR&recordSchema=iso”,

“type”: “application/atom+xml”,

“title”: “Up”

}

]

},

“acquisitionInformation”: [

{

“platform”: {

“id”: “http://gcmdservices.gsfc.nasa.gov/kms/concept/a915ab2f-46c5-493b-9f18-aeb3383ee72b”,

“platformShortName”: “Cryosat”,

“platformSerialIdentifier”: “2”

},

“instrument”: {

“id”: “https://gcmdservices.gsfc.nasa.gov/kms/concept/30787b9f-a407-47a5-b69b-5b9e1d1b1144”,

“instrumentShortName”: “SIRAL”,

“sensorType”: “ALTIMETRIC”

},

“acquisitionParameters”: {

“operationalMode”: “”,

“beginningDateTime”: “2010-07-22T12:05:23Z”,

“endingDateTime”: “2010-07-22T13:44:36Z”,

“orbitDirection”: “ASCENDING”,

“orbitNumber”: 1523,

“lastOrbitNumber”: 1523,

“ascendingNodeDate”: “2010-07-22T12:04:49Z”,

« ascendingNodeLongitude » : -169.101978,

« acquisitionType » : « NOMINAL »,

« startTimeFromAscendingNode » : 761,

« completionTimeFromAscendingNode » : 5953440,

« acquisitionStation » : « KS »

}

}

],

« productInformation » : {

« productType » : « SIR\_GDR\_2\_ »,

« size » : 8612306,

« availabilityTime » : « 2016-03-09T16 :39 :40Z »,

« version » : « C001 »,

« processingCenter » : « PDS »,

« processingDate » : « 2016-03-09T16 :39 :40Z »,

« processorVersion » : « 3.1 »,

« qualityInformation » : {

« qualityStatus » : « DEGRADED »

}

}

}

}

D.1.3.3 JSON-LD (Compacted)

{

***« @context » : « http ://schemas.opengis.net/eo-geojson/1.0/eo-geojson.jsonld »,***

“type”: “Feature”,

“id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/geo%2Bjson&parentIdentifier=EOP:ESA:CRYOSAT:CR2\_SIR&uid=CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001”,

“bbox”: [

-0.004573,

-169.106794,

0.046332,

166.040236

],

“geometry”: {

“type”: “LineString”,

“coordinates”: [

[

-169.106794,

0.046332

],

[

166.040236,

-0.004573

]

]

},

“properties”: {

“status”: “ARCHIVED”,

“parentIdentifier”: “CR2\_SIR”,

« title » : « CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001 »,

« identifier » : « CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001 »,

« date » : « 2010-07-22T12 :05 :23Z/2010-07-22T13 :44 :36Z »,

« updated » : « 2017-04-11T14 :37 :41Z »,

“links”: {

“alternates”: [

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/atom%2Bxml&parentIdentifier=EOP:ESA:CRYOSAT:CR2\_SIR&uid=CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001&recordSchema=server-choice”,

“type”: “application/atom+xml”,

“title”: “Atom format”

},

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/gml%2Bxml&parentIdentifier=EOP:ESA:CRYOSAT:CR2\_SIR&uid=CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001&recordSchema=om10”,

“type”: “application/gml+xml;profile=http://www.opengis.net/spec/EOMPOM/1.0”,

“title”: “O&M metadata”

},

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/gml%2Bxml&parentIdentifier=EOP:ESA:CRYOSAT:CR2\_SIR&uid=CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001&recordSchema=om”,

“type”: “application/gml+xml;profile=http://www.opengis.net/spec/EOMPOM/1.1”,

“title”: “O&M 1.1 metadata”

},

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/rdf%2Bxml&parentIdentifier=EOP:ESA:CRYOSAT:CR2\_SIR&uid=CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001&recordSchema=server-choice”,

“type”: “application/rdf+xml”,

“title”: “RDF/XML format”

},

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/ld%2Bjson&parentIdentifier=EOP:ESA:CRYOSAT:CR2\_SIR&uid=CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001&recordSchema=server-choice”,

“type”: “application/ld+json”,

“title”: “JSON-LD format”

},

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=text/turtle&parentIdentifier=EOP:ESA:CRYOSAT:CR2\_SIR&uid=CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001&recordSchema=server-choice”,

“type”: “text/turtle”,

“title”: “Turtle format”

}

],

“data”: [

{

“href”: “ftp://science-pds.cryosat.esa.int//SIR\_GDR/2010/07/CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001.DBL”,

“type”: “application/x-binary”,

“title”: “Download”

}

],

“via”: [

{

“href”: “ftp://science-pds.cryosat.esa.int//SIR\_GDR/2010/07/CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001.HDR”,

“type”: “application/xml”,

“title”: “Via”

}

],

“up”: [

{

“href”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/atom%2Bxml&uid=CR2\_SIR&recordSchema=iso”,

“type”: “application/atom+xml”,

“title”: “Up”

}

]

},

“acquisitionInformation”: [

{

“platform”: {

“id”: “http://gcmdservices.gsfc.nasa.gov/kms/concept/a915ab2f-46c5-493b-9f18-aeb3383ee72b”,

“platformShortName”: “Cryosat”,

“platformSerialIdentifier”: “2”

},

“instrument”: {

“id”: “https://gcmdservices.gsfc.nasa.gov/kms/concept/30787b9f-a407-47a5-b69b-5b9e1d1b1144”,

“instrumentShortName”: “SIRAL”,

“sensorType”: “ALTIMETRIC”

},

“acquisitionParameters”: {

“operationalMode”: “”,

“beginningDateTime”: “2010-07-22T12:05:23Z”,

“endingDateTime”: “2010-07-22T13:44:36Z”,

“orbitDirection”: “ASCENDING”,

“orbitNumber”: 1523,

“lastOrbitNumber”: 1523,

“ascendingNodeDate”: “2010-07-22T12:04:49Z”,

« ascendingNodeLongitude » : -169.101978,

« acquisitionType » : « NOMINAL »,

« startTimeFromAscendingNode » : 761548,

« completionTimeFromAscendingNode » : 5953,

« acquisitionStation » : « KS »

}

}

],

« productInformation » : {

« productType » : « SIR\_GDR\_2\_ »,

« size » : 8612306,

« availabilityTime » : « 2016-03-09T16 :39 :40Z »,

« version » : « C001 »,

« processingCenter » : « PDS »,

« processingDate » : « 2016-03-09T16 :39 :40Z »,

« processorVersion » : « 3.1 »,

« qualityInformation » : {

« qualityStatus » : « DEGRADED »

}

}

}

}

D.1.3.4 JSON-LD (Expanded)

{

« @context » : {

« eop » : « http ://www.opengis.net/ont/eo-geojson/1.0/ »,

“xsd”: “http://www.w3.org/2001/XMLSchema#”,

“dct”: “http://purl.org/dc/terms/”,

“atom”: “http://www.w3.org/2005/Atom/”,

“iana”: “http://www.iana.org/assignments/relation/”,

“owc”: “http://www.opengis.net/ont/owc/1.0/”,

“gj”: “https://purl.org/geojson/vocab#”,

“gsp”: “http://www.opengis.net/ont/geosparql#”,

“ical”: “http://www.w3.org/2002/12/cal/ical#”,

“media”: “http://search.yahoo.com/mrss/”

},

“@id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/geo%2Bjson&parentIdentifier=EOP:ESA:CRYOSAT:CR2\_SIR&uid=CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001”,

“@type”: [

“gj:Feature”,

“eop:EarthObservation”

],

“gj:bbox”: {

“@list”: [

-0.004573,

-169.106794,

0.046332,

166.040236

]

},

“gj:geometry”: {

“@type”: “gj:LineString”,

“gj:coordinates”: [

-169.106794,

0.046332,

166.040236,

-0.004573

]

},

« gj :properties » : {

« @type » : « gj :Properties »,

« dct :date » : « 2010-07-22T12 :05 :23Z/2010-07-22T13 :44 :36Z »,

« dct :modified » : « 2017-04-11T14 :37 :41Z »,

« dct :title » : « CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001 »,

« dct :identifier » : « CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001 »,

« eop :acquisitionInformation » : {

« @type » : « eop :AcquisitionInformation »,

“eop:acquisitionParameters”: {

“@type”: “eop:AcquisitionParameters”,

“eop:operationalMode”: “”,

« eop :acquisitionStation » : « KS »,

« acquisitionType » : {

« @id » : « eop :AcquisitionType/NOMINAL »

},

« eop :ascendingNodeDate » : « 2010-07-22T12 :04 :49Z »,

« eop :ascendingNodeLongitude » : -169.101978,

« eop :completionTimeFromAscendingNode » : « 5953.440918 »,

« eop :lastOrbitNumber » : 1523,

“eop:orbitDirection”: {

“@id”: “eop:ASCENDING”

},

“eop:orbitNumber”: 1523,

“eop:startTimeFromAscendingNode”: “0000.761548”,

“ical:dtend”: “2010-07-22T13:44:36Z”,

“ical:dtstart”: “2010-07-22T12:05:23Z”

},

“eop:instrument”: {

“@type”: “eop:Instrument”,

“@id”: “https://gcmdservices.gsfc.nasa.gov/kms/concept/30787b9f-a407-47a5-b69b-5b9e1d1b1144”,

“eop:instrumentShortName”: “SIRAL”,

“eop:sensorType”: {

“@id”: “eop:ALTIMETRIC”

}

},

“eop:platform”: {

“@id”: “http://gcmdservices.gsfc.nasa.gov/kms/concept/a915ab2f-46c5-493b-9f18-aeb3383ee72b”,

“@type”: “eop:Platform”,

“eop:platformShortName”: “Cryosat”,

“eop:platformSerialIdentifier”: “2”

}

},

“eop:parentIdentifier”: “CR2\_SIR”,

“eop:productInformation”: {

“@type”: “eop:ProductInformation”,

“eop:availabilityTime”: “2016-03-09T16:39:40Z”,

“eop:processingCenter”: “PDS”,

“eop:processingDate”: “2016-03-09T16:39:40Z”,

“eop:processorVersion”: “3.1”,

“eop:productType”: “SIR\_GDR\_2\_”,

“eop:qualityInformation”: {

“eop:qualityStatus”: “DEGRADED”

},

“eop:size”: 8612306,

“eop:version”: “C001”

},

“eop:status”: {

“@id”: “eop:ARCHIVED”

},

“owc:links”: {

“@type”: “owc:Links”,

“iana:alternate”: [

{

“@id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/atom%2Bxml&parentIdentifier=EOP:ESA:CRYOSAT:CR2\_SIR&uid=CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001&recordSchema=server-choice”,

“@type”: “atom:link”,

“dct:title”: “Atom format”,

“atom:type”: “application/atom+xml”

},

{

“@id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/gml%2Bxml&parentIdentifier=EOP:ESA:CRYOSAT:CR2\_SIR&uid=CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001&recordSchema=om10”,

“@type”: “atom:link”,

“dct:title”: “O&M metadata”,

“atom:type”: “application/gml+xml;profile=http://www.opengis.net/spec/EOMPOM/1.0”

},

{

“@id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/gml%2Bxml&parentIdentifier=EOP:ESA:CRYOSAT:CR2\_SIR&uid=CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001&recordSchema=om”,

“@type”: “atom:link”,

“dct:title”: “O&M 1.1 metadata”,

“atom:type”: “application/gml+xml;profile=http://www.opengis.net/spec/EOMPOM/1.1”

},

{

“@id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/rdf%2Bxml&parentIdentifier=EOP:ESA:CRYOSAT:CR2\_SIR&uid=CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001&recordSchema=server-choice”,

“@type”: “atom:link”,

“dct:title”: “RDF/XML format”,

“atom:type”: “application/rdf+xml”

},

{

“@id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/ld%2Bjson&parentIdentifier=EOP:ESA:CRYOSAT:CR2\_SIR&uid=CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001&recordSchema=server-choice”,

“@type”: “atom:link”,

“dct:title”: “JSON-LD format”,

“atom:type”: “application/ld+json”

},

{

“@id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=text/turtle&parentIdentifier=EOP:ESA:CRYOSAT:CR2\_SIR&uid=CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001&recordSchema=server-choice”,

“@type”: “atom:link”,

“dct:title”: “Turtle format”,

“atom:type”: “text/turtle”

}

],

“iana:enclosure”: {

« @id » : « ftp ://science-pds.cryosat.esa.int//SIR\_GDR/2010/07/CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001.DBL »,

“@type”: “atom:link”,

“dct:title”: “Download”,

“atom:type”: “application/x-binary”

},

“iana:up”: {

“@id”: “http://fedeo.esa.int/opensearch/request/?httpAccept=application/atom%2Bxml&uid=CR2\_SIR&recordSchema=iso”,

“@type”: “atom:link”,

“dct:title”: “Up”,

“atom:type”: “application/atom+xml”

},

“iana:via”: {

“@id”: “ftp://science-pds.cryosat.esa.int//SIR\_GDR/2010/07/CS\_LTA\_\_SIR\_GDR\_2\_\_20100722T120449\_20100722T134403\_C001.HDR”,

“@type”: “atom:link”,

“dct:title”: “Via”,

“atom:type”: “application/xml”

}

}

}

}

1. GeoJSON Schemas (Normative)

E.1 Schemas for EO GeoJSON validation

JSON Schema [OR18] representation (Draft 04) is used to define the schemas. This specification is supported by several tools (including Altova XML Spy 2016, JSONBuddy 3.5 and also Web-based tools[[21]](#footnote-21)) and is also used to define data types in the OpenAPI specification[[22]](#footnote-22). It does not allow to easily model composition of schemas or inheritance without relaxing the schemas. Therefore, the property “additionalProperties” is set to true in some schema definitions to allow using the “allOf” operator to model inheritance. A future version v5 of JSON Schema is expected to propose a $merge operator to better support this. Other schema languages (e.g., SJOT[[23]](#footnote-23)) have better support for this, but have less tool support.

The schemas below assume that numbers are not surrounded by double quotes as per the JSON Style Guidelines [OR16].

The file is available at http://schemas.opengis.net/eo-geojson/1.0/eo-geojson-schema.json (See Annex E:).

{

“$schema”: “http://json-schema.org/draft-04/schema#”,

“title”: “GeoJSON encoding of OGC 17-003 Earth Observation Metadata”,

“description”: “Definition of EO Dataset document. Note that numbers in the instance should not be surrounded by double-quotes to validate against this schema.”,

“$ref”: “#/definitions/EarthObservation”,

“definitions”: {

E.1.1 Definitions/MetadataInformation

“MetadataInformation”: {

“description”: “Subset of Properties”,

“type”: “object”,

“properties”: {

“lang”: {

“description”: “RFC3066”,

“type”: “string”,

“minLength”: 2,

“maxLength”: 3

},

“updated”: {

“type”: “string”,

“pattern”: “^[0-9]{4}-[0-9]{2}-[0-9]{2}T[0-9]{2}:[0-9]{2}:[0-9]{2}(\\.[0-9]+)?(Z|[\\+\\-][0-9]{2}:[0-9]{2})$”,

“format”: “date-time”

},

“published”: {

“type”: “string”,

“format”: “date-time”

},

“creationDate”: {

“type”: “string”,

“format”: “date-time”

}

},

“required”: [

“updated”

]

},

E.1.2 Definitions/DataIdentification

“DataIdentification”: {

“description”: “Subset of Properties”,

“type”: “object”,

“properties”: {

“parentIdentifier”: {

“type”: “string”

},

“doi”: {

“type”: “string”

},

“title”: {

“type”: “string”

},

“identifier”: {

“type”: “string”

},

“date”: {

“type”: “string”

},

“created”: {

“type”: “string”,

“format”: “date-time”

},

“available”: {

“type”: “string”

},

“additionalAttributes”: {

“type”: “object”,

“minProperties”: 1

}

},

“required”: [

“title”,

“identifier”,

“date”

]

},

E.1.3 Definitions/ProcessingInformation

“ProcessingInformation”: {

“description”: “Subset of ProductInformation”,

“type”: “object”,

“properties”: {

“processingLevel”: {

“type”: “string”,

“enum”: [

“1A”,

“1B”,

“1C”,

“2”,

“3”

]

},

“processorName”: {

“type”: “string”

},

“processorVersion”: {

“type”: “string”

},

“processingCenter”: {

“description”: “Codelist”,

“type”: “string”

},

“processingDate”: {

“type”: “string”,

“format”: “date-time”

},

“processingMode”: {

“description”: “Codelist”,

“type”: “string”

},

“compositeType”: {

“type”: “string”

},

“format”: {

“type”: “string”

},

“productContentsType”: {

“type”: “string”

},

“processingMethod”: {

“type”: “string”

},

“processingMethodVersion”: {

“type”: “string”

}

}

},

E.1.4 Definitions/Links

“Links”: {

“title”: “Links”,

“description”: “Objects with Links grouped by \”relation\” (i.e., Atom \”rel\” attribute).”,

“type”: “object”,

“properties”: {

“type”: {

“type”: “string”,

“enum”: [

“Links”

]

},

“qualityReport”: {

“type”: “array”,

“items”: {

“$ref”: “#/definitions/Link”

}

},

“previews”: {

“type”: “array”,

“items”: {

“$ref”: “#/definitions/Link”

}

},

“via”: {

“type”: “array”,

“items”: {

“$ref”: “#/definitions/Link”

}

},

“data”: {

“type”: “array”,

“items”: {

“$ref”: “#/definitions/Link”

}

},

“up”: {

“type”: “array”,

“items”: {

“$ref”: “#/definitions/Link”

}

},

“related”: {

“type”: “array”,

“items”: {

“$ref”: “#/definitions/Link”

}

},

“alternates”: {

“type”: “array”,

“items”: {

“$ref”: “#/definitions/Link”

}

}

}

},

E.1.5 Definitions/Properties

“Properties”: {

“title”: “Properties”,

“type”: “object”,

“allOf”: [

{

“type”: “object”,

“properties”: {

“type”: {

“type”: “string”,

“enum”: [

“Properties”

]

},

“status”: {

“type”: “string”,

“enum”: [

“ARCHIVED”,

“PLANNED”,

“ACQUIRED”,

“CANCELLED”,

“FAILED”,

“POTENTIAL”,

“REJECTED”,

“QUALITYDEGRADED”

]

},

“acquisitionInformation”: {

“type”: “array”,

“items”: {

“$ref”: “#/definitions/AcquisitionInformation”

}

},

“productInformation”: {

“$ref”: “#/definitions/ProductInformation”

},

“links”: {

“$ref”: “#/definitions/Links”

},

“offerings”: {

“description”: “OGC 14-055r2”,

“type”: “array”,

“items”: {

“$ref”: “http://schemas.opengis.net/eo-geojson/1.0/owc-geojson-schema.json#/definitions/Offering”

}

}

},

“required”: [

“status”,

“acquisitionInformation”,

“links”

]

},

{

“$ref”: “#/definitions/DataIdentification”

},

{

“$ref”: “#/definitions/MetadataInformation”

}

]

},

E.1.6 Definitions/EarthObservation

“EarthObservation”: {

“description”: “GeoJSON Feature”,

“type”: “object”,

“properties”: {

“@context”: {

“type”: “string”

},

“type”: {

“title”: “type”,

“type”: “string”,

“enum”: [

“Feature”

]

},

“id”: {

“type”: “string”,

“format”: “uri”

},

“geometry”: {

“I”: [

{

“$ref”: “http://schemas.opengis.net/eo-geojson/1.0/owc-geojson-schema.json#/definitions/Geometry”

},

{

“type”: “null”

}

]

},

“properties”: {

“$ref”: “#/definitions/Properties”

},

“bbox”: {

“type”: “array”,

“minItems”: 4,

“maxItems”: 4,

“items”: {

“type”: “number”

}

}

},

“required”: [

“type”,

“id”,

“geometry”,

“properties”

],

“additionalProperties”: false

},

E.1.7 Definitions/Platform

“Platform”: {

“type”: “object”,

“minProperties”: 1,

“properties”: {

“type”: {

“type”: “string”,

“enum”: [

“Platform”

]

},

“id”: {

“type”: “string”,

“format”: “uri”

},

“platformShortName”: {

“type”: “string”

},

“platformSerialIdentifier”: {

“type”: “string”

},

“orbitType”: {

“type”: “string”,

“enum”: [

“GEO”,

“LEO”

]

}

},

“required”: [

“platformShortName”

],

“additionalProperties”: false

},

E.1.8 Definitions/Instrument

“Instrument”: {

“type”: “object”,

“properties”: {

“type”: {

“type”: “string”,

“enum”: [

“Instrument”

]

},

“id”: {

“type”: “string”,

“format”: “uri”

},

“sensorType”: {

“type”: “string”,

“enum”: [

“OPTICAL”,

“RADAR”,

“ATMOSPHERIC”,

“ALTIMETRIC”,

“LIMB”

]

},

“instrumentShortName”: {

“type”: “string”

},

“description”: {

“type”: “string”

}

},

“required”: [

“instrumentShortName”

],

“additionalProperties”: false

},

E.1.9 Definitions/AcquisitionParameters

“AcquisitionParameters”: {

“type”: “object”,

“allOf”: [

{

“type”: “object”,

“properties”: {

“acquisitionType”: {

“type”: “string”,

“enum”: [

“NOMINAL”,

“CALIBRATION”,

“OTHER”

]

},

“acquisitionSubType”: {

“type”: “string”

},

“startTimeFromAscendingNode”: {

“type”: “integer”,

“minimum”: 0

},

“completionTimeFromAscendingNode”: {

“type”: “integer”,

“minimum”: 0

},

“relativeOrbitNumber”: {

“type”: “integer”

},

“wrsLongitude”: {

“type”: “string”

},

“wrsLatitude”: {

“type”: “string”

},

“tileId”: {

“type”: “string”

},

“groundTrackUncertainty”: {

“type”: “number”

},

“cycleNumber”: {

“type”: “integer”,

“minimum”: 0

},

“antennaLookDirection”: {

“type”: “string”,

“enum”: [

“LEFT”,

« RIGHT »

]

},

« acquisitionStation » : {

« type » : « string »

},

« acquisitionAngles » : {

« $ref » : « #/definitions/AcquisitionAngles »

},

« operationalMode » : {

« type » : « string »

},

« swathIdentifier » : {

« type » : « string »

},

« polarisationMode » : {

« description » : « Sar »,

« type » : « string »,

« enum » : [

« S »,

« D »,

« T »,

« Q »,

« UNDEFINED »

]

},

« polarisationChannels » : {

« description » : « Sar »,

« type » : « string »

},

“resolution”: {

“type”: “number”

},

“verticalResolution”: {

“description”: “Atm, Lmb”,

“type”: “number”

},

“waveLengths”: {

“type”: “array”,

“minItems”: 1,

“items”: {

“$ref”: “#/definitions/WavelengthInformation”

}

},

“measurementType”: {

“type”: “string”,

“enum”: [

“ABSORPTION”,

“EMISSION”

]

},

“dopplerFrequency”: {

“description”: “Sar”,

“type”: “number”,

« minimum » : 0,

« exclusiveMinimum » : true

},

« samplingRates » : {

« description » : « Alt »,

“type”: “array”,

“items”: {

“type”: “number”,

“minimum”: 0,

“exclusiveMinimum”: true

}

}

},

“required”: [

“acquisitionType”

]

},

{

“$ref”: “#/definitions/TemporalInformation”

},

{

“$ref”: “#/definitions/VerticalSpatialDomain”

},

{

“$ref”: “#/definitions/OrbitParameters”

}

]

},

E.1.10 Definitions/Link

“Link”: {

“type”: “object”,

“properties”: {

“href”: {

“type”: “string”,

“format”: “uri”

},

“type”: {

“type”: “string”

},

“title”: {

“type”: “string”

},

“length”: {

“type”: “integer”,

“minimum”: 0

},

“category”: {

“description”: “Media category property defined by MediaRSS.”,

“type”: “string”,

“enum”: [

“THUMBNAIL”,

“QUICKLOOK”,

“ALBUM”,

“CLOUD”,

“SNOW”,

“QUALITY”

]

},

“expression”: {

“description”: “Media expression property defined by MediaRSS.”,

“type”: “string”,

“enum”: [

“full”,

“sample”

]

},

“conformsTo”: {

“type”: “string”,

“format”: “uri”

}

},

“required”: [

“href”

],

“additionalProperties”: false

},

E.1.11 Definitions/ProductInformation

“ProductInformation”: {

“type”: “object”,

“allOf”: [

{

“type”: “object”,

“properties”: {

“type”: {

“type”: “string”,

“enum”: [

“ProductInformation”

]

},

“productType”: {

“type”: “string”

},

“size”: {

“type”: “integer”

},

“productVersion”: {

“type”: “string”

},

“statusSubType”: {

“type”: “string”,

“enum”: [

“ON-LINE”,

“OFF-LINE”

]

},

“qualityInformation”: {

“$ref”: “#/definitions/QualityInformation”

},

“statusDetail”: {

“type”: “string”

},

“availabilityTime”: {

“type”: “string”,

“format”: “date-time”

},

“timeliness”: {

“type”: “string”

},

“productGroupId”: {

“type”: “string”

},

“archivingCenter”: {

“type”: “string”

},

“referenceSystemIdentifier”: {

“type”: “string”

},

“archivingDate”: {

“type”: “string”,

“format”: “date-time”

}

},

“required”: [

“availabilityTime”

]

},

{

“$ref”: “#/definitions/ProcessingInformation”

},

{

“$ref”: “#/definitions/CoverageDescription”

}

]

},

E.1.12 Definitions/AcquisitionAngles

“AcquisitionAngles”: {

“type”: “object”,

“properties”: {

“illuminationAzimuthAngle”: {

“type”: “number”

},

“illuminationZenithAngle”: {

“type”: “number”

},

“illuminationElevationAngle”: {

“type”: “number”

},

“incidenceAngle”: {

“type”: “number”

},

“minimumIncidenceAngle”: {

“type”: “number”

},

“maximumIncidenceAngle”: {

“type”: “number”

},

“incidenceAngleVariation”: {

“type”: “number”

},

“acrossTrackIncidenceAngle”: {

“type”: “number”

},

“alongTrackIncidenceAngle”: {

“type”: “number”

},

“instrumentAzimuthAngle”: {

“type”: “number”

},

“instrumentZenithAngle”: {

“type”: “number”

},

“instrumentElevationAngle”: {

“type”: “number”

},

“pitch”: {

“type”: “number”

},

“roll”: {

“type”: “number”

},

“yaw”: {

“type”: “number”

}

},

“additionalProperties”: false

},

E.1.13 Definitions/QualityInformation

“QualityInformation”: {

“type”: “object”,

“properties”: {

“qualityStatus”: {

“type”: “string”,

“enum”: [

“NOMINAL”,

“DEGRADED”

]

},

“qualityDegradation”: {

“description”: “Percentage”,

“type”: “number”

},

“qualityDegradationTag”: {

“type”: “string”

},

“qualityDegradationQuotationMode”: {

“type”: “string”,

“enum”: [

“AUTOMATIC”,

“MANUAL”

]

}

},

“additionalProperties”: true

},

E.1.14 Definitions/CoverageDescription

“CoverageDescription”: {

“description”: “Subset of ProductInformation”,

“type”: “object”,

“properties”: {

“cloudCover”: {

“type”: “number”

},

“snowCover”: {

“type”: “number”

}

}

},

E.1.15 Definitions/FeatureCollection

“FeatureCollection”: {

“description”: “GeoJSON FeatureCollection”,

“type”: “object”,

“properties”: {

“type”: {

“type”: “string”,

“enum”: [

“FeatureCollection”

]

},

“bbox”: {

“type”: “array”

},

“features”: {

“type”: “array”,

“minItems”: 0,

“items”: {

“$ref”: “#/definitions/EarthObservation”

}

}

},

“required”: [

“type”,

“features”

]

},

E.1.16 Definitions/WavelengthInformation

“WavelengthInformation”: {

“type”: “object”,

“minProperties”: 1,

“properties”: {

“type”: {

“type”: “string”,

“enum”: [

“WavelengthInformation”

]

},

“discreteWavelengths”: {

“type”: “array”,

“minItems”: 1,

“items”: {

“type”: “number”,

“minimum”: 0,

“exclusiveMinimum”: true

}

},

“endWavelength”: {

“type”: “number”,

“minimum”: 0,

“exclusiveMinimum”: true

},

“spectralRange”: {

“type”: “string”,

“enum”: [

“INFRARED”,

“NIR”,

“SWIR”,

“MWIR”,

“LWIR”,

“FIR”,

“UV”,

“VISIBLE”,

“MICROWAVE”,

“OTHER”

]

},

“startWavelength”: {

“type”: “number”,

“minimum”: 0,

“exclusiveMinimum”: true

},

“wavelengthResolution”: {

“type”: “number”

}

},

“additionalProperties”: false

},

E.1.17 Definitions/VerticalSpatialDomain

“VerticalSpatialDomain”: {

“description”: “Subset of AcquisitionParameters”,

“type”: “object”,

“properties”: {

“highestLocation”: {

“type”: “string”

},

“lowestLocation”: {

“type”: “string”

},

“locationUnit”: {

“type”: “string”,

“enum”: [

“bar”,

“m”

]

}

}

},

E.1.18 Definitions/TemporalInformation

“TemporalInformation”: {

“description”: “Subset of AcquisitionParameters”,

“type”: “object”,

“properties”: {

“beginningDateTime”: {

“type”: “string”,

“format”: “date-time”

},

“endingDateTime”: {

“type”: “string”,

“format”: “date-time”

}

},

“required”: [

“beginningDateTime”,

“endingDateTime”

]

},

E.1.19 Definitions/AcquisitionInformation

“AcquisitionInformation”: {

“type”: “object”,

“properties”: {

“type”: {

“type”: “string”,

“enum”: [

“AcquisitionInformation”

]

},

“platform”: {

“$ref”: “#/definitions/Platform”

},

“instrument”: {

“$ref”: “#/definitions/Instrument”

},

“acquisitionParameters”: {

“$ref”: “#/definitions/AcquisitionParameters”

}

}

},

E.1.20 Definitions/OrbitParameters

“OrbitParameters”: {

“description”: “Subset of AcquisitionParameters”,

“type”: “object”,

“properties”: {

“orbitDirection”: {

“type”: “string”,

“enum”: [

“ASCENDING”,

“DESCENDING”

]

},

“lastOrbitDirection”: {

“type”: “string”,

“enum”: [

“ASCENDING”,

“DESCENDING”

]

},

“orbitDuration”: {

“type”: “integer”

},

“ascendingNodeDate”: {

“type”: “string”,

“format”: “date-time”

},

“ascendingNodeLongitude”: {

“type”: “number”

},

“orbitNumber”: {

“type”: “integer”,

“minimum”: 0

},

“lastOrbitNumber”: {

“type”: “number”

}

}

}

}

}

E.2 Schemas for OWC GeoJSON validation

The JSON schema definitions in the current section are “imported” by the schemas presented in the previous section. They represent a JSON Schema encoding of selected OGC 14-055r2 resources which are reused by the OGC 17-003 GeoJSON encoding without modification.

The file is available at http://schemas.opengis.net/eo-geojson/1.0/owc-geojson-schema.json (See Annex E:).

{

“$schema”: “http://json-schema.org/draft-04/schema#”,

“title”: “GeoJSON encoding of OGC 14-055r2 subset required by OGC 17-003 JSON Schema”,

“description”: “Definition of OGC 14-055r2 and GeoJSON elements required by GeoJSON encoding of EO Dataset Metadata. Note that numbers in the instance should not be surrounded by double-quotes to validate against this schema. “,

“definitions”: {

E.2.1 Definitions/Point (GeoJSON)

“Point”: {

“title”: “Point”,

“type”: “object”,

“properties”: {

“coordinates”: {

“title”: “gj:coordinates”,

“description”: “One position (longitude, latitude)”,

“type”: “array”,

“minItems”: 2,

“maxItems”: 2,

“items”: {

“type”: “number”

}

},

“type”: {

“type”: “string”,

“enum”: [

“Point”

]

}

},

“required”: [

“coordinates”,

“type”

],

“additionalProperties”: false

},

E.2.2 Definitions/MultiPoint (GeoJSON)

“MultiPoint”: {

“title”: “point”,

“type”: “object”,

“properties”: {

“coordinates”: {

“title”: “gj:coordinates”,

“description”: “Array of positions”,

“type”: “array”,

“minItems”: 1,

“items”: [

{

“description”: “One position”,

“type”: “array”,

“minItems”: 2,

“maxItems”: 2,

“items”: {

“type”: “number”

}

}

],

“additionalItems”: false

},

“type”: {

“type”: “string”,

“enum”: [

“MultiPoint”

]

}

},

“required”: [

“coordinates”,

“type”

],

“additionalProperties”: false

},

E.2.3 Definitions/LineString (GeoJSON)

“LineString”: {

“title”: “LineString”,

“type”: “object”,

“properties”: {

“coordinates”: {

“title”: “coordinates”,

“description”: “Array of positions”,

“type”: “array”,

“minItems”: 2,

“items”: {

“description”: “One position”,

“type”: “array”,

“minItems”: 2,

“maxItems”: 2,

“items”: {

“type”: “number”

}

}

},

“type”: {

“type”: “string”,

“enum”: [

“LineString”

]

}

},

“required”: [

“coordinates”,

“type”

],

“additionalProperties”: false

},

E.2.4 Definitions/MultiLineString (GeoJSON)

“MultiLineString”: {

“title”: “MultiLineString”,

“type”: “object”,

“properties”: {

“coordinates”: {

“title”: “coordinates”,

“description”: “Array of linestring”,

“type”: “array”,

“minItems”: 1,

“items”: {

“description”: “Linestring, i.e., array of positions”,

“type”: “array”,

“minItems”: 2,

“items”: {

“description”: “Position (longitude, latitude)”,

“type”: “array”,

“minItems”: 2,

“maxItems”: 2,

“items”: {

“type”: “number”

}

}

}

},

“type”: {

“type”: “string”,

“enum”: [

“MultiLineString”

]

}

},

“required”: [

“coordinates”,

“type”

],

“additionalProperties”: false

},

E.2.5 Definitions/Polygon (GeoJSON)

“Polygon”: {

“title”: “Polygon”,

“type”: “object”,

“properties”: {

“coordinates”: {

“title”: “coordinates”,

“description”: “Array of linestrings”,

“type”: “array”,

“minItems”: 1,

“items”: {

“description”: “Linear ring, i.e., linestring or array of positions”,

“type”: “array”,

“minItems”: 1,

“items”: {

“description”: “One position”,

“type”: “array”,

“minItems”: 2,

“maxItems”: 2,

“items”: {

“type”: “number”

}

}

}

},

“type”: {

“type”: “string”,

“enum”: [

“Polygon”

]

}

},

“required”: [

“coordinates”,

“type”

],

“additionalProperties”: false

},

E.2.6 Definitions/MultiPolygon (GeoJSON)

“MultiPolygon”: {

“title”: “MultiPolygon”,

“type”: “object”,

“properties”: {

“coordinates”: {

“title”: “coordinates”,

“description”: “Array of Polygons”,

“type”: “array”,

“minItems”: 1,

“items”: {

“description”: “Array of linestrings”,

“type”: “array”,

“minItems”: 1,

“items”: {

“description”: “Linear ring, i.e., linestring or array of positions”,

“type”: “array”,

“items”: {

“description”: “One position”,

“type”: “array”,

“minItems”: 2,

“maxItems”: 2,

“items”: {

“type”: “number”

}

}

}

}

},

“type”: {

“type”: “string”,

“enum”: [

“MultiPolygon”

]

}

},

“required”: [

“coordinates”,

“type”

],

“additionalProperties”: false

},

E.2.7 Definitions/Geometry (GeoJSON)

“Geometry”: {

“title”: “Geometry”,

“type”: “object”,

“I”: [

{

“$ref”: “#/definitions/Point”

},

{

“$ref”: “#/definitions/MultiPoint”

},

{

“$ref”: “#/definitions/LineString”

},

{

“$ref”: “#/definitions/MultiLineString”

},

{

“$ref”: “#/definitions/Polygon”

},

{

“$ref”: “#/definitions/MultiPolygon”

}

]

},

E.2.8 Definitions/Offering (OGC 14-055r2)

“Offering”: {

“title”: “Offering”,

“description”: “Offering as defined in OGC 14-055r2”,

“type”: “object”,

“properties”: {

“code”: {

“type”: “string”,

“format”: “uri”

},

“operations”: {

“type”: “array”,

“items”: {

“$ref”: “#/definitions/Operation”

}

},

“contents”: {

“type”: “array”

},

“styles”: {

“type”: “array”

}

},

“required”: [

“code”

]

},

E.2.9 Definitions/Operation (OGC 14-055r2)

“Operation”: {

“description”: “OGC 14-055r2”,

“type”: “object”,

“properties”: {

“code”: {

“type”: “string”,

“format”: “uri”

},

“method”: {

“type”: “string”,

“enum”: [

“GET”,

“POST”,

“PUT”,

“HEAD”,

“PATCH”,

“DELETE”

]

},

“type”: {

“description”: “Media type”,

“type”: “string”

},

“href”: {

“type”: “string”,

“format”: “uri”

},

“request”: {

“type”: “object”

},

“result”: {

“type”: “object”

}

},

“required”: [

“code”,

“method”,

“href”

]

}

}

}

1. Schemas and Examples

The following schema file, vocabulary definitions, context file and selected examples are provided in the OGC schema repository:

* eo-geojson-schema-standalone.json
* eo-geojson-schema.json
* owc-geojson-schema.json
* eo-geojson-vocabulary.owl
* eo-geojson-vocabulary.ttl
* owc-geojson-vocabulary.owl
* eo-geojson.jsonld
* example-1-seasat.json
* example-1-seasat.jsonld
* example-2-landsat.json
* example-2-landsat.jsonld
* example-3-cryosat.json
* example-3-cryosat.jsonld
* example-4-sentinel.json
* example-4-sentinel.jsonld

They are available at <http://schemas.opengis.net/eo-geojson/1.0>.

1. Revision History

| Date | Version | Editor | Sections modified | Description |
| --- | --- | --- | --- | --- |
| 10/02/2017 | 0.0.1 Draft D6 | Y. Coene | All | Initialised Draft Document. |
| 28/02/2017 | 0.0.2 Draft D7 | Y. Coene | All | Updated draft version provided to CEOS WGISS members. |
| 21/04/2017 | 0.0.3 Draft D8 | Y. Coene | All | JSON-LD content removed or moved to annexes. |
| 7.8 | FeatureCollection encoding example added. |
| Annex D | Original Annex C examples presented as GeoJSON, JSON-LD (Compacted) and JSON-LD (Expanded). |
| Annex B | Original Annex D updated with content moved from inside document to this annex.  Original section 5.2.2 “[JSON-LD] instance diagrams” removed.  This Annex moved as Annex B as info is needed to understand following annexes with JSON-LD examples and properties. |
| All | mediaType property replaced by “type” and local context added to map “type” to “atom:type” in the scope of the “links”object. |
| 7.1.4 | Offering example added for WMS and WCS. |
| Table 4 | Clarification added that geometry element can be a “null” value according to RFC 7946 to address comment from CWIC team (Eugene Yu and Linjun Kang) dated 17/03/2017. |
|  |  |  | Table 9 | Multiplicity of “title” (Data Identification) corrected as per CWIC team comments 17/03/2017. |
|  |  |  | 7.1 | “properties”: {} replaced by “properties”: {...} and “geometry”: {} replaced by “geometry”: {...} in JSON examples as per CWIC team comments 17/03/2017. |
|  |  |  | 7.6.2 | “spectralRange” removed from Instrument table as included in WavelengthInformation. |
|  |  |  | 7.4.1.4 | JSON schema diagram for LineString corrected. |
|  |  |  | 5.2.2 | Section explaining JSONPath added. |
|  |  |  | 7 | JSONPath information added in dictionary tables. |
| 25/04/2017 | 0.0.4 Draft D9 | Y. Coene | Annex C2 | Mapping on UMM improved with inputs from John Taylor. |
|  |  |  | 7.7.2 | Reference to ISO 8601 Duration added for CompositeType property |
|  |  |  | Table 7 | media:\* properties added and examples of quicklook, thumbnail and masks added below. |
|  |  |  | Annex B:  Annex D: | Mappings added for media:\* properties.  Media: namespace added to “expanded” examples. |
| 24/05/2017 | 0.0.5 Draft D10 | Y. Coene | Annex B | Annex C.3 with EO vocabulary definition (RDFS) updated and moved into JSON-LD Annex as B.3.  Included in Turtle format as more compact than RDF/XML format. |
|  |  |  | 1.2 | Aligned with modified table of content (Annex C.3 moved to B.3). |
|  |  |  | 7.1.3 | Example of local access link with “file” URI scheme added as per RFC8089. |
|  |  |  | 7.7 | format and archivingDate properties added in tables and figures. |
|  |  |  | Annex C | GeoJSON column in Annex C.2 moved to first column of table.  All tables from Annex C merged into a single table. |
|  |  |  | All | Single namespace eop: used instead of opt:, sar;, lmb: etc. |
| 13/06/2017 | 0.0.6 Draft D11 | Y. Coene | 7.1 | Figure 3 updated to allow for geometry=null in JSON Schema. |
|  |  |  | 2.2 | Description column filled in table with conformance classes. |
|  |  |  | 7.6, 7.6 | Requirement class “”instrument” added (7.5.1).  Requirement “wavelength-information” added (7.5.2).  Requirement acquisition-angles added as dependency in 7.5.4.  requirement quality-information added as dependency in 7.6. |
|  |  |  | Annex A | Conformance classes specified in same way as OGC 15-100r1. Diagram with requirement (class) dependencies added. |
|  |  |  | Annex E | E.1.12: JSON Schema in E.1.12 (Geometry) updated to allow for geometry=null.  E.1.16: JSON Schema for Link aligned with content of document (e.g., category, expression, conformsTo).  E.1.17: JSON Schema for ProductInformation aligned with content of document (e.g., archivingDate). |
| 21/06/2017 | 0.0.7 Draft D12 | Y. Coene | 7.4.1.5 | MultiLineString example added. |
|  |  |  | 7.1.4 | Offering example for WPS added. |
|  |  |  | 7.3 | “lang” added to map UMM metadata language information. |
|  |  |  | 9 | typos “Application” corrected into “application”. |
|  |  |  | B.2 | eop: namespace corrected in JSON-LD context definitions. |
|  |  |  | B.3 | Vocabulary updated to encode the individuals in a different way using intermediate classes for the enumerations. |
|  |  |  | C.1 | Mapping table completed/corrected for:   * lang * alt:cycleNumber * discreteWavelengths * Spatial option 5. * Spatial option 7. * updated (EarthObservationMetadata/ creationDate) |
|  |  |  | E.1.12 | bbox JSON schema definition updated. |
| 06/09/2017 | 0.0.8 Draft D13 | Y. Coene |  | Integration of comments received from CEOS WGISS NASA team (Allan Doyle, Michael Morahan, and Archie Warnock) on draft D12 as agreed during CEOS WGISS SLT teleconference 24/08/2017: |
|  |  |  | i | Comment AD2 (A. Doyle): “improvement” clarified.  Comment AD3: reference to definition of compaction added as footnote.  Comment AD4; added reference to OGC Simple Features. |
|  |  |  | 1.1 | Comment AD6: rephrase sentence confirming that CEOS WGISS review comments are taken into account.  CEOS added to list of submitting organizations in section iv as well. |
|  |  |  | Table 1 | Comment AD8: caption updated to avoid “EO GeoJSON” term. |
|  |  |  | 3 | Comment AD9: Reference NR4 moved to OR33 to become non-normative. |
|  |  |  | 4 | Comment AD10: datastrip, swath, granule, dataset definitions added or improved. |
|  |  |  | 6.2 | Comment AD11: Sentence reworded. |
|  |  |  | Table 4 and other tables. | Comment AD13: title of first column in properties table changed from “GeoJSON Property” into “JSON Property”. |
|  |  |  | Figure 4 and other figures. | Comment AD15: Remove “(GeoJSON)” from caption of JSON Schema figures except when appropriate. |
|  |  |  | Example 3 and others. | Comment AD18: Remove “(GeoJSON)” from caption of examples except where appropriate. |
|  |  |  | 7.1.2 | Comment AD21: Changed {} into {...}. |
|  |  |  | Example 12 | Comment AD33: Added remark about line breaks which were added for readability of WPS example.  Comment MM4: invalid date corrected. |
|  |  |  | 7.6.3 | Comment AD57: Added missing caption. |
|  |  |  | D.1.2.2 | Comment AD80: Made first and last position contain identical values in example. |
|  |  |  | 6.1 | Comment MM5: Sentence added to clarify that ordering of members of any JSON object is irrelevant. |
|  |  |  | 7.4.2 | Comment MM6: Example added for VerticalSpatialDomain encoding. |
|  |  |  | 7.7 | Comment MM6: Example of ProductInformation encoding extended with more properties. |
|  |  |  | C.1 | Comment MM10: UMM-C property “Collection Status” mapped to “status”. |
|  |  |  | Table 11  C.1  B.3 | Comment AW3: definition of lower/upper bound corrected. locationUnit added.  minimumAltitude and maximumAltitude replaced by lowestLocation and highestLocation.  locationUnit added to allow use of distance or pressure for expressing vertical spatial domain.  locationUnit added to vocabulary definition in Turtle. |
|  |  |  | [OR13] | Reference to CEOS Best Practice document OR13 removed (together with two related footnotes) in list of non-normative references as agreed in SWG telco 30/08/2017. |
|  |  |  | All | Editorial comments on previous version from John Taylor addressed. |
| 22/01/2018 | 1.0.0 Draft D1 | Y. Coene |  |  |
|  |  |  | B.2.2 | JSON-LD 1.1 context updated to allow constants to be interpreted as relative/local URI and be expanded using @base URI. |
|  |  |  | All | atom: replaced by “iana:” to align URI of relations with [NR11] and OGC JSON Best Practice Candidate Alpha version.  Added definition of “iana:” namespace. |
|  |  |  | 7.1.5. | JSON Schema for OGC 14-055r2 Operation object added. |
|  |  |  | All | Reference to UMM-C added as [OR04]. Existing OR04 moved to OR13. |
|  |  |  | Annex F | Annex with download location for schemas and examples added. |
|  |  |  | Table 18, Annex B.3, C.1, E.1.15 | Comment OB1 (22/12/2017) addressed: track/frame renamed into wrsLongitudeGrid/wrsLatitudeGrid. |
|  |  |  | Table 18, Annex B.3, C.1, E.1.15 | Comment OB2 (22/12/2017) addressed: relativePassNumber renamed into relativeOrbitNumber. |
|  |  |  | Section 7.1.1 | Mandatory “identifier” added in example. |
|  |  |  | Section 7.3 | “identifier” added in figure.  Mandatory “identifier” added in example. |
|  |  |  | Annex D | “identifier” and “dct:identifier” property added in all examples. |
|  |  |  | Annex E.1.1 | “identifier” added in JSON schema fragment. |
|  |  |  | Table 9, Table 12, Table 13, Table 20, Table 22 | Properties of type DateTime better defined referring to footnote with RFC3339 pattern to be used as discussed via OGC SWG email exchange. |
|  |  |  | Table 4 | Comment AD37 closed in same way as in OGC 17-047: bbox definition updated reducing dimensions to n=2. |
|  |  |  | All and Annex A | Relative URI of requirement classes and requirements updated (“class” removed and “eo-geojson” removed as already part of common part of URI. Core conformance class added as a choice of either a single object or collection of objects. |
|  |  |  | Section 2.2 and Annex A | Offering conformance class added. |
|  |  |  | Section 7.4.3.  Annex B.3  Annex C.1  Annex E.1. | Optional lastOrbitDirection added to close comment JG-01 (NASA). |
| 01/02/2018 | 1.0.0 Draft D2 | Y. Coene | All DateTime occurances and footnote 10. | dateTime format explanation updated as decided in SWG of 31/01/2018.  The definition is identical to the definition of dateTime in JSON Schema, i.e., refers to section 5.6 of RFC3339. Non-UTC times are allowed again. |
| 2018-10-24 | 1.0.0 Draft D4 | Y. Coene | All | Integrated comments from OAB and Public Comments:   * AA-1 * AA-3 * AA-4 * Carl Reed (OAB Review). * DLR-1 * DLR-2 * DLR-3 (Partly) * DLR-4 * DLR-5 (Partly) * DLR-6 * DLR-7 * DLR-8 * DLR-9 (Partly) * DLR-10 * DLR-12 * DLR-14 * DLR-15 * DLR-17 * DLR-62 * DLR-63 * OGC-1 * OGC-2: http://www.opengis.net/owc/1.0/ and http://www.opengis.net/eo-geojson/1.0/ ontology namespaces renamed into http://www.opengis.net/ont/owc/1.0/ and http://www.opengis.net/ont/eo-geojson/1.0/ as per OGC 12-081. * VITO-2   Remain to be done:   * DLR-11, * DLR-13 (no action) * DLR-16, * DLR-18 (no action) * DLR-61 * AA-2 (no action) |
| 2018-11-23 | 1.0.0 Draft D5 | Y. Coene | All | Implemented decisions from SWG telco on 2018-11-06:   * DLR-3: domain and range restrictions removed for remaining “iana” and “media” in Annex B.3. * DLR-5: line 1134 in OWL file (Annex B.3): antennaLookDirection changed into ObjectProperty. * DLR-9: line 896 in OWL file. Eop:discreteWavelengths has “s” removed in its URI. The explanation in the OWL file that it is a “list of something” is reworded as there are no lists/arrays in JSON-LD. eop:samplingRates also changed into eop:samplingRate for same reason. * DLR-11: JSON-LD 1.0 @context removed from document (and Annex B.2). Explanation added why a JSON-LD 1.0 @context was not considered. * DLR-16: “Unit of measure (m) is SI base unit (m) without prefix.”. Two times “(m)” inside this description is unnecessary. All similar sentences were modified. * DLR-16: altitudeUnit made a URI in JSON-LD in eop: namespace and two individuals created corresponding to “m” and “bar”. * DLR-61: Instrument object is split into Instrument (§7.6.2) (containing id, sensorType, instrumentShortName and description) and InstrumentParameters, both below the same parent object AcquisitionInformation.   Refactored JSON Schema in Annex E by isolating reusable definitions corresponding to lower level specifications in Annex E.2.  SpectralRange constants updated with values proposed by DLR (§7.6.3, B.3.1, E.1.16). |
| 2019-02-07 | 1.0.0 Draft D6 | Y. Coene | Annex A  Annex C:  Annex E.1 | Aligned data and metadata dates with OGC 13-026r9 version uploaded after SWG telco on 16/01/2019. Added in tables and XMLSpy diagrams:   * published (metadata – Section 7.2) * creationDate (metadata – Section 7.2) * lang (metadata) – was missing. * created (data – Section 7.3) * available (data – Section 7.3)   Isolated metadata dates in separate MetadataInformation object (Section 7.2) for closer alignment with UMM-G metadata model.  Added conformance class for Section 7.3 in Annex A and figure in Annex A.1.  conformsTo and referenceSystemIdentifier entries corrected.  Updated JSON Schema for Properties, MetadataInformation and DataIdentification. |
| 2019-02-19 | 1.0.0 Draft D7 | Y. Coene | All | Solution for DLR-61 improved: Moved all InstrumentParameters properties to AcquisitionParameters as decided during the SWG telco on 18/02/2019.  conformsTo and referenceSystemIdentifier entries in JSON-LD context updated (“@id”) as the properties are of type “URI”. |
| 2019-07-31 | 1.0.0 r2 | Y. Coene | Section 3.2  Annex A  Annex B.2.1  Annex C.1 | References [OR2], [OR3], [OR4], [OR32] updated to latest versions.  Typos in A.6 and A.12 tables corrected.  Encoding for “offerings”, “operations”, “contents” corrected. “kind” property added.  “published” mapped to dct:issued to be consistent with Annex B.2.1. |

1. See section 4.1 and [OR13]. [↑](#footnote-ref-1)
2. http://opengeospatial.org/cite [↑](#footnote-ref-2)
3. More details can be found in the online documentation of Altova XMLSpy 2016 available at <http://manual.altova.com/xmlspy/spyenterprise/index.html?viewconfig.htm>. [↑](#footnote-ref-3)
4. https://en.wikipedia.org/wiki/International\_System\_of\_Units [↑](#footnote-ref-4)
5. Although "type": [ "Feature", "EarthObservation" ] is valid JSON, GeoJSON expects "type" to be a fixed string "Feature". [↑](#footnote-ref-5)
6. This alternative Link model is used by the YouTube JSON API and the NASA CMR JSON responses for granules. [↑](#footnote-ref-6)
7. OGC 14-055r2 allows additional attributes as "extension" in a DataType link. [↑](#footnote-ref-7)
8. Mandatory also according to Table 2 of OGC 14-055r2. [↑](#footnote-ref-8)
9. When specifying a temporal range the element should contain two dates separated by a slash, like: "2004-02-19T03:03:23.736Z/2010-09-12T15:57:36.072Z." [↑](#footnote-ref-9)
10. A String matching RFC 3339 section 5.6. yyyy-MM-ddThh:mm:ss[.S](Z/(+/-)th:tm) where yyyy = Four digit year, MM = Two digit month (01 = January), dd = Two digit day of month (01 = first day), hh = Hour of day (00 – 23), mm = Minute of hour (00 – 59), ss = Second of minute (00 – 59), S = fraction of seconds with any precision. Times are in UTC (ending with the mandatory Z character) or defined with an offset w.r.t. UTC: th = Time offset hours (00 - 23), tm = Time offset minutes (00 - 59). [↑](#footnote-ref-10)
11. Future work: model dependency of some attributes on the value of this property using JSON Schema dependencies. [↑](#footnote-ref-11)
12. https://en.wikipedia.org/wiki/International\_System\_of\_Units#Derived\_units [↑](#footnote-ref-12)
13. https://en.wikipedia.org/wiki/ISO\_8601#Durations [↑](#footnote-ref-13)
14. Note that "method" as property name would conflict with the "method" property in Offerings. [↑](#footnote-ref-14)
15. http://docs.oasis-open.org/odata/odata-json-format/v4.0/odata-json-format-v4.0.pdf [↑](#footnote-ref-15)
16. http://docs.oasis-open.org/search-ws/searchRetrieve/v1.0/os/part0-overview/searchRetrieve-v1.0-os-part0-overview.html [↑](#footnote-ref-16)
17. http://ontorule-project.eu/parrot/parrot [↑](#footnote-ref-17)
18. http://www.essepuntato.it/lode [↑](#footnote-ref-18)
19. https://github.com/dgarijo/Widoco [↑](#footnote-ref-19)
20. UMM-Common [OR3] has removed notion of "sensor" since version 1.4, but allows for instruments composed of instruments (See [OR3] section 1.9.20.1). [↑](#footnote-ref-20)
21. E.g., [*https://jsonschemalint.com/#/version/draft-04/markup/json*](https://jsonschemalint.com/#/version/draft-04/markup/json) or http://www.jsonschemavalidator.net/ [↑](#footnote-ref-21)
22. https://www.openapis.org/specification/repo [↑](#footnote-ref-22)
23. "SJOT: Schemas for JSON Objects", https://www.genivia.com/sjot.html [↑](#footnote-ref-23)