

# OGC API - Environmental Data Retrieval Standard - Part 1 - Core

# Open Geospatial Consortium

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## OGC API - Environmental Data Retrieval Standard - Part 1 - Core

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# Table of Contents

1. Introduction	6
2. Scope	7
3. Conformance	8
4. References	10
5. Terms and Definitions	11
5.1. Conformance Module; Conformance Test Module	11
5.2. Conformance Class; Conformance Test Class	11
5.3. dataset	11
5.4. Distribution	11
5.5. Executable Test Suite (ETS)	11
5.6. Recommendation	12
5.7. Requirement	12
5.8. Requirements Class	12
5.9. Requirements Module	12
5.10. Standardization Target	12
6. Conventions	13
6.1. Identifiers	13
6.2. Link relations	13
6.3. Examples	13
6.4. Schema	13
6.5. Use of HTTPS	13
6.6. API definition	13
6.6.1. General remarks	13
6.6.2. Role of OpenAPI	14
6.6.3. References to OpenAPI components in normative statements	14
6.6.4. Paths in OpenAPI definitions	14
6.6.5. Reusable OpenAPI components	15
7. Overview	16
7.1. Dependencies	17
7.2. Overview	17
7.3. Dependencies	18
7.4. Platform	18
7.4.1. API landing page	18
7.4.2. API definition	19
7.4.3. Declaration of conformance classes	20
7.5. General Requirements	22
7.5.1. HTTP 1.1	22
7.5.2. HTTP Status Codes	22

7.5.3. Web Caching .....	23
7.5.4. Support for Cross-Origin Requests .....	23
7.5.5. Asynchronous queries .....	23
7.5.6. Encodings .....	24
7.5.7. Link Headers .....	25
8. Requirement Class "Collections" .....	26
8.1. Overview .....	26
8.2. Spatial Resources .....	26
8.2.1. Collections Metadata .....	27
8.2.2. Collection Information .....	29
8.2.3. Collection Resource .....	32
8.3. Query Resources .....	32
8.4. Parameter Modules .....	33
8.4.1. Parameter coords .....	33
8.4.2. Parameter datetime .....	34
8.4.3. Parameter parametername .....	35
8.4.4. Parameter crs .....	37
8.4.5. Parameter outputFormat .....	37
8.5. QueryType specific Operations .....	38
8.5.1. Point .....	38
8.5.2. Polygon .....	44
8.5.3. Parameters .....	44
8.5.4. Parameter coords .....	44
8.5.5. Parameter interpolationX .....	46
8.5.6. Parameter interpolationY .....	47
8.5.7. Parameter z .....	49
8.5.8. Cube .....	50
8.5.9. Trajectory (corridor) .....	58
8.5.10. Items .....	62
8.5.11. Instance .....	63
8.6. General Requirements .....	64
8.6.1. Coordinate Reference Systems .....	64
9. Requirements classes for encodings .....	65
9.1. Overview .....	65
9.2. Requirement Class "HTML" .....	65
9.3. Requirement Class "GeoJSON" .....	66
10. Requirements class "OpenAPI 3.0" .....	67
10.1. Basic requirements .....	67
10.2. Complete definition .....	67
10.3. Exceptions .....	67
10.4. Security .....	68

11. Media Types .....	69
Annex A: Abstract Test Suite (Normative) .....	70
A.1. Introduction .....	70
A.2. Conformance Class Core .....	70
A.2.1. General Tests .....	70
A.2.2. Landing Page {root}/ .....	70
A.2.3. API Definition Path {root}/api (link) .....	71
A.2.4. Conformance Path {root}/conformance .....	72
A.3. Conformance Class Collections .....	73
A.3.1. General Tests .....	73
A.3.2. Feature Collections {root}/collections .....	73
A.3.3. Feature Collection {root}/collections/{collectionId} .....	74
A.3.4. Features {root}/collections/{collectionId}/items .....	75
A.3.5. Second Tier Tests .....	79
A.4. Conformance Class GeoJSON .....	80
A.4.1. GeoJSON Definition .....	81
A.4.2. GeoJSON Content .....	81
A.5. Conformance Class HTML .....	81
A.5.1. HTML Definition .....	82
A.5.2. HTML Content .....	82
A.6. Conformance Class OpenAPI 3.0 .....	82
Annex B: Examples (Informative) .....	85
B.1. Example Landing Pages .....	85
B.2. API Description Examples .....	85
B.3. Conformance Examples .....	85
B.4. Collections Metadata Examples .....	86
B.5. Collection Instance Metadata Examples .....	90
B.6. Collection Query Metadata Examples .....	99
B.7. Collection Information Examples .....	134
Annex C: Revision History .....	135
Annex D: Bibliography .....	136

# Chapter 1. Introduction

## i. Abstract

The OGC has extended their suite of standards to include Resource Oriented Architectures and Web APIs, these standards are based on a common foundation upon which all OGC APIs will be built. This document extends that foundation to define the Environmental Data Retrieval (EDR) API.

An Environmental Data Retrieval (EDR) API provides a family of lightweight interfaces to access Environmental Data resources. Each resource addressed by an EDR API maps to a defined query pattern. These patterns are described in the [Requirement Class Core](#) section.

## ii. Keywords

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

ogcdoc, OGC document, property, geographic information, spatial data, spatial things, dataset, distribution, API, geojson, covJSON,, html, OpenAPI, AsyncAPI, REST, Common

## iii. Preface

### OGC Declaration

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## iv. Submitting organizations

The following organizations submitted this Document to the Open Geospatial Consortium (OGC):

- Met Office
- others TBD

## v. Submitters

All questions regarding this submission should be directed to the editors or the submitters:

Name	Affiliation
Mark Burgoyne ( <i>editor</i> )	Met Office
others	TBD

# Chapter 2. Scope

This specification identifies resources, captures compliance classes, and specifies requirements which are applicable to OGC Environmental Data Retrieval API's.

This specification addresses two fundamental operations; discovery and query.

Discovery operations allow the API to be interrogated to determine its capabilities and retrieve information (metadata) about this distribution of a resource. This includes the API definition of the server as well as metadata about the Environmental Data resources provided by the server.

Query operations allow Environmental Data resources to be retrieved from the underlying data store based upon simple selection criteria, defined by this standard and selected by the client.



# Chapter 3. Conformance

Conformance with this standard shall be checked using the tests specified in Annex A (normative) of this document. The framework, concepts, and methodology for testing, and the criteria to claim conformance are specified in the OGC Compliance Testing Policies and Procedures and the OGC Compliance Testing web site.

The one Standardization Target for this standard is Web APIs.

OGC API-Common provides a common foundation for OGC API standards. Therefore, this standard should be viewed as an extension to API-Common. Conformance to this standard requires demonstrated conformance to the applicable Conformance Classes of API-Common.

This standard identifies six (6) Conformance Classes. The Conformance Classes implemented by an API are advertised through the /conformance path on the landing page. Each Conformance Class is defined by one Requirements Class. The tests in Annex A are organized by Requirements Class. The Requirements Classes define the functional requirements which will be tested through the associated Conformance Class.

The requirements classes for OGC API-EDR are:

- [Core](#)

The *Core Requirements Class* is the minimal useful service interface for an OGC API. The requirements specified in this Requirements Class are mandatory for all implementations of API-EDR.

- [Collections](#)

<b>NOTE</b>	Validate that this description is accurate.
-------------	---

The *Collections Requirements Class* defines the requirements specific to the query and retrieval of Environmental Data Resources.

- [HTML](#)
- [GeoJSON](#)
- [CovJSON](#)

Neither the nor *Core* nor *Collections* requirements class mandate a specific encoding or format for representing resources. The *HTML*, *GeoJSON* and *CovJSON* requirements classes specify representations for these resources in commonly used encodings for spatial data on the web.

None of these encodings are mandatory. An implementation of the *API-EDR* standard may decide to implement another encoding instead of, or in addition those listed. However, a common format does simplifies interoperability so support for *CovJSON* is highly recommended.

- [OpenAPI 3.0](#)

The *OGC API-Common* standard does not mandate any encoding or format for the formal definition

of the API. However, the preferred option is the OpenAPI 3.0 specification. Therefore the EDR API's will be defined using *OpenAPI 3.0*.

# Chapter 4. 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.

- Open API Initiative: **OpenAPI Specification 3.0.3**, <https://github.com/OAI/OpenAPI-Specification/blob/master/versions/3.0.3.md>
- Fielding, R., Gettys, J., Mogul, J., Frystyk, H., Masinter, L., Leach, P., Berners-Lee, T.: **IETF RFC 2616, HTTP/1.1**, <http://tools.ietf.org/rfc/rfc2616.txt>
- Rescorla, E.: **IETF RFC 2818, HTTP Over TLS**, <http://tools.ietf.org/rfc/rfc2818.txt>
- Klyne, G., Newman, C.: **IETF RFC 3339, Date and Time on the Internet: Timestamps**, <http://tools.ietf.org/rfc/rfc3339.txt>
- Berners-Lee, T., Fielding, R., Masinter, L.: **IETF RFC 3896, Uniform Resource Identifier (URI): Generic Syntax**, <http://tools.ietf.org/rfc/rfc3896.txt>
- Butler, H., Daly, M., Doyle, A., Gillies, S., Hagen, S., Schaub, T.: **IETF RFC 7946, The GeoJSON Format**, <https://tools.ietf.org/rfc/rfc7946.txt>
- Nottingham, M.: **IETF RFC 8288, Web Linking**, <http://tools.ietf.org/rfc/rfc8288.txt>
- W3C: **HTML5, W3C Recommendation**, <http://www.w3.org/TR/html5/>
- **Schema.org**: <http://schema.org/docs/schemas.html>
- Blower, J., Riechert, M., Roberts, B.: **Overview of the CoverageJSON format**, <https://www.w3.org/TR/covjson-overview/>
- Weibel, S., Kunze, J., Lagoze, C., Wolf, M.: **IETF RFC 2413, Dublin Core Metadata for Resource Discovery**, <https://tools.ietf.org/rfc/rfc2413.txt>
- Herring, J.: **Simple feature access - Part 1: Common architecture**, [http://portal.opengeospatial.org/files/?artifact\\_id=25355](http://portal.opengeospatial.org/files/?artifact_id=25355)
- Lott, R.: **Well-known text representation of coordinate reference systems**, <http://docs.opengeospatial.org/is/18-010r7/18-010r7.html>

# Chapter 5. Terms and Definitions

This document uses the terms defined in Sub-clause 5 of [OGC API-Common Part 1 \(OGC 19-072\)](#), 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.

## 5.1. Conformance Module; Conformance Test Module

set of related tests, all within a single conformance test class ([OGC 08-131](#))

NOTE: When no ambiguity is possible, the word ‘test’ may be omitted. i.e. conformance test module is the same as conformance module. Conformance modules may be nested in a hierarchical way.

## 5.2. Conformance Class; Conformance Test Class

set of conformance test modules that must be applied to receive a single certificate of conformance ([OGC 08-131](#))

NOTE: When no ambiguity is possible, the word \_test\_ may be left out, so conformance test class maybe called a conformance class.

## 5.3. dataset

collection of data, published or curated by a single agent, and available for access or download in one or more formats (DCAT)

## 5.4. Distribution

represents an accessible form of a **dataset** (DCAT)

EXAMPLE: a downloadable file, an RSS feed or a web service that provides the data.

## 5.5. Executable Test Suite (ETS)

A set of code (e.g. Java and CTL) that provides runtime tests for the assertions defined by the ATS. Test data required to do the tests are part of the ETS ([OGC 08-134](#))

## 5.6. Recommendation

expression in the content of a document conveying that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required, or that (in the negative form) a certain possibility or course of action is deprecated but not prohibited ([OGC 08-131](#))

## 5.7. Requirement

expression in the content of a document conveying criteria to be fulfilled if compliance with the document is to be claimed and from which no deviation is permitted ([OGC 08-131](#))

## 5.8. Requirements Class

aggregate of all requirement modules that must all be satisfied to satisfy a conformance test class ([OGC 08-131](#))

## 5.9. Requirements Module

aggregate of requirements and recommendations of a specification against a single standardization target type ([OGC 08-131](#))

## 5.10. Standardization Target

entity to which some requirements of a standard apply ([OGC 08-131](#))

NOTE: The standardization target is the entity which may receive a certificate of conformance for a requirements class.

# Chapter 6. Conventions

## 6.1. Identifiers

The normative provisions in this standard are denoted by the URI

<http://www.opengis.net/spec/ogcapi-edr-1/1.0>

All requirements and conformance tests that appear in this document are denoted by partial URIs which are relative to this base.

## 6.2. Link relations

To express relationships between resources, [RFC 8288 \(Web Linking\)](#) and [registered link relation types](#) are used.

## 6.3. Examples

Most of the examples provided in this standard are encoded in JSON. JSON was chosen because it is widely understood by implementers and easy to include in a text document. This convention should NOT be interpreted as a requirement that JSON must be used. Implementors are free to use any format they desire as long as there is a Conformance Class for that format and the API advertises its support for that Conformance Class.

## 6.4. Schema

JSON Schema is used throughout this standard to define the structure of resources. These schema are typically represented using YAML encoding. This convention is for the ease of the user. It does not prohibit the use of another schema language or encoding. Nor does it indicate that JSON schema is required. Implementations should use a schema language and encoding appropriate for the format of the resource.

## 6.5. Use of HTTPS

For simplicity, this document in general only refers to the HTTP protocol. This is not meant to exclude the use of HTTPS and simply is a shorthand notation for "HTTP or HTTPS". In fact, most servers are expected to use [HTTPS](#), not [HTTP](#).

## 6.6. API definition

### 6.6.1. General remarks

Good documentation is essential for every API so that developers can more easily learn how to use the API. In the best case, documentation would be available both in HTML for human consumption and in a machine readable format that can be processed by software for run-time binding.

This standard specifies requirements and recommendations for APIs that share spatial resources and want to follow a standard way of doing so. In general, APIs will go beyond the requirements and recommendations stated in this standard. They will support additional operations, parameters, etc. that are specific to the API or the software tool used to implement the API.

### 6.6.2. Role of OpenAPI

This document uses OpenAPI 3.0 fragments as examples and to formally state requirements. Using OpenAPI 3.0 is not required for implementing an OGC API. Other API definition languages may be used along with, or instead of OpenAPI. However, any API definition language used should have an associated conformance class advertised through the /conformance path.

This approach is used to avoid lock-in to a specific approach to defining an API. This standard includes a [conformance class](#) for API definitions that follow the [OpenAPI specification 3.0](#). Conformance classes for additional API definition languages will be added as the API landscape continues to evolve.

In this document, fragments of OpenAPI definitions are shown in YAML since YAML is easier to format than JSON and is typically used in OpenAPI editors.

### 6.6.3. References to OpenAPI components in normative statements

Some normative statements (requirements, recommendations and permissions) use a phrase that a component in the API definition of the server must be "based upon" a schema or parameter component in the OGC schema repository.

In this case, the following changes to the pre-defined OpenAPI component are permitted:

- If the server supports an XML encoding, `xml` properties may be added to the relevant OpenAPI schema components.
- The range of values of a parameter or property may be extended (additional values) or constrained (if a subset of all possible values are applicable to the server). An example for a constrained range of values is to explicitly specify the supported values of a string parameter or property using an enum.
- Additional properties may be added to the schema definition of a Response Object.
- Informative text may be changed or added, like comments or description properties.

For API definitions that do not conform to the [OpenAPI Specification 3.0](#) the normative statement should be interpreted in the context of the API definition language used.

### 6.6.4. Paths in OpenAPI definitions

All paths in an OpenAPI definition are relative to the base URL of a server. Unlike Web Services, an API is decoupled from the server(s). Some ramifications of this are:

- An API may be hosted (replicated) on more than one server.
- Parts of an API may be distributed across multiple servers.

### Example 1. URL of the OpenAPI definition

If the OpenAPI Server Object looks like this:

```
servers:  
- url: https://dev.example.org/  
  description: Development server  
- url: https://data.example.org/  
  description: Production server
```

The path `"/mypath"` in the OpenAPI definition of the API would be the URL <https://data.example.org/mypath> for the production server.

## 6.6.5. Reusable OpenAPI components

Reusable components for OpenAPI definitions for a OGC API are referenced from this document.

### CAUTION

During the development phase, these components use a base URL of `"https://raw.githubusercontent.com/engeospatial/oapi_common/master/"`, but eventually they are expected to be available under the base URL `"http://schemas.opengis.net/ogcapi_common/1.0/openapi/"`.



# Chapter 7. Overview

## General

The OGC API family of standards enable access to resources using the HTTP protocol and its' associated operations (GET, PUT, POST, etc.). OGC API-Common defines a set of features which are applicable to all OGC APIs. Other OGC standards extend API-Common with features specific to a resource type. This OGC API-EDR standard defines an API with two goals:

**NOTE** | What are the goals of API\_EDR?

1. { TBD-1}
2. { TBD-2}

Resources exposed through an OGC API may be accessed through a Universal Resource Identifier (URI). URIs are composed of three sections:

- Service Offering: The service endpoint (subsequently referred to as Base URI or {root})
- Access Paths: Unique paths to Resources
- Query: Parameters to adjust the representation of a Resource or Resources like encoding format or subsetting

Some resources are also accessible through links on previously accessed resources. Unique relation types are used for each resource.

[Table 1](#) summarizes the access paths and relation types defined in this standard.

**NOTE** | Add the rest of the API\_EDR paths

*Table 1. Environmental Data API Paths*

Path Template	Relation	Resource
<b>Common</b>		
<a href="#">{root}/</a>	none	Landing page
<a href="#">{root}/api</a>	<a href="#">service-desc</a> or <a href="#">service-doc</a>	API Description (optional)
<a href="#">{root}/conformance</a>	<a href="#">conformance</a>	Conformance Classes
<a href="#">{root}/collections</a>	<a href="#">data</a>	Metadata describing the spatial collections available from this API.
<a href="#">{root}/collections/{coverageid}</a>		Metadata describing the collection which has the unique identifier <a href="#">{collectionid}</a>

Where:

- {root} = Base URI for the API server
- {collectionid} = an identifier for a specific collection

## 7.1. Dependencies

The OGC API-EDR standard is an extension of the OGC API-Common standard. Therefore, an implementation of API-EDR must first satisfy the appropriate Requirements Classes from API-Common. [Table 2](#) Identifies the API-Common Requirements Classes which are applicable to each section of this Standard. Instructions on when and how to apply these Requirements Classes are provided in each section.

Table 2. Mapping API-EDR Sections to API-Common Requirements Classes

API-EDR Section	API-Common Requirements Class
<a href="#">API Landing Page</a>	<a href="http://www.opengis.net/spec/ogcapi_common-1/1.0/req/core">http://www.opengis.net/spec/ogcapi_common-1/1.0/req/core</a>
<a href="#">API Definition</a>	<a href="http://www.opengis.net/spec/ogcapi_common-1/1.0/req/core">http://www.opengis.net/spec/ogcapi_common-1/1.0/req/core</a>
<a href="#">Declaration of Conformance Classes</a>	<a href="http://www.opengis.net/spec/ogcapi_common-1/1.0/req/core">http://www.opengis.net/spec/ogcapi_common-1/1.0/req/core</a>
<a href="#">Collections</a>	<a href="http://www.opengis.net/spec/ogcapi_common-1/1.0/req/collections">http://www.opengis.net/spec/ogcapi_common-1/1.0/req/collections</a>
<a href="#">OpenAPI 3.0</a>	<a href="http://www.opengis.net/spec/ogcapi_common-1/1.0/req/oas30">http://www.opengis.net/spec/ogcapi_common-1/1.0/req/oas30</a>
<a href="#">GeoJSON</a>	<a href="http://www.opengis.net/spec/ogcapi_common-1/1.0/req/json">http://www.opengis.net/spec/ogcapi_common-1/1.0/req/json</a>
<a href="#">CovJSON</a>	<a href="http://www.opengis.net/spec/ogcapi_common-1/1.0/req/json">http://www.opengis.net/spec/ogcapi_common-1/1.0/req/json</a>
<a href="#">HTML</a>	<a href="http://www.opengis.net/spec/ogcapi_common-1/1.0/req/html">http://www.opengis.net/spec/ogcapi_common-1/1.0/req/html</a>

## 7.2. Overview

Requirements Class	
<a href="http://www.opengis.net/spec/ogcapi-coverages-1/1.0/req/core">http://www.opengis.net/spec/ogcapi-coverages-1/1.0/req/core</a>	
Target type	Web API
Dependency	<a href="http://www.opengis.net/spec/ogcapi_common-1/1.0/req/core">http://www.opengis.net/spec/ogcapi_common-1/1.0/req/core</a>
Dependency	<a href="http://www.opengis.net/spec/ogcapi_common-1/1.0/req/collections">http://www.opengis.net/spec/ogcapi_common-1/1.0/req/collections</a>

The **Core** Requirements Class defines the requirements for locating, understanding, and accessing environmental data resources. The **Core** Requirements Class is presented in five sections:

1. **API Platform**: a set of common capabilities
2. **Collection Access**: operations for accessing collections of environmental data.
3. **TBD Access**: operations for accessing environmental data resources
4. **Parameters**: parameters for use in the API-EDR operations.
5. **General**: general principles for use with this standard.

## 7.3. Dependencies

The OGC API-EDR standard is an extension of the OGC API-Common standard. Therefore, an implementation of API-EDR must first satisfy the appropriate Requirements Classes from API-Common.

Requirement 1	/req/core/api-common
The API implementation SHALL demonstrate conformance with the following Requirements Classes of the OGC API-Common version 1.0 Standard.	
A	<a href="http://www.opengis.net/spec/ogcapi_common-1/1.0/req/core">http://www.opengis.net/spec/ogcapi_common-1/1.0/req/core</a>
B	<a href="http://www.opengis.net/spec/ogcapi_common-1/1.0/req/collections">http://www.opengis.net/spec/ogcapi_common-1/1.0/req/collections</a>

## 7.4. Platform

API-Common defines a set of common capabilities which are applicable to any OGC Web API. Those capabilities provide the platform upon which resource-specific APIs can be built. This section describes those capabilities and any modifications needed to better support Environmental Data resources.

### 7.4.1. API landing page

The landing page provides links to start exploration of the resources offered by an API. Its most important component is a list of links. OGC API-Common already requires some common links. Those links are sufficient for this standard.

Table 3. Dependencies

<a href="http://www.opengis.net/spec/ogcapi_common-1/1.0/req/core">http://www.opengis.net/spec/ogcapi_common-1/1.0/req/core</a>
---

### Operation

The **Landing Page** operation is defined in the **Core** conformance class of API-Common. No modifications are needed to support **Environmental** resources. The **Core** conformance class specifies only one way of performing this operation:

1. Issue a **GET** request on the **{root}/** path

Support for **GET** on the **{root}/** path is required by API-Common.

### Response

A successful response to the **Landing Page** operation is defined in API-Common. The schema for this resource is provided in **Landing Page Response Schema**.

```
Unresolved directive in clause_7_core.adoc -  
include::openapi/schemas/common/landingPage.yaml[]
```

The following JSON fragment is an example of a response to an OGC API-EDR Landing Page operation.

### Landing Page Example

```
Unresolved directive in clause_7_core.adoc -  
include::examples/JSON/landingPage_example.json[]
```

## Error situations

The requirements for handling unsuccessful requests are provided in [\[http-response\]](#). General guidance on HTTP status codes and how they should be handled is provided in [HTTP Status Codes](#).

## 7.4.2. API definition

Every API is required to provide a definition document that describes the capabilities of that API. This definition document can be used by developers to understand the API, by software clients to connect to the server, or by development tools to support the implementation of servers and clients.

Table 4. Dependencies

[http://www.opengis.net/spec/ogcapi\\_common-1/1.0/req/core](http://www.opengis.net/spec/ogcapi_common-1/1.0/req/core)

## Operation

This operation is defined in the **Core** conformance class of API-Common. No modifications are needed to support **Environmental** resources. The **Core** conformance class describes two ways of performing this operation:

1. Issue a **GET** request on the **{root}/api** path
2. Follow the **service-desc** or **service-doc** link on the landing page

Only the link is required by API-Common.

## Response

A successful response to the API Definition request is a resource which documents the design of the API. API-Common leaves the selection of format for the API Definition response to the API implementor. However, the options are limited to those which have been defined in the API-Common standard. At this time OpenAPI 3.0 is the only option provided.

## Error situations

The requirements for handling unsuccessful requests are provided in [\[http-response\]](#). General

guidance on HTTP status codes and how they should be handled is provided in [HTTP Status Codes](#).

### 7.4.3. Declaration of conformance classes

To support "generic" clients that want to access multiple OGC API standards and extensions - and not "just" a specific API / server, the API has to declare the conformance classes it claims to have implemented.

Table 5. Dependencies

[http://www.opengis.net/spec/ogcapi\\_common-1/1.0/req/core](http://www.opengis.net/spec/ogcapi_common-1/1.0/req/core)

#### Operation

This operation is defined in the **Core** conformance class of API-Common. No modifications are needed to support **Environmental** resources. The **Core** conformance class describes two ways of performing this operation:

1. Issue a **GET** request on the **{root}/conformance** path
2. Follow the **conformance** link on the landing page

Both techniques are required by API-Common.

#### Response

A successful response to the Conformance operation is a list of URLs. Each URL identifies an OGC Conformance Class for which this API claims conformance. The schema for this resource is defined in API-Common and provided for reference in [Conformance Response Schema](#).

Requirement 2	/req/core/conformance
The list of Conformance Classes advertised by the API SHALL include:	
A	<a href="http://www.opengis.net/spec/ogcapi-common-1/1.0/conf/core">http://www.opengis.net/spec/ogcapi-common-1/1.0/conf/core</a>
B	<a href="http://www.opengis.net/spec/ogcapi-common-1/1.0/conf/collections">http://www.opengis.net/spec/ogcapi-common-1/1.0/conf/collections</a>
C	<a href="http://www.opengis.net/spec/ogcapi-edr-1/1.0/conf/core">http://www.opengis.net/spec/ogcapi-edr-1/1.0/conf/core</a>

#### Conformance Response Schema

```
Unresolved directive in clause_7_core.adoc -  
include::openapi/schemas/common/confClasses.yaml[]
```

The following JSON fragment is an example of a response to an OGC API-EDR conformance operation.

```
Unresolved directive in clause_7_core.adoc -
include::examples/JSON/conformance_example.json[]
```

## Error situations

The requirements for handling unsuccessful requests are provided in [\[http-response\]](#). General guidance on HTTP status codes and how they should be handled is provided in [HTTP Status Codes](#).

Information Resources can be exposed using two path templates:

- /collections/{collectionId}/{queryType}
- /collections/{collectionId}/instance/{instanceId}/{queryType}

Where

{collectionId} = a unique identifier for a Spatial Resource collection.

{instanceId} = a text string identifying the 'Version' or 'Instance' of the chosen collection.

{queryType} = a text string identifying the type of geo-spatial query pattern performed by the API.

Information Resources associated with a specific collection should be accessed through the [/collections](#) path. Those which are not associated with a specific collection should use the [/{instanceId}/{queryType}](#) template.

The EDR API [instanceId](#) parameter allows support for multiple iterations or versions of the same underlying datasource to be accessed by the API. This is applicable when the entire datasource has been regenerated rather than individual values in the datasource being changed. If only one instance of the datasource exists a value of *default* or *latest* could be used.

The EDR API standard has identified an initial set of common [queryTypes](#) to implement, this list may change as the standard is used. The [Table 3](#) provides a list of the proposed [queryTypes](#).

Table 6. Information Resource Types

Query Type	API Standard
Corridor	/corridor
Cube	/cube
Items	/items
Point	/point
Polygon	/polygon
Trajectory	/trajectory
Instance	/instance

## 7.5. General Requirements

The following general requirements and recommendations apply to all OGC APIs.

### 7.5.1. HTTP 1.1

The standards used for Web APIs are built on the HTTP protocol. Therefore, conformance with HTTP or a closely related protocol is required.

Unresolved directive in clause\_7\_core.adoc - include::requirements/core/REQ\_http.adoc[]

### 7.5.2. HTTP Status Codes

Table 4 lists the main HTTP status codes that clients should be prepared to receive. This includes support for specific security schemes or URI redirection. In addition, other error situations may occur in the transport layer outside of the server.

Table 7. Typical HTTP status codes

Status code	Description
200	A successful request.
202	A successful request, but the response is still being generated. The response will include a <b>Retry-After</b> header field giving a recommendation in seconds for the client to retry.
304	An <b>entity tag</b> was provided in the request and the resource has not been changed since the previous request.
308	The server cannot process the data through a synchronous request. The response includes a <b>Location</b> header field which contains the URI of the location the result will be available at once the query is complete <b>Asynchronous queries</b> .
400	The server cannot or will not process the request due to an apparent client error. For example, a query parameter had an incorrect value.
401	The request requires user authentication. The response includes a <b>WWW-Authenticate</b> header field containing a challenge applicable to the requested resource.
403	The server understood the request, but is refusing to fulfill it. While status code 401 indicates missing or bad authentication, status code 403 indicates that authentication is not the issue, but the client is not authorised to perform the requested operation on the resource.
404	The requested resource does not exist on the server. For example, a path parameter had an incorrect value.
405	The request method is not supported. For example, a POST request was submitted, but the resource only supports GET requests.
406	Content negotiation failed. For example, the <b>Accept</b> header submitted in the request did not support any of the media types supported by the server for the requested resource.

Status code	Description
413	Request entity too large. For example the query would involve returning more data than the server is capable of processing, the implementation should return a message explaining the query limits imposed by the server implementation.
500	An internal error occurred in the server.

More specific guidance is provided for each resource, where applicable.

Permission 1	/per/core/additional-status-codes
A	Servers MAY support other capabilities of the HTTP protocol and, therefore, MAY return other status codes than those listed in <a href="#">Table 4</a> , too.

### 7.5.3. Web Caching

Entity tags are a mechanism for web cache validation and for supporting conditional requests to reduce network traffic. Entity tags are specified by [HTTP/1.1 \(RFC 2616\)](#).

Recommendation 1	/rec/core/etag
A	The service SHOULD support entity tags and the associated headers as specified by HTTP/1.1.

### 7.5.4. Support for Cross-Origin Requests

Access to data from a HTML page is by default prohibited for security reasons, if the data is located on another host than the webpage ("same-origin policy"). A typical example is a web-application accessing feature data from multiple distributed datasets.

Recommendation 2	/rec/core/cross-origin
A	If the server is intended to be accessed from the browser, cross-origin requests SHOULD be supported. Note that support can also be added in a proxy layer on top of the server.

Two common mechanisms to support cross-origin requests are:

- [Cross-origin resource sharing \(CORS\)](#)
- [JSONP \(JSON with padding\)](#)

### 7.5.5. Asynchronous queries

It will not always be possible to respond to queries synchronously, if the query requires handling



asynchronously the system should respond with a HTTP code of 308 and include a **Location** response header field with the URI of the location of the data once the query has completed. If the user queries the URI of the product of the query before the data is available that response should respond with a HTTP code of 202 and include a **Retry-after** response header field with a suggested interval in seconds to retry the data retrieval.

Recommendation 3	/rec/core/asynchronous-query
A	If a requests will require significant time to execute, asynchronous queries SHOULD be supported.
B	User SHOULD be redirected to a URI location where the result will be available once completed using a HTTP statuts code of 308 with a header field of <i>Location</i> containing the URI.
C	The result URI SHOULD return a HTTP statuts code of 202 with a header field of <i>Retry_after</i> with a recommendation in seconds of how long to wait before retrying the request.
D	Once the data is available the result URI SHOULD return a HTTP statuts code of 200 with the data.

- [Asynchrony](#)

### 7.5.6. Encodings

While the OAPI Common standard does not specify any mandatory encoding, the following encodings are recommended. See [Clause 7 \(Overview\)](#) for a discussion of this issue.

HTML encoding recomendation:

Recommendation 4	/rec/core/html
A	To support browsing a API with a web browser and to enable search engines to crawl and index the dataset, implementations SHOULD consider to support an HTML encoding.

GeoJSON encoding recomendation:

Recommendation 5	/rec/core/geojson
A	If the resource can be represented for the intended use in GeoJSON, implementations SHOULD consider to support GeoJSON as an encoding.

CoverageJSON encoding recommendation:

Recommendation 6	/rec/core/covjson
A	If the resource can be represented for the intended use in CoverageJSON, implementations SHOULD consider to support CoverageJSON as an encoding.

Requirement [/req/core/http](#) implies that the encoding of a response is determined using content negotiation as specified by the HTTP RFC.

The section [Media Types](#) includes guidance on media types for encodings that are specified in this document.

Note that any API that supports multiple encodings will have to support a mechanism to mint encoding-specific URIs for resources in order to express links, for example, to alternate representations of the same resource. This document does not mandate any particular approach how this is supported by the API.

As clients simply need to dereference the URI of the link, the implementation details and the mechanism how the encoding is included in the URI of the link are not important. Developers interested in the approach of a particular implementation, for example, to manipulate ("hack") in the browser address bar, can study the API definition.

NOTE	Two common approaches are:
	<ul style="list-style-type: none"><li>• an additional path for each encoding of each resource (this can be expressed, for example, using format specific suffixes like ".html");</li><li>• an additional query parameter (for example, "accept" or "f") that overrides the Accept header of the HTTP request.</li></ul>

### 7.5.7. Link Headers

Recommendation 7	/rec/core/link-header
A	Links included in payload of responses SHOULD also be included as <a href="#">Link</a> headers in the HTTP response according to <a href="#">RFC 8288, Clause 3</a> .
B	This recommendation does not apply, if there are a large number of links included in a response or a link is not known when the HTTP headers of the response are created.

# Chapter 8. Requirement Class "Collections"

Unresolved directive in clause\_8\_collections.adoc -  
include::requirements/requirements\_class\_collections.adoc[]

## 8.1. Overview

Spatial Resources are the resources which we usually think of as Geospatial Data. They include Features, Coverages, and Images. This Conformance Class defines basic patterns for accessing Spatial Resources. Additional OGC API Standards have been developed to address specific API requirements for each Spatial Resource type.

OGC APIs are designed to support two access patterns; Hypermedia Access, and Direct Access. OGC APIs support both access patterns through the use of API Definition documents, standardized paths, and standardized hypermedia schemas.

Hypermedia Access was described in the [\[navigation-introduction\]](#) section of Clause 8. For Spatial Resources, hypermedia navigation is enabled through the links included in each schema defined by this Requirement Class.

Direct access is the use of known URL paths to access a resource directly. The requirements in this Requirement Class are organized around the standard paths for Spatial Data.

## 8.2. Spatial Resources

Detailed requirements for each Spatial Resource type are dealt with in the resource-specific API standards. However, this API Common standard has the responsibility to see that all OGC API standards work together by:

1. Providing specifications for the description of each collection (`/collections/{collectionId}`), and the list of collections (`/collections`)
2. Providing a consistent framework for serving spatial data from the OGC API, regardless of the type. Consistent means that #1 works exactly the same (potentially with type-specific additional properties) and that the different types of data can all be collections on the same OGC API endpoint.
3. Providing a tie point for other OGC API modules to connect to and reference (processes inputs & outputs, cataloging, searching and filtering collections, detailed metadata, tiles, styles, clipping and intersecting bounding boxes in common) Just by virtue of understanding that `/collections/{collectionId}` points to a spatial **data layer**.

Spatial Resources are exposed using the path template.

```
/collections/{collectionId}/items
```

The resources returned from each node in this template are described in [Table 5](#).

Table 8. Spatial Resource Paths

Path Template	Resource
/collections	Metadata describing the spatial collections available from this API.
/collections/{collectionId}	Metadata describing the collection with the unique identifier {collectionId}
/collections/{collectionId}/items	The spatial collection resource identified by the {collectionId} parameter.

### 8.2.1. Collections Metadata

OGC APIs typically organize their Spatial Resources into collections. Information about those collections is accessed through the /collections path.

#### Operation

Unresolved directive in clause\_8\_collections.adoc - include::requirements/collections/REQ\_rc-md-op.adoc[]

#### Response

Unresolved directive in clause\_8\_collections.adoc - include::requirements/collections/REQ\_rc-md-success.adoc[]

The collections metadata returned by this operation is based on the [Collections Metadata Schema](#). Examples of collections metadata are provided in [Collections Metadata Examples](#).

```

{
  "$schema": "http://json-schema.org/draft-07/schema#",
  "title": "Collections Schema",
  "description": "This schema defines the metadata resource returned from
/collections.",
  "type": "object",
  "required": [
    "links",
    "collections"
  ],
  "properties": {
    "links": {
      "type": "array",
      "items": {"$href": "link.json"}
    },
    "collections": {
      "type": "array",
      "items": {"$href": "collectionInfo.json"}
    }
  }
}

```

This schema is further constrained by the following requirements and recommendations.

To support hypermedia navigation, the **links** property must be populated with sufficient hyperlinks to navigate through the whole dataset.

Unresolved directive in clause\_8\_collections.adoc - include::requirements/collections/REQ\_rc-md-links.adoc[]

Additional information may be available to assist in understanding and using this dataset. Links to those resources should be provided as well.

Recommendation 8	/rec/collections/rc-md-descriptions
A	If external schemas or descriptions exist that provide additional information about the structure or semantics for the resource, a 200-response SHOULD include links to each of those resources in the <b>links</b> property of the response (relation: <b>describedBy</b> ).
B	The <b>type</b> link parameter SHOULD be provided for each link. This applies to resources that describe to the whole dataset.

The **collections** property of the Collections Metadata provides a description of each collection. These descriptions are based on the [Collection Information Schema](#). This schema is described in detail in the [Collection Information](#) section of this Standard. The following requirements and

recommendations govern the use of Collection Information in the Collections Metadata.

Unresolved directive in clause\_8\_collections.adoc - include::requirements/collections/REQ\_rc-md-items.adoc[]

While it is preferred that the Collections Metadata describe all of the collections accessible through the API, in some cases that is impractical. Developers have an option to only return a subset, as long as they provide a way to retrieve the remaining metadata as well.

Permission 2	/per/collections/rc-md-items
A	To support servers with many collections, servers MAY limit the number of items included in the <b>collections</b> property.

## Error situations

See [HTTP Status Codes](#) for general guidance.

## 8.2.2. Collection Information

Each resource collection is described by a set of metadata. That metadata is accessed directly using the `/collections/{collectionId}` path or as an entry in the **collections** property of the Collections Metadata resource.

## Operation

Unresolved directive in clause\_8\_collections.adoc - include::requirements/collections/REQ\_src-md-op.adoc[]

## Response

Unresolved directive in clause\_8\_collections.adoc - include::requirements/collections/REQ\_src-md-success.adoc[]

Collection Information is based on the [Collection Information Schema](#). Examples of Collection Information are provided in [Collection Information Examples](#).

```
{
  "$schema": "http://json-schema.org/draft-07/schema#",
  "title": "Collection Information Schema",
  "description": "This schema defines metadata resource returned from
/collections/{collectionId}.",
  "type": "object",
  "required": [
    "id",
    "links"
  ],
  "properties": {
    "id": {
      "type": "string"
    },
    "title": {
      "type": "string"
    },
    "description": {
      "type": "string"
    },
    "links": {
      "type": "array",
      "items": {"$href": "link.json"}
    },
    "extent": {"$href": "extent.json"},
    "itemType": {
      "type": "string",
      "default": "unknown"
    },
    "crs": {
      "description": "the list of coordinate reference systems supported by the
API; the first item is the default coordinate reference system",
      "type": "array",
      "items": {
        "type": "string"
      },
      "default": [
        "http://www.opengis.net/def/crs/OGC/1.3/CRS84"
      ],
      "example": [
        "http://www.opengis.net/def/crs/OGC/1.3/CRS84",
        "http://www.opengis.net/def/crs/EPSG/0/4326"
      ]
    }
  }
}
```

This schema is further constrained by the following requirements and recommendations.

To support hypermedia navigation, the **links** property must be populated with sufficient hyperlinks to navigate through the whole dataset.

Unresolved directive in clause\_8\_collections.adoc - include::requirements/collections/REQ\_rc-md-items-links.adoc[]

Additional information may be available to assist in understanding and using this dataset. Links to those resources should be provided as well.

Recomendation 9	/rec/core/rc-md-items-descriptions
A	If external schemas or descriptions exist that provide additional information about the structure or semantics of the collection, a 200-response SHOULD include links to each of those resources in the <b>links</b> property of the response (relation: <b>describedBy</b> ).
B	The <b>type</b> link parameter SHOULD be provided for each link.

Additional requirements and recomendations apply to the **extent** property of the Collection Information.

Unresolved directive in clause\_8\_collections.adoc - include::requirements/collections/REQ\_rc-md-extent.adoc[]

Recommendation 10	/rec/core/rc-md-extent-single
A	While the spatial and temporal extents support multiple bounding boxes ( <b>bbox</b> array) and time intervals ( <b>interval</b> array) for advanced use cases, implementations SHOULD provide only a single bounding box or time interval unless the use of multiple values is important for the use of the dataset and agents using the API are known to be support multiple bounding boxes or time intervals.

Permission 3	/per/collections/rc-md-extent-extensions
A	The Core only specifies requirements for spatial and temporal extents. However, the <b>extent</b> object MAY be extended with additional members to represent other extents, for example, thermal or pressure ranges.
B	The Core only supports spatial extents in WGS84 longitude/latitude and temporal extents in the Gregorian calendar (these are the only enum values in <b>extent.yaml</b> ).



C	Extensions to the Core MAY add additional reference systems to the <b>extent</b> object.
---	--

## Error situations

See [HTTP Status Codes](#) for general guidance.

If the parameter **collectionId** does not exist on the server, the status code of the response will be **404** (see [Table 4](#)).

### 8.2.3. Collection Resource

A collection resource is the content of the collection as opposed to metadata about that collection. This standard defines the general behavior of this operation, but detailed requirements are the purview of the API standard for that resource type.

## Operation

Unresolved directive in clause\_8\_collections.adoc - include::requirements/collections/REQ\_rc-op.adoc[]

## Response

Unresolved directive in clause\_8\_collections.adoc - include::requirements/collections/REQ\_rc-response.adoc[]

## Error situations

See [HTTP Status Codes](#) for general guidance.

## 8.3. Query Resources

Query Resources are spatial queries which support the operation of the API or the access and use of the Spatial Resources. They are described in the [QueryType specific Operations](#) section.

Query Resources related to Spatial Resources can be exposed using the path template:

- `/collections/{collectionId}/{queryType}`

The resources returned from each node in this template are described in [\[query-resource-paths\]](#).

Table 9. Information Resource Paths

Path Template	Resource
/collections	The root resource describing the spatial collections available from this API.
/collections/{collectionId}	Identifies a collection with the unique identifier <b>{collectionId}</b>

Path Template	Resource
/collections/{collectionId}/{queryType}	Identifies an Information Resource of type {resourceType} associated with the {collectionId} collection.

The OGC API-Common standard does not define any Information Resource types. However [Table 7](#) provides a mapping of the initial query types proposed for the EDR API.

Table 10. Query Types

Path Template	Query Type
<b>Description</b>	/collections/{collectionId}/point
Point	Return data for the requested point location
/collections/{collectionId}/polygon	Polygon
Return data for the requested polygon area	/collections/{collectionId}/cube
Cube	Return data for a spatial cube
/collections/{collectionId}/trajectory	Trajectory
Return data along a defined trajectory	/collections/{collectionId}/corridor
Corridor	Return data within a spatial corridor
/collections/{collectionId}/items	Item
Items associated with the {collectionId} collection.	/collections/{collectionId}/instance
Instance	List the available instances of the collection

## 8.4. Parameter Modules

Query parameters are used in URLs to define the resources which are returned on a GET request. The EDR standard defines the following as standard parameters for use in EDR API standards.

### 8.4.1. Parameter coords

Requirement 3	/req/edr/coords-definition
---------------	----------------------------

A	<p>Each resource collection operation SHALL support a parameter <b>coords</b> with the following characteristics (using an OpenAPI Specification 3.0 fragment):</p> <pre> name: coords in: query required: true schema:   type: string style: form explode: false </pre>
B	<p>The <b>coords</b> string value will be a Well Known Text of representation geometry as defined in <a href="#">Simple Feature Access - Part 1: Common Architecture</a>. The representation type will depend on the queryType of the API</p>

<b>Requirement 4</b>	<b>/req/edr/coords-response</b>
A	<p>Only those resources that have a spatial geometry that intersects the area defined by the <b>coords</b> parameter SHALL be part of the result set.</p>
B	<p>The coordinates SHALL consist of a Well Known Text (WKT) geometry string</p>
C	<p>The coordinate reference system of the values SHALL be interpreted as WGS84 longitude/latitude</p> <pre> WKT: GEOGCS["WGS 84",DATUM["WGS_1984",SPHEROID["WGS 84",6378137,298.257223563,AUTHORITY["EPSG","7030"]],AUTH ORITY["EPSG","6326"]],PRIMEM["Greenwich",0,AUTHORITY["EP SG","8901"]],UNIT["degree",0.01745329251994328,AUTHORITY ["EPSG","9122"]],AUTHORITY["EPSG","4326"]] </pre> <pre> EPSG: http://www.opengis.net/def/crs/OGC/1.3/CRS84 </pre> <p>unless a different coordinate reference system is specified in a parameter <b>crs</b>.</p>

### 8.4.2. Parameter datetime

Unresolved directive in clause\_8\_collections.adoc - include::requirements/collections/REQ\_rc-time-

definition.adoc[]

Unresolved directive in clause\_8\_collections.adoc - include::requirements/collections/REQ\_rc-time-response.adoc[]

"Intersects" means that the time (instant or period) specified in the parameter **datetime** includes a timestamp that is part of the temporal geometry of the resource (again, a time instant or period). For time periods this includes the start and end time.

#### Example 2. A date-time

February 12, 2018, 23:20:52 GMT:

**time=2018-02-12T23%3A20%3A52Z**

For resources with a temporal property that is a timestamp (like **lastUpdate** in the building features), a date-time value would match all resources where the temporal property is identical.

For resources with a temporal property that is a date or a time interval, a date-time value would match all resources where the timestamp is on that day or within the time interval.

#### Example 3. Intervals

February 12, 2018, 00:00:00 GMT to March 18, 2018, 12:31:12 GMT:

**datetime=2018-02-12T00%3A00%3A00Z%2F2018-03-18T12%3A31%3A12Z**

February 12, 2018, 00:00:00 UTC or later:

**datetime=2018-02-12T00%3A00%3A00Z%2F..**

March 18, 2018, 12:31:12 UTC or earlier:

**datetime=..%2F2018-03-18T12%3A31%3A12Z**

A template for the definition of the parameter in YAML according to OpenAPI 3.0 is available at [datetime.yaml](#).

### 8.4.3. Parameter **parametername**

Requirement 5	/req/edr/parameters-definition
---------------	--------------------------------

A	<p>Each resource collection operation SHALL support a parameter `parametername` with the following characteristics (using an OpenAPI Specification 3.0 fragment):</p> <pre> name: parametername in: query required: true explode: false schema:   minItems: 1   type: array   items:     type: string </pre>
---	--

<b>Requirement 6</b>	<b>/req/edr/parameters-response</b>
A	If the <b>parametername</b> parameter is provided, only those parameters named SHALL be returned. If the <b>parametername</b> parameter is not specified all parameters in the collection SHALL be returned.
B	The <b>parametername</b> parameter SHALL consist of a comma delimited string value based on an enumerated list of options listed in the collections metadata

*Example 4. A single parameter*

Only return values for the Maximum\_temperature

**parametername=Maximum\_temperature**

*Example 5. Return multiple parameters*

Values for the Maximum\_temperature, Minimum\_temperature and Total\_precipitation

**parametername=Maximum\_temperature,Minimum\_temperature,Total\_precipitation**

If none of the requested parameters exist in the collection a 403 message SHOULD be returned.

#### 8.4.4. Parameter crs

Requirement 7	/req/edr/outputCRS-definition
A	<p>Each resource collection operation SHALL support a parameter <b>CRS</b> with the following characteristics (using an OpenAPI Specification 3.0 fragment):</p> <pre>name: CRS in: query required: false schema:   type: string style: form explode: false</pre>

Requirement 8	/req/edr/outputCRS-response
A	<p>If the <b>CRS</b> parameter is provided, the returned information should be reprojected (if required) to the defined coordinate system. If the <b>CRS</b> parameter is not specified the data will be returned in its native projection.</p>
B	<p>The <b>CRS</b> parameter SHALL consist of an identifier selected from the enumerated list of valid values supplied in the collections metadata.</p>

The value of the crs query parameter will be one of the name values described in the collection metadata for supported crs transformations.

#### 8.4.5. Parameter outputFormat

Requirement 9	/req/edr/outputFormat-definition
---------------	----------------------------------

A	<p>Each resource collection operation SHALL support a parameter `outputFormat` with the following characteristics (using an OpenAPI Specification 3.0 fragment):</p> <pre> name: outputFormat in: query required: false schema:   type: string style: form explode: false </pre>
---	--

<b>Requirement 10</b>	<b>/req/edr/outputFormat-response</b>
A	If the <b>outputFormat</b> parameter is provided, the returned information should be transformed to the defined data format.
B	The <b>outputFormat</b> parameter SHALL consist of an string value based on an enumerated list of available options provided in the collections metadata.

*Example 6. Return data as coverageJSON*

```
outputFormat=coverageJSON
```

If not specified the query will return data in the native format of the collection. If the requested format system does not match an entry in the defined list of valid outputFormats for the collection a 403 message SHOULD be returned.

## 8.5. QueryType specific Operations

The following describes the query parameters that are unique or specialised to the individual query types:

### 8.5.1. Point

#### Parameters

##### Parameter coords

<b>Requirement 11</b>	<b>/req/edr/coords-definition</b>
-----------------------	-----------------------------------

A	<p>Each resource collection operation SHALL support a parameter <b>coords</b> with the following characteristics (using an OpenAPI Specification 3.0 fragment):</p> <pre> name: coords in: query required: true schema:   type: string style: form explode: false </pre>
B	<p>The <b>coords</b> string value will be a Well Known Text of representation geometry as defined in <a href="#">Simple Feature Access - Part 1: Common Architecture</a>. The representation type will depend on the queryType of the API</p>

<b>Requirement 12</b>	<b>/req/edr/coords-response</b>
A	<p>Only those resources that have a spatial geometry that intersects the area defined by the <b>coords</b> parameter SHALL be part of the result set.</p>
B	<p>The coordinates SHALL consist of a Well Known Text (WKT) geometry string</p>
C	<p>The coordinate reference system of the values SHALL be interpreted as WGS84 longitude/latitude</p> <pre> WKT: GEOGCS["WGS 84",DATUM["WGS_1984",SPHEROID["WGS 84",6378137,298.257223563,AUTHORITY["EPSG","7030"]],AUTH ORITY["EPSG","6326"]],PRIMEM["Greenwich",0,AUTHORITY["EP SG","8901"]],UNIT["degree",0.01745329251994328,AUTHORITY ["EPSG","9122"]],AUTHORITY["EPSG","4326"]] </pre> <pre> EPSG: http://www.opengis.net/def/crs/OGC/1.3/CRS84 </pre> <p>unless a different coordinate reference system is specified in a parameter <b>crs</b>.</p>

location(s) to return data for, the coordinates are defined by a Well Known Text (wkt) string. to retrieve a single location :



POINT(x y)

A point at height *z* POINT(x y z)

And for a list of locations

MULTIPOINTx y),(x1 y1),(x2 y2),(x3 y3

And for a list of locations at defined heights

MULTIPOINTx y z),(x1 y1 z1),(x2 y2 z2),(x3 y3 z3

see [http://portal.opengeospatial.org/files/?artifact\\_id=25355](http://portal.opengeospatial.org/files/?artifact_id=25355) and [https://en.wikipedia.org/wiki/Well-known\\_text\\_representation\\_of\\_geometry](https://en.wikipedia.org/wiki/Well-known_text_representation_of_geometry)

the coordinate values will depend on the CRS parameter, if this is not defined the values will be assumed to WGS84 values (i.e x=longitude and y=latitude)

#### *Example 7. Point*

retrieve data for Greenwich, London

`coords=POINT(0 51.48)`

#### *Example 8. Point for a specific height*

retrieve data for Mount Everest

`coords=POINT(86.95 27.99 8848)`

#### *Example 9. Multiple locations*

retrieve data for a list of locations : 38.9N 77W, 48.85N 2.35E, 39.92N 116.38E, 35.29S 149.1E, 51.5N 0.1W

`coords=MULTIPOINT 38.9 -77),(48.85 2.35),(39.92 116.38),(-35.29 149.1),(51.5 -0.1`

#### *Example 10. Multiple locations with specified heights*

retrieve data for a list of locations : 38.9N 77W, 48.85N 2.35E, 39.92N 116.38E, 35.29S 149.1E, 51.5N 0.1W

`coords=MULTIPOINT -77.02 38.94 72.3),(-3.50 50.72 36.35),(1.43 43.63 135.63),(117.23 39.13 10.04),(144.96 -37.80 33.83`

## Parameter interpolation

<b>Requirement 13</b>	<b>/req/edr/interpolation-definition</b>
A	<p>Each resource collection operation MAY support a parameter <b>interpolation</b> with the following characteristics (using an OpenAPI Specification 3.0 fragment):</p> <pre>name: interpolation in: query required: false schema:   type: string style: form explode: false</pre>
<b>Requirement 14</b>	<b>/req/edr/interpolation-response</b>
A	<p>If the <b>interpolation</b> parameter is defined the result set SHALL to data point that is the best match based on the chosen algorithm.</p>
B	<p>The interpolation information is an interpolation method. The available interpolation methods should be part of the instance metadata:</p> <pre>interpolation = interpolation-method</pre>
C	<p>If not specified the query will use the default interpolation method for the chosen collection.</p>
D	<p>If the interpolation method value e does not match one of the listed methods a 403 error message should be returned.</p>

### Example 11. An interpolation

Use the defined nearest neighbour algorithm to get the best data match for the requested locations

**interpolation=nearest-neighbour**

### Example 12. An interpolation

Use the defined nearest neighbour algorithm to get the best data match for the requested locations

`interpolation=nearest-neighbour`

#### Parameter within

Requirement 15	/req/edr/within-definition
A	Each resource collection operation MAY support a parameter `within` with the following characteristics (using an OpenAPI Specification 3.0 fragment):
B	If the instance metadata does not provide <code>withinUnits</code> values the API SHALL NOT support <code>within</code> queries: <div><pre>name: within in: query required: false schema:   type: string style: form explode: false</pre></div>

Requirement 16	/req/edr/within-response
A	If the <code>within</code> parameter is provided, all selected information within the specified radius SHALL be part of the result set.
B	If a <code>withinUnits</code> parameter is not provided, a 403 error WILL be returned.

#### Parameter withinUnits

Requirement 17	/req/edr/withinUnits-definition
A	Each resource collection operation MAY support a parameter `withinUnits` with the following characteristics (using an OpenAPI Specification 3.0 fragment):

B	<p>A <code>withinUnits</code> value MUST be one of the values defined in the instance metadata:</p> <pre> name: withinUnits in: query required: false schema:   type: string style: form explode: false </pre>
<b>Requirement 18</b>	<b>/req/edr/within-response</b>
A	<p>The <code>withinUnits</code> parameter defines the distance units of the <code>within</code> query parameter value .</p>

## 8.5.2. Polygon

## 8.5.3. Parameters

### 8.5.4. Parameter coords

Requirement 19	/req/edr/coords-definition
A	<p>Each resource collection operation SHALL support a parameter <b>coords</b> with the following characteristics (using an OpenAPI Specification 3.0 fragment):</p> <pre>name: coords in: query required: true schema:   type: string style: form explode: false</pre>
B	<p>The <b>coords</b> string value will be a Well Known Text of representation geometry as defined in <a href="#">Simple Feature Access - Part 1: Common Architecture</a>. The representation type will depend on the queryType of the API</p>

Requirement 20	/req/edr/coords-response
A	<p>Only those resources that have a spatial geometry that intersects the area defined by the <b>coords</b> parameter SHALL be part of the result set.</p>
B	<p>The coordinates SHALL consist of a Well Known Text (WKT) geometry string</p>

C	<p>The coordinate reference system of the values SHALL be interpreted as WGS84 longitude/latitude</p> <div> WKT: GEOGCS["WGS 84",DATUM["WGS_1984",SPHEROID["WGS 84",6378137,298.257223563,AUTHORITY["EPSG","7030"]],AUTHORITY["EPSG","6326"]],PRIMEM["Greenwich",0,AUTHORITY["EPSG","8901"]],UNIT["degree",0.01745329251994328,AUTHORITY["EPSG","9122"]],AUTHORITY["EPSG","4326"]] </div> <div> EPSG: <a href="http://www.opengis.net/def/crs/OGC/1.3/CRS84">http://www.opengis.net/def/crs/OGC/1.3/CRS84</a> </div> <p>unless a different coordinate reference system is specified in a parameter <b>crs</b>.</p>
---	--

Only data that has a geometry that intersects the area defined by the polygon are selected.

The polygon is defined using a Well Known Text string following

```
coords=POLYGON((x y,x1 y1,x2 y2,...,xn yn x y))
```

which are values in the coordinate system defined by the crs query parameter (if crs is not defined the values will be assumed to be WGS84 longitude/latitude coordinates).

For instance a polygon that roughly describes an area that contains South West England in WGS84 would look like:

```
coords=POLYGON((-6.1 50.3,-4.35 51.4,-2.6 51.6,-2.8 50.6,-5.3 49.9,-6.1,50.3))
```

see [http://portal.opengeospatial.org/files/?artifact\\_id=25355](http://portal.opengeospatial.org/files/?artifact_id=25355) and [https://en.wikipedia.org/wiki/Well-known\\_text\\_representation\\_of\\_geometry](https://en.wikipedia.org/wiki/Well-known_text_representation_of_geometry)

`The coords parameter will only support 2D POLYGON`

#### Example 13. A polygon covering the UK

An area covering the UK in WGS84 (from 15°W to 5°E and from 60.95°S to 48.8°S)

```
coords=POLYGON -15 48.8,-15 60.95,5 60.85,5 48.8,-15 48.8
```

#### Example 14. Multiple areas

Selecting data for two different regions

```
coords=MULTIPOLYGON -15 48.8,-15 60.95,5 60.85,5 48.8,-15 48.8),(-6.1 50.3,-4.35 51.4,-2.6 51.6,-2.8 50.6,-5.3 49.9,-6.1,50.3
```

### 8.5.5. Parameter interpolationX

Requirement 21	/req/edr/interpolationX-definition
A	<p>Each resource collection operation MAY support a parameter `interpolationX` with the following characteristics (using an OpenAPI Specification 3.0 fragment):</p> <pre>name: interpolationX in: query required: false schema:   type: string style: form explode: false</pre>

<b>Requirement 22</b>	<b>/req/edr/interpolationX-response</b>
A	If the <b>interpolationX</b> parameter is defined the result set SHALL contain values derieved based on the chosen interpolation algorithm at the number of specified x intervals.
B	The interpolationX information is an interpolation method and an interval. The available interpolation methods should be part of the collection response and the interval is a number :
C	The interpolation information is an interpolation method. The available interpolation methods should be part of the instance metadata:
D	<p>If the interpolation method value e does not match one of the listed methods a 403 error message should be returned.</p> <pre>interpolationX = "R"interval "/" interpolation-method</pre>

If not specified the query will not perform any interpolation of data along the X axis. If the interpolationX method does not match an entry in the defined list of valid interpolationX methods for the collection a 403 message SHOULD be returned.

*Example 15. An interpolationX*

Use the defined linear algorithm to return 10 values between the minimum X value and the maximum X value

**interpolationX=R10/linear**

### 8.5.6. Parameter interpolationY

<b>Requirement 23</b>	<b>/req/edr/interpolationY-definition</b>
-----------------------	---



A	<p>Each resource collection operation MAY support a parameter `interpolationY` with the following characteristics (using an OpenAPI Specification 3.0 fragment):</p> <div><pre>name: interpolationY in: query required: false schema:   type: string style: form explode: false</pre></div>
---	--

<b>Requirement 24</b>	<b>/req/edr/interpolationY-response</b>
A	If the <b>interpolationY</b> parameter is defined the result set SHALL contain values derieved based on the chosen interpolation algorithm at the number of specifed y intervals.
B	<p>The interpolationY information is an interpolation method and an interval. The available interpolation methods should be part of the collection response and the interval is a number.</p> <div style="border: 1px solid #ccc; padding: 10px; margin: 10px 0; background-color: #f9f9f9;"> <code>interpolationY = "R"interval "/" interpolation-method</code> </div>
C	The interpolation information is an interpolation method. The available interpolation methods should be part of the instance metadata:
D	If not specified the query will use the default interpolation method for the chosen collection.
E	If the interpolation method value e does not match one of the listed methods a 403 error message should be returned.

If not specified the query will not perform any interpolation of data along the Y axis. If the interpolationY method does not match an entry in the defined list of valid interpolationY methods for the collection a 403 message SHOULD be returned.

*Example 16. An interpolationY*

Use the defined nearest-neighbour algorithm to return 3 values between the minimum Y value and the maximum Y value

**interpolationY=R3/nearest-neighbour**

### 8.5.7. Parameter z

Define the vertical level to return data from i.e. Z=level

*Example 17. A Z value*

for instance if the 850hPa pressure level is being queried

**Z=850**

When not specified the API **MUST** return data from the lowest (i.e. nearest the surface) level of data in the collection instance (if the instance has a height dimension).

## 8.5.8. Cube

### Parameters

#### Parameter coords

Requirement 25	/req/edr/coords-definition
A	<p>Each resource collection operation SHALL support a parameter <b>coords</b> with the following characteristics (using an OpenAPI Specification 3.0 fragment):</p> <pre>name: coords in: query required: true schema:   type: string style: form explode: false</pre>
B	<p>The <b>coords</b> string value will be a Well Known Text of representation geometry as defined in <a href="#">Simple Feature Access - Part 1: Common Architecture</a>. The representation type will depend on the queryType of the API</p>

Requirement 26	/req/edr/coords-response
A	<p>Only those resources that have a spatial geometry that intersects the area defined by the <b>coords</b> parameter SHALL be part of the result set.</p>
B	<p>The coordinates SHALL consist of a Well Known Text (WKT) geometry string</p>

C	<p>The coordinate reference system of the values SHALL be interpreted as WGS84 longitude/latitude</p> <pre>WKT: GEOGCS["WGS 84",DATUM["WGS_1984",SPHEROID["WGS 84",6378137,298.257223563,AUTHORITY["EPSG","7030"]],AUTHORITY["EPSG","6326"]],PRIMEM["Greenwich",0,AUTHORITY["EPSG","8901"]],UNIT["degree",0.01745329251994328,AUTHORITY["EPSG","9122"]],AUTHORITY["EPSG","4326"]]</pre> <pre>EPSG: http://www.opengis.net/def/crs/OGC/1.3/CRS84</pre> <p>unless a different coordinate reference system is specified in a parameter <b>crs</b>.</p>
---	---

Only data that has a geometry that intersects the area defined by the cube are selected.

The cubes X Y coordinates are defined using Rectangular Polygon as Well Known Text

```
coords=POLYGON((x y,x1 y1,x2 y2, x3 y3, x y))
```

which are values in the coordinate system defined by the crs query parameter if crs is not defined the values will be assumed to be WGS84 longitude/latitude coordinates and heights will be assumed to be in metres above mean sea level

For instance a cube that roughly describes an area that contains South West England in WGS84 would look like

`If the WKT does not define a Rectangle the service will generate an error message`

see [http://portal.opengeospatial.org/files/?artifact\\_id=25355](http://portal.opengeospatial.org/files/?artifact_id=25355) and [https://en.wikipedia.org/wiki/Well-known\\_text\\_representation\\_of\\_geometry](https://en.wikipedia.org/wiki/Well-known_text_representation_of_geometry)

*Example 18. A cube covering the South West of the UK*

```
coords=POLYGON -6.0 50.0,-4.35 50.0,-4.35 52.0,, -6.0 52.0,-6.0 50.0
```

## Parameter interpolationX

Requirement 27	/req/edr/interpolationX-definition
A	<p>Each resource collection operation MAY support a parameter `interpolationX` with the following characteristics (using an OpenAPI Specification 3.0 fragment):</p> <pre>name: interpolationX in: query required: false schema:   type: string style: form explode: false</pre>

<b>Requirement 28</b>	<b>/req/edr/interpolationX-response</b>
A	If the <b>interpolationX</b> parameter is defined the result set SHALL contain values derieved based on the chosen interpolation algorithm at the number of specified x intervals.
B	The interpolationX information is an interpolation method and an interval. The available interpolation methods should be part of the collection response and the interval is a number :
C	The interpolation information is an interpolation method. The available interpolation methods should be part of the instance metadata:
D	<p>If the interpolation method value e does not match one of the listed methods a 403 error message should be returned.</p> <pre>interpolationX = "R"interval "/" interpolation-method</pre>

If not specified the query will not perform any interpolation of data along the X axis. If the interpolationX method does not match an entry in the defined list of valid interpolationX methods for the collection a 403 message SHOULD be returned.

*Example 19. An interpolationX*

Use the defined linear algorithm to return 10 values between the minimum X value and the maximum X value

**interpolationX=R10/linear**

**Parameter interpolationY**

<b>Requirement 29</b>	<b>/req/edr/interpolationY-definition</b>
-----------------------	---

A	<p>Each resource collection operation MAY support a parameter `interpolationY` with the following characteristics (using an OpenAPI Specification 3.0 fragment):</p> <pre>name: interpolationY in: query required: false schema:   type: string style: form explode: false</pre>
---	---

<b>Requirement 30</b>	<b>/req/edr/interpolationY-response</b>
A	If the <b>interpolationY</b> parameter is defined the result set SHALL contain values derieved based on the chosen interpolation algorithm at the number of specifed y intervals.
B	<p>The interpolationY information is an interpolation method and an interval. The available interpolation methods should be part of the collection response and the interval is a number.</p> <div style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;"> <code>interpolationY = "R"interval "/" interpolation-method</code> </div>
C	The interpolation information is an interpolation method. The available interpolation methods should be part of the istance metadata:
D	If not specified the query will use the default interpolation method for the chosen collection.
E	If the interpolation method value e does not match one of the listed methods a 403 error message should be returned.

If not specified the query will not perform any interpolation of data along the Y axis. If the interpolationY method does not match an entry in the defined list of valid interpolationY methods for the collection a 403 message SHOULD be returned.

*Example 20. An interpolationY*

Use the defined nearest-neighbour algorithm to return 3 values between the minimum Y value and the maximum Y value

**interpolationY=R3/nearest-neighbour**

#### **Parameter minZ**

Define the height of the bottom of the cube i.e. minZ=level

The units will default to those of the coordinate reference system. If no CRS is defined the values will be assumed to be height above sea level in metres.

*Example 21. A minZ*

if bottom of cube is at the 950hPa pressure level

**minZ=950**



## Parameter maxZ

Define the height of the top of the cube i.e. maxZ=level

The units will default to those of the coordinate reference system. If no CRS is defined the values will be assumed to be height above sea level in metres.

*Example 22. A maxZ*

if top of cube is at the 650hPa pressure level

minZ=650

## Parameter interpolationZ

Requirement 31	/req/edr/interpolationZ-definition
A	<p>Each resource collection operation MAY support a parameter `interpolationZ` with the following characteristics (using an OpenAPI Specification 3.0 fragment):</p> <pre>name: interpolationZ in: query required: false schema:   type: string style: form explode: false</pre>

<b>Requirement 32</b>	<b>/req/edr/interpolationZ-response</b>
A	If the <b>interpolationZ</b> parameter is defined the result set SHALL contain values derieved based on the chosen interpolation algorithm at the number of specifed z intervals.
B	<p>The interpolationY information is an interpolation method and an interval. The available interpolation methods should be part of the collection response and the interval is a number :</p> <pre>interpolationZ = "R" intervals "/" intervalinterpolation-method</pre>
C	The interpolation information is an interpolation method. The available interpolation methods should be part of the instance metadata:
D	If not specified the query will use the default interpolation method for the chosen collection.
E	If the interpolation method value e does not match one of the listed methods a 403 error message should be returned.

If not specified the query will not perform any interpolation of data along the Z axis. If the interpolationZ method does not match an entry in the defined list of valid interpolationZ methods for the collection a 403 message SHOULD be returned.

*Example 23. An interpolationZ*

Use the defined cubic-spline algorithm to return 3 values between the minimum Z value and the maximum Z value

**interpolationZ=R3/cubic-spline**

## 8.5.9. Trajectory (corridor)

### Parameters

#### Parameter coords

Requirement 33	/req/edr/coords-definition
A	<p>Each resource collection operation SHALL support a parameter <b>coords</b> with the following characteristics (using an OpenAPI Specification 3.0 fragment):</p> <pre>name: coords in: query required: true schema:   type: string style: form explode: false</pre>
B	<p>The <b>coords</b> string value will be a Well Known Text of representation geometry as defined in <a href="#">Simple Feature Access - Part 1: Common Architecture</a>. The representation type will depend on the queryType of the API</p>

Requirement 34	/req/edr/coords-response
A	<p>Only those resources that have a spatial geometry that intersects the area defined by the <b>coords</b> parameter SHALL be part of the result set.</p>
B	<p>The coordinates SHALL consist of a Well Known Text (WKT) geometry string</p>

C	<p>The coordinate reference system of the values SHALL be interpreted as WGS84 longitude/latitude</p> <div> WKT: GEOGCS["WGS 84",DATUM["WGS_1984",SPHEROID["WGS 84",6378137,298.257223563,AUTHORITY["EPSG","7030"]],AUTHORITY["EPSG","6326"]],PRIMEM["Greenwich",0,AUTHORITY["EPSG","8901"]],UNIT["degree",0.01745329251994328,AUTHORITY["EPSG","9122"]],AUTHORITY["EPSG","4326"]] </div> <div> EPSG: <a href="http://www.opengis.net/def/crs/OGC/1.3/CRS84">http://www.opengis.net/def/crs/OGC/1.3/CRS84</a> </div> <p>unless a different coordinate reference system is specified in a parameter <b>crs</b>.</p>
---	--

"Intersects" means that the area specified by the parameter **coords**, includes a coordinate that is part of the (spatial) geometry of the resource. This includes the boundaries of the geometries.

The trajectory query supports the Linestring Well Know Text (WKT) geometry type, the trajectory query SHOULD support 2D, 3D and 4D queries allowing the definition of a vertical level value (z) and an time value (as an epoc time) therefore coordinates for geometries may be 2D (x, y), 3D (x, y, z) or 4D (x, y, z, t).

If the collection instance has height (z) dimension and the Well Known Text query does does not include a height value a 403 error should be returned

If the collection does not have a height dimension but time values are required in the WKT geometry the z value SHOULD always be 0.

#### Example 24. A basic surface route

From Bristol to Exeter

**coords=LINESTRING(51.14 -2.98,51.36 -2.87,51.03 -3.15,50.74 -3.48,50.9 -3.36)**

#### Example 25. A basic surface route with defined time intervals

From Bristol to Exeter

**coords=LINESTRING(51.14 -2.98 0 1560507000,51.36 -2.87 0 1560507600,51.03 -3.15 0 1560508200,50.74 -3.48 0 1560508500,50.9 -3.36 0 1560510240)**

## Parameter interpolation

Requirement 35	/req/edr/interpolation-definition
A	<p>Each resource collection operation MAY support a parameter <b>interpolation</b> with the following characteristics (using an OpenAPI Specification 3.0 fragment):</p> <pre>name: interpolation in: query required: false schema:   type: string style: form explode: false</pre>
Requirement 36	/req/edr/interpolation-response
A	<p>If the <b>interpolation</b> parameter is defined the result set SHALL to data point that is the best match based on the chosen algorithm.</p>
B	<p>The interpolation information is an interpolation method. The available interpolation methods should be part of the instance metadata:</p> <pre>interpolation = interpolation-method</pre>
C	<p>If not specified the query will use the default interpolation method for the chosen collection.</p>
D	<p>If the interpolation method value e does not match one of the listed methods a 403 error message should be returned.</p>

## Parameter interpolationZ

Requirement 37	/req/edr/interpolationZ-definition
A	<p>Each resource collection operation MAY support a parameter `interpolationZ` with the following characteristics (using an OpenAPI Specification 3.0 fragment):</p> <pre>name: interpolationZ in: query required: false schema:   type: string style: form explode: false</pre>
Requirement 38	/req/edr/interpolationZ-response
A	<p>If the <b>interpolationZ</b> parameter is defined the result set SHALL contain values derieved based on the chosen interpolation algorithm at the number of specifed z intervals.</p>
B	<p>The interpolationY information is an interpolation method and an interval. The available interpolation methods should be part of the collection response and the interval is a number :</p> <pre>interpolationZ = "R" intervals "/" intervalinterpolation-method</pre>
C	<p>The interpolation information is an interpolation method. The available interpolation methods should be part of the instance metadata:</p>
D	<p>If not specified the query will use the default interpolation method for the chosen collection.</p>
E	<p>If the interpolation method value e does not match one of the listed methods a 403 error message should be returned.</p>

## 8.5.10. Items

### Parameters

Due to the concept of **Collections** in EDR the item query is a powerful and flexible tool, but retains only simple options. It could be used to rerun a previously run query but with a replacement for one or more of the input parameters; this would be achieved by using the id field value from the successful output from a previous query as the input id query parameter of item query, then the API user could override one or more of the original query parameters by just entering the query parameters that they want to change (i.e. a trajectory query where the same route is used every day with the same interpolation options, crs and outputFormat and the user just needs to enter the new time range).

Again this is dependant on the data publisher implementing support for the functionality.

*Example 26. id*

return information for the requested id

id=gfs-query-2020-01-31

As in the EDR concept a **Collection** is a black box it would be possible to overload the id query parameter to perform different actions, as it is the **Collection** black box that interprets how it handles the parameter; for instance in the Metar collection it could be combined with the parametername query parameter and the time parameter to return all Metars for ICAO id KIAD for the requested time period

.

return information for the requested id

/collections/metar/raw/item?id=KIAD&parametername=icao\_id&time=2020-01-31T00:00:00Z/2020-02-01T04:00:00Z

This example does have a flaw in that the EDR API provides no mechanism for the user to discover the available icao id's in the metadata (the id's are available in the query results but not in any of the available metadata outputs).

### 8.5.11. Instance

It is not unusual in the scientific world for there to be multiple versions or instances of the same collection, these is where the same information is reprocessed or regenerated. Although they could be described as new collections the instance query type allows this data to be described as different views of the same collection.

#### Parameters

##### Parameter `instanceId`

A unique identifier for the instance of the collection

`/collections/{collectionId}/instance/{instanceId}`

1. Return the Raw data instance metadata (`instanceId = raw`) for the Metar (`collectionId = metar`) collection

```
/collections/metar/instance/raw
```

1. Return the Level 1 Quality controlled data instance (`instanceId = qc_lvl_1`) metadata for the Metar (`collectionId = metar`) collection

```
/collections/metar/instance/qc_lvl_1
```

##### Parameter `queryType`

The `queryType` options are exactly the same as those available to collections that don't have multiple instances and support the same query parameters and functionality. See the `<query-resource-table>` for the mappings of the initial query types proposed for the EDR API.

`/collections/{collectionId}/instance/{instanceId}/{queryType}`

see the [QueryType specific Operations](#) section for details of the query parameters supported by the queryTypes.

1. A point query on an Raw data instance(`instanceId = raw`) for the Metar (`collectionId = metar`) collection

```
/collections/metar/instance/raw/point
```

1. A trajectory query on an Raw data instance(`instanceId = raw`) for the Metar (`collectionId = metar`) collection

```
/collections/metar/instance/raw/trajectory
```



## 8.6. General Requirements

The following general requirements and recommendations apply to all OGC APIs which host Spatial Resources.

### 8.6.1. Coordinate Reference Systems

As discussed in Chapter 9 of the W3C/OGC Spatial Data on the Web [Best Practices document](#), how to express and share the location of resources in a consistent way is one of the most fundamental aspects of publishing geographic data and it is important to be clear about the coordinate reference system that coordinates are in.

For the reasons discussed in the Best Practices, EDR APIs **MUST** always support WGS84 longitude and latitude as a coordinate reference system.

Unresolved directive in clause\_8\_collections.adoc -  
include::requirements/collections/REQ\_crs84.adoc[]

The implementations compliant with the Core are not required to support publishing geometries in coordinate reference systems other than <http://www.opengis.net/def/crs/OGC/1.3/CRS84>.

# Chapter 9. Requirements classes for encodings

## 9.1. Overview

This clause specifies two pre-defined requirements classes for encodings to be used by an OGC API implementation. These encodings are commonly used encodings for spatial data on the web:

- [HTML](#)
- [GeoJSON](#)

Neither of these encodings are mandatory and an implementation of the [Core](#) requirements class may implement either, both, or none of them. [Clause 7 \(Overview\)](#) includes a discussion about recommended encodings.

## 9.2. Requirement Class "HTML"

Geographic information that is only accessible in formats like GeoJSON or GML has two issues:

- The data is not discoverable using the most common mechanism for discovering information, that is the search engines of the Web,
- The data can not be viewed directly in a browser - additional tools are required to view the data.

Therefore, sharing data on the Web should include publication in HTML. To be consistent with the Web, it should be done in a way that enables users and search engines to access all data.

This is discussed in detail in [W3C Best Practice](#). This standard therefore [recommends](#) supporting HTML as an encoding.

Requirements Class	
<a href="http://www.opengis.net/spec/ogcapi-coverages-1/1.0/req/html">http://www.opengis.net/spec/ogcapi-coverages-1/1.0/req/html</a>	
Target type	Web API
Dependency	<a href="#">Conformance Class "Core"</a>
Dependency	<a href="#">API-Common HTML</a>
Dependency	<a href="#">HTML5</a>
Dependency	<a href="#">Schema.org</a>

Unresolved directive in clause\_9\_encodings.adoc - include::requirements/html/REQ\_definition.adoc[]

Unresolved directive in clause\_9\_encodings.adoc - include::requirements/html/REQ\_content.adoc[]

<b>Recommendation 11</b>	<b>/rec/html/schema-org</b>
A	A 200-response with the media type <code>text/html</code> , SHOULD include <a href="https://schema.org/">Schema.org</a> annotations.

## 9.3. Requirement Class "GeoJSON"

GeoJSON is a commonly used format that is simple to understand and well supported by tools and software libraries. Since most Web developers are comfortable with using a JSON-based format, supporting GeoJSON is recommended if the resource can be represented in GeoJSON for the intended use.

```
Unresolved      directive      in      clause_9_encodings.adoc      -
include::requirements/requirements_class_geojson.adoc[]

Unresolved      directive      in      clause_9_encodings.adoc      -
include::requirements/geojson/REQ_definition.adoc[]

Unresolved      directive      in      clause_9_encodings.adoc      -
include::requirements/geojson/REQ_content.adoc[]
```

**NOTE**      The following schema names are from API-Features and need to be updated.

Templates for the definition of the schemas for the GeoJSON responses in JSON Schema definitions are available at [collections.yaml](#) and [collectionInfo.yaml](#).

These are generic schemas that do not include any application schema information about specific resource types or their properties.

# Chapter 10. Requirements class "OpenAPI 3.0"

## 10.1. Basic requirements

APIs conforming to this requirements class document themselves by an [OpenAPI Document](#).

Requirements Class	
<a href="http://www.opengis.net/spec/ogcapi-coverages/1.0/req/oas30">http://www.opengis.net/spec/ogcapi-coverages/1.0/req/oas30</a>	
Target type	Web API
Dependency	<a href="#">Conformance Class "Core"</a>
Dependency	<a href="#">OGC API-Common Standard 1.0</a>
Dependency	<a href="#">OpenAPI Specification 3.0.2</a>

Unresolved directive in clause\_10\_oas.adoc - include::requirements/oas30/REQ\_oas-definition-1.adoc[]

**CAUTION** | [ISSUE 117](#)

The OpenAPI media type has not been registered yet with IANA and will likely change. We need to update the media type after registration.

Unresolved directive in clause\_10\_oas.adoc - include::requirements/oas30/REQ\_oas-definition-2.adoc[]

Two example OpenAPI documents are included in [Annex B](#).

Unresolved directive in clause\_10\_oas.adoc - include::requirements/oas30/REQ\_oas-impl.adoc[]

## 10.2. Complete definition

Unresolved directive in clause\_10\_oas.adoc - include::requirements/oas30/REQ\_completeness.adoc[]

Note that APIs that, for example, are access-controlled (see [Security](#)), support web cache validation, CORS or that use HTTP redirection will make use of additional HTTP status codes beyond regular codes such as **200** for successful GET requests and **400**, **404** or **500** for error situations. See [HTTP Status Codes](#).

Clients have to be prepared to receive responses not documented in the OpenAPI definition. For example, additional errors may occur in the transport layer outside of the server.

## 10.3. Exceptions

Unresolved directive in clause\_10\_oas.adoc - include::requirements/oas30/REQ\_exception-

codes.adoc[]

*Example 27. An exception response object definition*

```
description: An error occurred.
content:
  application/json:
    schema:
      $ref:
        https://raw.githubusercontent.com/engeospatial/OAPI/openapi/schemas/exception.yaml
  text/html:
    schema:
      type: string
```

## 10.4. Security

Unresolved directive in clause\_10\_oas.adoc - include::requirements/oas30/REQ\_security.adoc[]

The OpenAPI specification currently supports the following [security schemes](#):

- HTTP authentication,
- an API key (either as a header or as a query parameter),
- OAuth2's common flows (implicit, password, application and access code) as defined in RFC6749, and
- OpenID Connect Discovery.

# Chapter 11. Media Types

JSON media types that would typically be used in on OGC API that supports JSON are

- `application/geo+json` for feature collections and features, and
- `application/json` for all other resources.

XML media types that would typically occur in on OGC API that supports XML are

- `application/gml+xml;version=3.2` for any GML 3.2 feature collections and features,
- `application/gml+xml;version=3.2;profile=http://www.opengis.net/def/profile/ogc/2.0/gml-sf0` for GML 3.2 feature collections and features conforming to the GML Simple Feature Level 0 profile,
- `application/gml+xml;version=3.2;profile=http://www.opengis.net/def/profile/ogc/2.0/gml-sf2` for GML 3.2 feature collections and features conforming to the GML Simple Feature Level 2 profile, and
- `application/xml` for all other resources.

The typical HTML media type for all "web pages" in an OGC API would be `text/html`.

The media types for an OpenAPI definition are `vnd.oai.openapi+json;version=3.0` (JSON) and `application/vnd.oai.openapi;version=3.0` (YAML).

<b>NOTE</b>	The OpenAPI media type has not been registered yet with IANA and may change.
-------------	--

# Annex A: Abstract Test Suite (Normative)

## A.1. Introduction

OGC Web APIs are not a Web Services in the traditional sense. Rather, they define the behavior and content of a set of Resources exposed through a Web Application Programming Interface (Web API). Therefore, an API may expose resources in addition to those defined by the standard. A test engine must be able to traverse the API, identify and validate test points, and ignore resource paths which are not to be tested.

## A.2. Conformance Class Core

Conformance Class	
<a href="http://www.opengis.net/spec/ogcapi-common/1.0/conf/core">http://www.opengis.net/spec/ogcapi-common/1.0/conf/core</a>	
Target type	Web API
Requirements Class	<a href="http://www.opengis.net/spec/ogcapi_common/1.0/req/core">http://www.opengis.net/spec/ogcapi_common/1.0/req/core</a>

### A.2.1. General Tests

#### HTTP

Abstract Test 1	/ats/core/http
Test Purpose	Validate that the resource paths advertised through the API conform with HTTP 1.1 and, where appropriate, TLS.
Requirement	<a href="#">/req/core/http</a>
Test Method	<ol style="list-style-type: none"><li>1. All compliance tests shall be configured to use the HTTP 1.1 protocol exclusively.</li><li>2. For APIs which support HTTPS, all compliance tests shall be configured to use <a href="#">HTTP over TLS</a> (RFC 2818) with their HTTP 1.1 protocol.</li></ol>

### A.2.2. Landing Page {root}/

Abstract Test 2	/ats/core/root-op
Test Purpose	Validate that a landing page can be retrieved from the expected location.

Requirement	<a href="#">/req/core/root-op</a>
Test Method	<ol style="list-style-type: none"> <li>1. Issue an HTTP GET request to the URL {root}/</li> <li>2. Validate that a document was returned with a status code 200</li> <li>3. Validate the contents of the returned document using test <a href="#">/ats/core/root-success</a>.</li> </ol>

<b>Abstract Test 3</b>	<b><a href="#">/ats/core/root-success</a></b>
Test Purpose	Validate that the landing page complies with the require structure and contents.
Requirement	<a href="#">/req/core/root-success</a>
Test Method	<p>Validate the landing page for all supported media types using the resources and tests identified in <a href="#">Table 8</a></p> <p>For formats that require manual inspection, perform the following:</p> <ol style="list-style-type: none"> <li>a. Validate that the landing page includes a "service-desc" and/or "service-doc" link to an API Definition</li> <li>b. Validate that the landing page includes a "conformance" link to the conformance class declaration</li> <li>c. Validate that the landing page includes a "data" link to the Feature contents.</li> </ol>

The landing page may be retrieved in a number of different formats. The following table identifies the applicable schema document for each format and the test to be used to validate the landing page against that schema. All supported formats should be exercised.

*Table 11. Schema and Tests for Landing Pages*

Format	Schema Document	Test ID
HTML	<a href="#">landingPage.json</a>	<a href="#">/ats/html/content</a>
JSON	<a href="#">landingPage.json</a>	<a href="#">/ats/geojson/content</a>

### A.2.3. API Definition Path {root}/api (link)

<b>Abstract Test 4</b>	<b><a href="#">/ats/core/api-definition-op</a></b>
Test Purpose	Validate that the API Definition document can be retrieved from the expected location.



Requirement	<a href="#">/req/core/api-definition-op</a>
Test Purpose	Validate that the API Definition document can be retrieved from the expected location.
Test Method	<ol style="list-style-type: none"> <li>1. Construct a path for each API Definition link on the landing page</li> <li>2. Issue a HTTP GET request on each path</li> <li>3. Validate that a document was returned with a status code 200</li> <li>4. Validate the contents of the returned document using test <a href="#">/ats/core/api-definition-success</a>.</li> </ol>

<b>Abstract Test 5</b>	<b><a href="#">/ats/core/api-definition-success</a></b>
Test Purpose	Validate that the API Definition complies with the required structure and contents.
Requirement	<a href="#">/req/core/api-definition-success</a>
Test Method	Validate the API Definition document against an appropriate schema document.

#### A.2.4. Conformance Path {root}/conformance

<b>Abstract Test 6</b>	<b><a href="#">/ats/core/conformance-op</a></b>
Test Purpose	Validate that a Conformance Declaration can be retrieved from the expected location.
Requirement	<a href="#">/req/core/conformance-op</a>
Test Method	<ol style="list-style-type: none"> <li>1. Construct a path for each "conformance" link on the landing page as well as for the {root}/conformance path.</li> <li>2. Issue an HTTP GET request on each path</li> <li>3. Validate that a document was returned with a status code 200</li> <li>4. Validate the contents of the returned document using test <a href="#">/ats/core/conformance-success</a>.</li> </ol>

<b>Abstract Test 7</b>	<b><a href="#">/ats/core/conformance-success</a></b>
------------------------	--

Test Purpose	Validate that the Conformance Declaration response complies with the required structure and contents.
Requirement	<a href="#">/req/core/conformance-success</a>
Test Method	<ol style="list-style-type: none"> <li>1. Validate the response document against OpenAPI 3.0 schema <a href="#">confClasses.yaml</a></li> <li>2. Validate that the document includes the conformance class "http://www.opengis.net/spec/ogcapi-features-1/1.0/conf/core"</li> <li>3. Validate that the document list all OGC API conformance classes that the API implements.</li> </ol>

## A.3. Conformance Class Collections

<b>Conformance Class</b>	
<a href="http://www.opengis.net/spec/ogcapi-common/1.0/conf/collections">http://www.opengis.net/spec/ogcapi-common/1.0/conf/collections</a>	
Target type	Web API
Requirements Class	<a href="http://www.opengis.net/spec/ogcapi_common/1.0/req/collections">http://www.opengis.net/spec/ogcapi_common/1.0/req/collections</a>
Dependency	<a href="#">Conformance Class "OAPI Core"</a>

### A.3.1. General Tests

#### CRS 84

<b>Abstract Test 8</b>	<b><a href="#">/ats/collections/crs84</a></b>
Test Purpose	Validate that all spatial geometries provided through the API are in the CRS84 spatial reference system unless otherwise requested by the client.
Requirement	<a href="#">/req/collections/crs84</a>
Test Method	<ol style="list-style-type: none"> <li>1. Do not specify a coordinate reference system in any request. All spatial data should be in the CRS84 reference system.</li> <li>2. Validate retrieved spatial data using the CRS84 reference system.</li> </ol>

### A.3.2. Feature Collections {root}/collections

<b>Abstract Test 9</b>	<b>/ats/collections/rc-md-op</b>
Test Purpose	Validate that information about the Collections can be retrieved from the expected location.
Requirement	<a href="#">/req/collections/rc-md-op</a>
Test Method	<ol style="list-style-type: none"> <li>1. Issue an HTTP GET request to the URL {root}/collections</li> <li>2. Validate that a document was returned with a status code 200</li> <li>3. Validate the contents of the returned document using test <a href="#">/ats/collections/rc-md-success</a>.</li> </ol>

<b>Abstract Test 10</b>	<b>/ats/collections_rc-md-success</b>
Test Purpose	Validate that the Collections content complies with the required structure and contents.
Requirement	<a href="#">/req/collections/rc-md-success</a> , <a href="#">/req/collections/crs84</a>
Test Method	<ol style="list-style-type: none"> <li>1. Validate that all response documents comply with <a href="#">/ats/collections/rc-md-links</a></li> <li>2. In case the response includes a "crs" property, validate that the first value is either "http://www.opengis.net/def/crs/OGC/1.3/CRS84" or "http://www.opengis.net/def/crs/OGC/0/CRS84h"</li> <li>3. Validate the collections content for all supported media types using the resources and tests identified in <a href="#">Table 9</a></li> </ol>

The Collections content may be retrieved in a number of different formats. The following table identifies the applicable schema document for each format and the test to be used to validate the against that schema. All supported formats should be exercised.

*Table 12. Schema and Tests for Collections content*

Format	Schema Document	Test ID
HTML	<a href="#">collections.json</a>	<a href="#">/ats/html/content</a>
JSON	<a href="#">collections.json</a>	<a href="#">/ats/geojson/content</a>

### A.3.3. Feature Collection {root}/collections/{collectionId}

<b>Abstract Test 11</b>	<b>/ats/collections/src-md-op</b>
-------------------------	-----------------------------------

Test Purpose	Validate that the Collection content can be retrieved from the expected location.
Requirement	<a href="#">/req/collections/src-md-op</a>
Test Method	For every Feature Collection described in the Collections content, issue an HTTP GET request to the URL <a href="#">/collections/{collectionId}</a> where <a href="#">{collectionId}</a> is the <a href="#">id</a> property for the collection. . Validate that a Collection was returned with a status code 200 . Validate the contents of the returned document using test <a href="#">/ats/collections/src-md-success</a> .

<b>Abstract Test 12</b>	<b><a href="#">/ats/collections/src-md-success</a></b>
Test Purpose	Validate that the Collection content complies with the required structure and contents.
Requirement	<a href="#">/req/collections/src-md-success</a>
Test Method	Verify that the content of the response is consistent with the content for this Resource Collection in the <a href="#">/collections</a> response. That is, the values for <a href="#">id</a> , <a href="#">title</a> , <a href="#">description</a> and <a href="#">extent</a> are identical.

#### A.3.4. Features [{root}/collections/{collectionId}/items](#)

**NOTE**      This test is too Feature centric. Will need to be greatly reduced in scope.

<b>Abstract Test 13</b>	<b><a href="#">/ats/collections/rc-op</a></b>
Test Purpose	Validate that resources can be identified and extracted from a Collection using query parameters.
Requirement	<a href="#">/req/collections/rc-op</a>

Test Method	<ol style="list-style-type: none"> <li>1. For every resource collection identified in Collections, issue an HTTP GET request to the URL <code>/collections/{collectionId}/items</code> where <code>{collectionId}</code> is the <code>id</code> property for a Collection described in the Collections content.</li> <li>2. Validate that a document was returned with a status code 200.</li> </ol> <p>Repeat these tests using the following parameter tests:</p> <p><b>Bounding Box:</b></p> <ul style="list-style-type: none"> <li>• Parameter <a href="#">/ats/collections/rc-bbox-definition</a></li> <li>• Response <a href="#">/ats/collections/rc-bbox-response</a></li> </ul> <p><b>DateTime:</b></p> <ul style="list-style-type: none"> <li>• Parameter <a href="#">/ats/collections/rc-time-definition</a></li> <li>• Response <a href="#">/ats/collections/rc-time-response</a></li> </ul> <p>Execute requests with combinations of the "bbox" and "datetime" query parameters and verify that only features are returned that match both selection criteria.</p>
-------------	--

<b>Abstract Test 14</b>	<b><a href="#">/ats/collections/rc-bbox-definition</a></b>
Test Purpose	Validate that the bounding box query parameters are constructed correctly.
Requirement	<a href="#">/req/collections/rc-bbox-definition</a>

Test Method	<p>Verify that the <b>bbox</b> query parameter complies with the following definition (using an OpenAPI Specification 3.0 fragment):</p> <pre> name: bbox in: query required: false schema:   type: array   minItems: 4   maxItems: 6   items:     type: number style: form explode: false </pre> <p>Use a bounding box with four numbers in all requests:</p> <ul style="list-style-type: none"> <li>• Lower left corner, WGS 84 longitude</li> <li>• Lower left corner, WGS 84 latitude</li> <li>• Upper right corner, WGS 84 longitude</li> <li>• Upper right corner, WGS 84 latitude</li> </ul>
-------------	---

<b>Abstract Test 15</b>	<b>/ats/collections/rc-bbox-response</b>
Test Purpose	Validate that the bounding box query parameters are processed correctly.
Requirement	<a href="#">/req/collections/rc-bbox-response</a>
Test Method	<ol style="list-style-type: none"> <li>1. Verify that only resources that have a spatial geometry that intersects the bounding box are returned as part of the result set.</li> <li>2. Verify that the <b>bbox</b> parameter matched all resources in the collection that were not associated with a spatial geometry (this is only applicable for datasets that include resources without a spatial geometry).</li> <li>3. Verify that the coordinate reference system of the geometries is WGS 84 longitude/latitude ("http://www.opengis.net/def/crs/OGC/1.3/CRS84" or "http://www.opengis.net/def/crs/OGC/0/CRS84h") since no parameter <b>bbox-crs</b> was specified in the request.</li> </ol>

<b>Abstract Test 16</b>	<b>/ats/collections/rc-time-definition</b>
Test Purpose	Validate that the dateTime query parameters are constructed correctly.
Requirement	<a href="#">/req/collections/rc-time-definition</a>
Test Method	<p>Verify that the <b>datetime</b> query parameter complies with the following definition (using an OpenAPI Specification 3.0 fragment):</p> <pre> name: datetime in: query required: false schema:   type: string style: form explode: false </pre>

<b>Abstract Test 17</b>	<b>/ats/collections/rc-time-response</b>
Test Purpose	Validate that the dataTime query parameters are processed correctly.
Requirement	<a href="#">/req/collections/rc-time-response</a>
Test Method	<ol style="list-style-type: none"> <li>1. Verify that only resources that have a temporal geometry that intersects the temporal information in the <b>datetime</b> parameter were included in the result set</li> <li>2. Verify that all resources in the collection that are not associated with a temporal geometry are included in the result set</li> <li>3. Validate that the dateime parameter complies with the syntax described in <a href="#">/req/collections/rc-time-response</a>.</li> </ol>

<b>Abstract Test 18</b>	<b>/ats/collections/rc-response</b>
Test Purpose	Validate that the Resource Collection complies with the require structure and contents.
Requirement	<a href="#">/req/collections/rc-response</a>

Test Method	The test method is specific to the resource type returned.
-------------	--

### A.3.5. Second Tier Tests

These tests are invoked by other tests.

#### Extent

<b>Abstract Test 19</b>	<b>/ats/collections/rc-md-extent</b>
Test Purpose	Validate that the <b>extent</b> property if it is present
Requirement	<a href="#">/req/collections/rc-md-extent</a>
Test Method	<ol style="list-style-type: none"> <li>1. Verify that the <b>extent</b> provides bounding boxes that include all spatial geometries</li> <li>2. Verify that if the <b>extent</b> provides time intervals that include all temporal geometries in this collection.</li> <li>3. A temporal extent of <b>null</b> indicates an open time interval.</li> </ol>

#### Items

<b>Abstract Test 20</b>	<b>/ats/collections/rc-md-items</b>
Test Purpose	Validate that each collection provided by the server is described in the Collections Metadata.
Requirement	<a href="#">/req/collections/rc-md-items</a>
Test Method	<ol style="list-style-type: none"> <li>1. Verify that there is an entry in the <b>collections</b> array of the Collections Metadata for each feature collection provided by the API.</li> <li>2. Verify that each collection entry includes an identifier.</li> <li>3. Verify that each collection entry includes links in accordance with <a href="#">/collections/rc-md-items-links</a>.</li> <li>4. Verify that if the collection entry includes an extent property, that that property complies with <a href="#">/collections/rc-md-extent</a></li> <li>5. Validate each collection entry for all supported media types using the resources and tests identified in <a href="#">Table 10</a></li> </ol>

The collection entries may be encoded in a number of different formats. The following table identifies the applicable schema document for each format and the test to be used to validate the



against that schema. All supported formats should be exercised.

Table 13. Schema and Tests for Collection Entries

Format	Schema Document	Test ID
HTML	<a href="#">collectionInfo.json</a>	<a href="#">/ats/html/content</a>
JSON	<a href="#">collectionInfo.json</a>	<a href="#">/ats/geojson/content</a>

<b>Abstract Test 21</b>	<b><a href="#">/ats/collections/rc-md-items-links</a></b>
Test Purpose	Validate that each Feature Collection metadata entry in the Collections Metadata document includes all required links.
Requirement	<a href="#">/req/collections/rc-md-items-links</a>
Test Method	<ol style="list-style-type: none"><li>1. Verify that each Collection item in the Collections Metadata document includes a <b>link</b> property for each supported encoding.</li><li>2. Verify that the <b>links</b> properties of the collection includes an item for each supported encoding with a link to the features resource (relation: <b>items</b>).</li><li>3. Verify that all links include the <b>rel</b> and <b>type</b> link parameters.</li></ol>

## Links

<b>Abstract Test 22</b>	<b><a href="#">/ats/collections/rc-md-links</a></b>
Test Purpose	Validate that the required links are included in the Collections Metadata document.
Requirement	<a href="#">/req/collections/rc-md-links</a>
Test Method	<p>Verify that the response document includes:</p> <ol style="list-style-type: none"><li>1. a link to this response document (relation: <b>self</b>),</li><li>2. a link to the response document in every other media type supported by the server (relation: <b>alternate</b>).</li></ol> <p>Verify that all links include the <b>rel</b> and <b>type</b> link parameters.</p>

## A.4. Conformance Class GeoJSON

<b>Conformance Class</b>
--------------------------

<a href="http://www.opengis.net/spec/ogcapi-common/1.0/conf/geojson">http://www.opengis.net/spec/ogcapi-common/1.0/conf/geojson</a>	
Target type	Web API
Requirements Class	<a href="http://www.opengis.net/spec/ogcapi-common/1.0/req/geojson">http://www.opengis.net/spec/ogcapi-common/1.0/req/geojson</a>
Dependency	Conformance Class "OAPI Core"

#### A.4.1. GeoJSON Definition

<b>Abstract Test 23</b>	<b>/ats/geojson/definition</b>
Test Purpose	Verify support for JSON and GeoJSON
Requirement	<a href="/req/geojson/definition">/req/geojson/definition</a>
Test Method	<ol style="list-style-type: none"> <li>1. A resource is requested with response media type of <code>application/geo+json</code></li> <li>2. All 200-responses SHALL support the following media types: <ul style="list-style-type: none"> <li>◦ <code>application/geo+json</code> for resources that include feature content, and</li> <li>◦ <code>application/json</code> for all other resources.</li> </ul> </li> </ol>

#### A.4.2. GeoJSON Content

<b>Abstract Test 24</b>	<b>/ats/geojson/content</b>
Test Purpose	Verify the content of a GeoJSON document given an input document and schema.
Requirement	<a href="/req/geojson/content">/req/geojson/content</a>
Test Method	<ol style="list-style-type: none"> <li>1. Validate that the document is a GeoJSON document.</li> <li>2. Validate the document against the schema using an JSON Schema validator.</li> </ol>

### A.5. Conformance Class HTML

<b>Conformance Class</b>	
<a href="http://www.opengis.net/spec/ogcapi-common/1.0/conf/html">http://www.opengis.net/spec/ogcapi-common/1.0/conf/html</a>	
Target type	Web API

Requirements Class	<a href="http://www.opengis.net/spec/ogcapi_common/1.0/req/html">http://www.opengis.net/spec/ogcapi_common/1.0/req/html</a>
Dependency	<a href="#">Conformance Class "OAPI Core"</a>

### A.5.1. HTML Definition

<b>Abstract Test 25</b>	<b>/ats/html/definition</b>
Test Purpose	Verify support for HTML
Requirement	<a href="/req/html/definition">/req/html/definition</a>
Test Method	Verify that every <b>200</b> -response of every operation of the API where HTML was requested is of media type <b>text/html</b>

### A.5.2. HTML Content

<b>Abstract Test 26</b>	<b>/ats/html/content</b>
Test Purpose	Verify the content of an HTML document given an input document and schema.
Requirement	<a href="/req/html/content">/req/html/content</a>
Test Method	<ol style="list-style-type: none"> <li>1. Validate that the document is an <a href="#">HTML 5 document</a></li> <li>2. Manually inspect the document against the schema.</li> </ol>

## A.6. Conformance Class OpenAPI 3.0

<b>Conformance Class</b>	
<a href="http://www.opengis.net/spec/ogcapi-common/1.0/conf/oas3">http://www.opengis.net/spec/ogcapi-common/1.0/conf/oas3</a>	
Target type	Web API
Requirements Class	<a href="http://www.opengis.net/spec/ogcapi_common/1.0/req/oas3">http://www.opengis.net/spec/ogcapi_common/1.0/req/oas3</a>
Dependency	<a href="#">Conformance Class "OAPI Core"</a>

<b>Abstract Test 27</b>	<b>/ats/oas30/completeness</b>
Test Purpose	Verify the completeness of an OpenAPI document.

Requirement	<a href="#">/req/oas30/completeness</a>
Test Method	Verify that for each operation, the OpenAPI document describes all <a href="#">HTTP Status Codes</a> and <a href="#">Response Objects</a> that the API uses in responses.

  

<b>Abstract Test 28</b>	<b><a href="#">/ats/oas30/exceptions-codes</a></b>
Test Purpose	Verify that the OpenAPI document fully describes potential exception codes.
Requirement	<a href="#">/req/oas30/exceptions-codes</a>
Test Method	Verify that for each operation, the OpenAPI document describes all <a href="#">HTTP Status Codes</a> that may be generated.

  

<b>Abstract Test 29</b>	<b><a href="#">/ats/oas30/oas-definition-1</a></b>
Test Purpose	Verify that JSON and HTML versions of the OpenAPI document are available.
Requirement	<a href="#">/req/oas30/oas-definition-1</a>
Test Method	<ol style="list-style-type: none"> <li>1. Verify that an OpenAPI definition in JSON is available using the media type <code>application/vnd.oai.openapi+json;version=3.0</code> and link relation <code>service-desc</code></li> <li>2. Verify that an HTML version of the API definition is available using the media type <code>text/html</code> and link relation <code>service-doc</code>.</li> </ol>

  

<b>Abstract Test 30</b>	<b><a href="#">/ats/oas30/oas-definition-2</a></b>
Test Purpose	Verify that the OpenAPI document is valid JSON.
Requirement	<a href="#">/req/oas30/oas-definition-2</a>
Test Method	Verify that the JSON representation conforms to the <a href="#">OpenAPI Specification, version 3.0</a> .

  

<b>Abstract Test 31</b>	<b><a href="#">/ats/oas30/oas-impl</a></b>
-------------------------	--

Test Purpose	Verify that all capabilities specified in the OpenAPI definition are implemented by the API.
Requirement	<a href="#">/req/oas30/oas-impl</a>
Test Method	<ol style="list-style-type: none"> <li>1. Construct a path from each URL template including all server URL options and all enumerated path parameters.</li> <li>2. For each path defined in the OpenAPI document, validate that the path performs in accordance with the API definition and the API-Features standard.</li> </ol>

<b>Abstract Test 32</b>	<b><a href="#">/ats/oas30/security</a></b>
Test Purpose	Verify that any authentication protocols implemented by the API are documented in the OpenAPI document.
Requirement	<a href="#">/req/oas30/security</a>
Test Method	<ol style="list-style-type: none"> <li>1. Identify all authentication protocols supported by the API.</li> <li>2. Validate that each authentication protocol is described in the OpenAPI document by a Security Schema Object and its' use specified by a Security Requirement Object.</li> </ol>

# Annex B: Examples (Informative)

## B.1. Example Landing Pages

*Example 28. JSON Landing Page*

```
{
  "links": [
    { "href": "http://data.example.org/",
      "rel": "self", "type": "application/json", "title": "this document" },
    { "href": "http://data.example.org/api",
      "rel": "service", "type": "application/openapi+json;version=3.0", "title":
"the API definition" },
    { "href": "http://data.example.org/conformance",
      "rel": "conformance", "type": "application/json", "title": "OGC conformance
classes implemented by this API" },
    { "href": "http://data.example.org/collections",
      "rel": "data", "type": "application/json", "title": "Metadata about the
resource collections" }
  ]
}
```

## B.2. API Description Examples

**NOTE** | include::examples/tbd.adoc[]

## B.3. Conformance Examples

*Example 29. Conformance Response*

This example response in JSON is for an OGC API Features that supports OpenAPI 3.0 for the API definition and HTML and GeoJSON as encodings for resources.

```
{
  "conformsTo": [
    "http://www.opengis.net/spec/ogcapi-features-1/1.0/req/core",
    "http://www.opengis.net/spec/ogcapi-features-1/1.0/req/oas30",
    "http://www.opengis.net/spec/ogcapi-features-1/1.0/req/html",
    "http://www.opengis.net/spec/ogcapi-features-1/1.0/req/geojson"
  ]
}
```

## B.4. Collections Metadata Examples

### Example 30. Collection metadata response document

This collection metadata example response in JSON is for a service with collections "Metar", "GFS height above ground parameters" and "DEM". It includes links to the collection resource in all formats that are supported by the API (link relation type: "items").

There is a link to the feature collections response itself (link relation type: "self").

Representations of this resource in other formats are referenced using link relation type "alternate".

An additional link is to a GML application schema for the dataset - using: <https://www.iana.org/assignments/link-relations/link-relations.xhtml> [link relation type] "describedBy".

A bulk download of all the features in the dataset is referenced using link relation type "enclosure"

Finally there are also links to the license information for the building data (using: <https://www.iana.org/assignments/link-relations/link-relations.xhtml> [link relation type] "license").

Reference system information is not provided as the service provides geometries only in the default system (spatial: WGS 84 longitude/latitude; temporal: Gregorian calendar).

```
{
  "links": [
    { "href": "http://data.example.org/collections.json",
      "rel": "self", "type": "application/json", "title": "this document" },
    { "href": "http://data.example.org/collections.html",
      "rel": "alternate", "type": "text/html", "title": "this document as HTML" },
    { "href": "http://schemas.example.org/1.0/foobar.xsd",
      "rel": "describedBy", "type": "application/xml", "title": "XML schema for
Acme Corporation data" }
  ],
  "collections": [
    {
      "id": "metar",
      "title": "Metars",
      "description": "Metar observations",
      "extent": {
        "spatial": [ -180.0, -89.9, 180, 89.9 ],
        "temporal": [ "2020-01-30T12:00:00Z/2020-01-13T11:00:00Z" ]
      },
      "dataDetails": {
        "@context": {
          "@version": 1.1,
          "xsd": "http://www.w3.org/2001/XMLSchema#",
          "dc": "http://purl.org/dc/terms/",
          "dcam": "http://purl.org/dc/dcam/"
        }
      }
    }
  ]
}
```



```

    },
    "dc:accessRights": {
    },
    "dcam:domainIncludes":
["temperature","wind_speed","wind_direction","maximum_wind_gust_speed","speci_visi
bility","pressure","pressure_msl","raw_observation","id"]

},
"links": [
{ "href": "http://data.example.org/collections/metars",
  "rel": "metadata", "type": "application/json",
  "title": "Instances of the Metar collection" },
{ "href": "https://data.example.org/collection/metar/link-for-more-
details",
  "rel": "source", "type": "application/json",
  "title": "Further information about the Metar data" },
{ "href": "https://data.example.org/collection/metar/link-for-publisher-
details",
  "rel": "publisher", "type": "application/json",
  "title": "Further information about the data publisher" },
{ "href": "http://data.example.org/collections/metars/point",
  "rel": "point", "type": "application/json",
  "title": "Point query for the Metar collection" },
{ "href": "http://data.example.org/collections/metars/polygon",
  "rel": "polygon", "type": "application/json",
  "title": "Polygon query for the Metar collection" },
{ "href": "http://data.example.org/collections/metars?outputFormat=html",
  "rel": "instances", "type": "text/html",
  "title": "Instances of the Metar collection" }
{ "href": "https://data.example.org/collection/metar/licence-doc",
  "rel": "licence", "type": "text/html",
  "title": "Licence for the Metar collection" }
]
},
{
  "id": "gfs_time-height_above_ground-lat-lon",
  "title": "GFS time, height_above_ground lat-lon",
  "description": "GFS parameters based on heights above ground level",
  "extent": {
    "spatial": [ -180.0, -89.9, 180, 89.9 ],
    "temporal": [ "2020-02-01T00:00:00Z/2020-02-12T00:00:00Z" ],
    "vertical": [ "2.0","10.0","80.0"]
  },
  "dataDetails": {
    "@context": {
      "@version": 1.1,
      "xsd": "http://www.w3.org/2001/XMLSchema#",
      "dc": "http://purl.org/dc/terms/",
      "dcam": "http://purl.org/dc/dcam/"
    }
  }
}

```

```

    },

    "dc:accessRights": {},
    "dc:source": {
        "dc:title": "datasource name",
        "dc:identifier" : "https://data.example.org/collection/gfs_time-
height_above_ground-lat-lon/link-for-more-details"
    },
    "dc:publisher" : "contact@example.org",
    "dcam:domainIncludes":
["appparent_temperature_height_above_ground", "dewpoint_temperature_height_above_g
round", "relative_humidity_height_above_ground"]

    },
    "supportedQueryTypes": {"point", "polygon", "cube", "trajectory"}
    "links": [
        { "href": "http://data.example.org/collections/gfs_time-
height_above_ground-lat-lon",
          "rel": "instances", "type": "application/json",
          "title": "Instances of the gfs_time-height_above_ground-lat-lon
collection" },
        { "href": "http://data.example.org/collections/gfs_time-
height_above_ground-lat-lon?outputFormat=html",
          "rel": "instances", "type": "text/html",
          "title": "Instances of the gfs_time-height_above_ground-lat-lon
collection" },
        { "href": "https://data.example.org/collection/gfs_time-
height_above_ground-lat-lon/licence-doc",
          "rel": "licence", "type": "text/html",
          "title": "Licence for the gfs_time-height_above_ground-lat-lon
collection" }
    ]
},
{
    "id": "dem",
    "title": "DEM",
    "description": "Global Digital Elevation Model height data",
    "extent": {
        "spatial": [ -180.0, -89.9, 180, 89.9 ]
    },
    "dataDetails": {
        "@context": {
            "@version": 1.1,
            "xsd": "http://www.w3.org/2001/XMLSchema#",
            "dc": "http://purl.org/dc/terms/",
            "dcam": "http://purl.org/dc/dcam/"
        },

        "dc:accessRights": {},
        "dc:source": {
            "dc:title": "datasource name",

```

```

        "dc:identifier" : "https://data.example.org/collection/dem/link-for-
more-details"
      },
      "dc:publisher" : "contact@example.org",
      "dcam:domainIncludes": ["height"]

    },
    "supportedQueryTypes": {"point","polygon","trajectory"}
    "links": [
      { "href": "http://data.example.org/collections/dem",
        "rel": "instances", "type": "application/json",
        "title": "Instances of the dem collection" },
      { "href": "http://data.example.org/collections/dem?outputFormat=html",
        "rel": "instances", "type": "text/html",
        "title": "Instances of the dem collection" },
      { "href": "https://data.example.org/collection/dem/licence-doc",
        "rel": "licence", "type": "text/html",
        "title": "Licence for the dem collection" }
    ]
  }
]
}

```

## B.5. Collection Instance Metadata Examples

### Example 31. Collection instance metadata response document

This collection metadata example response in JSON lists the available instances for the gfs\_time-height\_above\_ground-lat-lon gfs collection. It includes links to the collection resource in all formats that are supported by the API (link relation type: "items").

There is a link to the feature collections response itself (link relation type: "self").

Representations of this resource in other formats are referenced using link relation type "alternate".

An additional link is to a GML application schema for the dataset - using:https://www.iana.org/assignments/link-relations/link-relations.xhtml[link relation type] "describedBy".

A bulk download of all the features in the dataset is referenced using link relation type "enclosure"

Finally there are also links to the license information for the building data (using:https://www.iana.org/assignments/link-relations/link-relations.xhtml[link relation type] "license").

Reference system information is not provided as the service provides geometries only in the default system (spatial: WGS 84 longitude/latitude; temporal: Gregorian calendar).

```
{
  "links": [
    { "href": "http://data.example.org/collections.json",
      "rel": "self", "type": "application/json", "title": "this document" },
    { "href": "http://data.example.org/collections.html",
      "rel": "alternate", "type": "text/html", "title": "this document as HTML" },
    { "href": "http://schemas.example.org/1.0/foobar.xsd",
      "rel": "describedBy", "type": "application/xml", "title": "XML schema for
Acme Corporation data" }
  ],
  "instances": [
    {
      "id": "latest",
      "title": "Latest",
      "description": "GFS parameters based on heights above ground level from the
latest model run",
      "extent": {
        "spatial": [ -180.0, -89.9, 180, 89.9 ],
        "temporal": [ "2020-02-01T12:00:00Z/2020-02-12T00:00:00Z" ],
        "vertical": [ "2.0", "10.0", "80.0" ]
      },
      "dataDetails": {
        "@context": {
          "@version": 1.1,
          "xsd": "http://www.w3.org/2001/XMLSchema#"
        }
      }
    }
  ]
}
```

```

        "dc": "http://purl.org/dc/terms/",
        "dcam": "http://purl.org/dc/dcam/"
    },

    "dc:accessRights": {},
    "dcam:domainIncludes":
["appparent_temperature_height_above_ground", "dewpoint_temperature_height_above_ground", "relative_humidity_height_above_ground"]

    },
    "itemType": "Grid",
    "links": [
        { "href": "http://data.example.org/collections/gfs_time-height_above_ground-lat-lon/latest",
          "rel": "metadata", "type": "application/json",
          "title": "Metadata for the the gfs_time-height_above_ground-lat-lon latest run instance of the collection" },
        { "href": "http://data.example.org/collections/gfs_time-height_above_ground-lat-lon/latest?outputFormat=html",
          "rel": "metadata", "type": "text/html",
          "title": "Metadata for the the gfs_time-height_above_ground-lat-lon latest run instance of the collection" },
        { "href": "https://data.example.org/collection/gfs_time-height_above_ground-lat-lon/link-for-more-details",
          "rel": "source", "type": "application/json",
          "title": "Further information about the gfs_time-height_above_ground-lat-lon latest run instance of the collection" },
        { "href": "https://data.example.org/collection/gfs_time-height_above_ground-lat-lon/link-for-publisher-details",
          "rel": "publisher", "type": "application/json",
          "title": "Further information about the data publisher" },
        { "href": "http://data.example.org/collections/gfs_time-height_above_ground-lat-lon/point",
          "rel": "point", "type": "application/json",
          "title": "Point query for the the gfs_time-height_above_ground-lat-lon latest run instance of the collection" },
        { "href": "http://data.example.org/collections/gfs_time-height_above_ground-lat-lon/polygon",
          "rel": "polygon", "type": "application/json",
          "title": "Polygon query for the gfs_time-height_above_ground-lat-lon latest run instance of the collection" },
        { "href": "http://data.example.org/collections/gfs_time-height_above_ground-lat-lon/trajectory",
          "rel": "trajectory", "type": "application/json",
          "title": "Trajectory query for the gfs_time-height_above_ground-lat-lon latest run instance of the collection" },
        { "href": "https://data.example.org/collection/gfs_time-height_above_ground-lat-lon/licence-doc",
          "rel": "licence", "type": "text/html",
          "title": "Licence for the the gfs_time-height_above_ground-lat-lon latest run instance of the collection" }
    ]

```

```

    ],
    {
      "id": "2020-02-01T12:00:00Z",
      "title": "2020-02-01T12:00:00Z",
      "description": "GFS parameters based on heights above ground level from the
2020-02-01T12:00:00Z run",
      "extent": {
        "spatial": [ -180.0, -89.9, 180, 89.9 ],
        "temporal": [ "2020-02-01T12:00:00Z/2020-02-12T00:00:00Z" ],
        "vertical": [ "2.0", "10.0", "80.0" ]
      },
      "dataDetails": {
        "@context": {
          "@version": 1.1,
          "xsd": "http://www.w3.org/2001/XMLSchema#",
          "dc": "http://purl.org/dc/terms/",
          "dcam": "http://purl.org/dc/dcam/"
        },
        "dc:accessRights": {},
        "dc:source": {
          "dc:title": "datasource name",
          "dc:identifier" : "https://data.example.org/collection/gfs_time-
height_above_ground-lat-lon/link-for-more-details"
        },
        "dc:publisher" : "contact@example.org",
        "dcam:domainIncludes":
[ "apparent_temperature_height_above_ground", "dewpoint_temperature_height_above_g
round", "relative_humidity_height_above_ground" ]
      },
      "supportedQueryTypes": { "point", "polygon", "cube", "trajectory" }
      "links": [
        { "href": "http://data.example.org/collections/gfs_time-
height_above_ground-lat-lon/2020-02-01T12:00:00Z",
          "rel": "Metadata", "type": "application/json",
          "title": "Metadata for the 2020-02-01T12:00:00Z run" },
        { "href": "http://data.example.org/collections/gfs_time-
height_above_ground-lat-lon/2020-02-01T12:00:00Z?outputFormat=html",
          "rel": "instances", "type": "text/html",
          "title": "Metadata for the 2020-02-01T12:00:00Z run" },
        { "href": "https://data.example.org/collection/gfs_time-
height_above_ground-lat-lon/licence-doc",
          "rel": "licence", "type": "text/html",
          "title": "Licence for the 2020-02-01T12:00:00Z run" }
      ]
    },
    {
      "id": "2020-02-01T00:00:00Z",
      "title": "2020-02-01T00:00:00Z",

```

```

    "description": "GFS parameters based on heights above ground level from the
2020-02-01T00:00:00Z run",
    "extent": {
      "spatial": [ -180.0, -89.9, 180, 89.9 ],
      "temporal": [ "2020-02-01T00:00:00Z/2020-02-11T12:00:00Z" ],
      "vertical": [ "2.0", "10.0", "80.0" ]
    },
    "dataDetails": {
      "@context": {
        "@version": 1.1,
        "xsd": "http://www.w3.org/2001/XMLSchema#",
        "dc": "http://purl.org/dc/terms/",
        "dcam": "http://purl.org/dc/dcam/"
      },

      "dc:accessRights": {},
      "dc:source": {
        "dc:title": "datasource name",
        "dc:identifier" : "https://data.example.org/collection/gfs_time-
height_above_ground-lat-lon/link-for-more-details"
      },
      "dc:publisher" : "contact@example.org",
      "dcam:domainIncludes":
[ "apparent_temperature_height_above_ground", "dewpoint_temperature_height_above_g-
round", "relative_humidity_height_above_ground" ]

    },
    "supportedQueryTypes": { "point", "polygon", "cube", "trajectory" }
    "links": [
      { "href": "http://data.example.org/collections/gfs_time-
height_above_ground-lat-lon/2020-02-01T00:00:00Z",
        "rel": "instances", "type": "application/json",
        "title": "Metadata for the 2020-02-01T00:00:00Z run" },
      { "href": "http://data.example.org/collections/gfs_time-
height_above_ground-lat-lon/2020-02-01T00:00:00Z?outputFormat=html",
        "rel": "instances", "type": "text/html",
        "title": "Metadata for the 2020-02-01T00:00:00Z run" },
      { "href": "https://data.example.org/collection/gfs_time-
height_above_ground-lat-lon/licence-doc",
        "rel": "licence", "type": "text/html",
        "title": "Licence for the 2020-02-01T00:00:00Z run" }
    ]
  }
]
}

```

### Example 32. Collection instance metadata response document

This collection metadata example response in JSON lists the available instances for the Metar collection. It includes links to the collection resource in all formats that are supported by the API ([link relation type](#): "items").

There is a link to the feature collections response itself ([link relation type](#): "self").

Representations of this resource in other formats are referenced using [link relation type](#) "alternate".

An additional link is to a GML application schema for the dataset - using: <https://www.iana.org/assignments/link-relations/link-relations.xhtml> [[link relation type](#) "describedBy"].

A bulk download of all the features in the dataset is referenced using [link relation type](#) "enclosure".

Finally there are also links to the license information for the building data (using: <https://www.iana.org/assignments/link-relations/link-relations.xhtml> [[link relation type](#) "license"]).

Reference system information is not provided as the service provides geometries only in the default system (spatial: WGS 84 longitude/latitude; temporal: Gregorian calendar).

```
{
  "links": [
    { "href": "http://data.example.org/collections.json",
      "rel": "self", "type": "application/json", "title": "this document" },
    { "href": "http://data.example.org/collections.html",
      "rel": "alternate", "type": "text/html", "title": "this document as HTML" },
    { "href": "http://schemas.example.org/1.0/foobar.xsd",
      "rel": "describedBy", "type": "application/xml", "title": "XML schema for
Acme Corporation data" }
  ],
  "instances": [
    {
      "id": "raw",
      "title": "Raw",
      "description": "Raw Metar observations",
      "extent": {
        "spatial": [ -180.0, -89.9, 180, 89.9 ],
        "temporal": [ "2020-01-30T12:00:00Z/2020-01-13T11:00:00Z" ]
      },
      "dataDetails": {
        "@context": {
          "@version": 1.1,
          "xsd": "http://www.w3.org/2001/XMLSchema#",
          "dc": "http://purl.org/dc/terms/",
          "dcam": "http://purl.org/dc/dcam/"
        }
      }
    }
  ]
}
```



```

    },

    "dc:accessRights": {},
    "dcam:domainIncludes":
["temperature","wind_speed","wind_direction","maximum_wind_gust_speed","speci_visi
bility","pressure","pressure_msl","raw_observation","id"]

    },
    "links": [
      { "href": "http://data.example.org/collections/metars/raw",
        "rel": "metadata", "type": "application/json",
        "title": "Metadata for Raw Metar data" },
      { "href":
"http://data.example.org/collections/metars/raw?outputFormat=html",
        "rel": "instances", "type": "text/html",
        "title": "Metadata for Raw Metar data" },
      { "href": "https://data.example.org/collection/metar/licence-doc",
        "rel": "licence", "type": "text/html",
        "title": "Licence for Raw Metar data" },
      { "href": "https://data.example.org/collection/metar/link-for-more-
details",
        "rel": "source", "type": "application/json",
        "title": "Further information about the Metar data" },
      { "href": "https://data.example.org/collection/metar/link-for-publisher-
details",
        "rel": "publisher", "type": "application/json",
        "title": "Further information about the data publisher" },
      { "href": "http://data.example.org/collections/metars/point",
        "rel": "point", "type": "application/json",
        "title": "Point query for the Metar collection" }
    ]
  },
  {
    "id": "initial_qc",
    "title": "Intial QC",
    "description": "First pass of Quality Control processed Metar observations",
    "extent": {
      "spatial": [ -180.0, -89.9, 180, 89.9 ],
      "temporal": [ "2020-01-30T12:00:00Z/2020-01-13T11:00:00Z" ]
    },
    "dataDetails": {
      "@context": {
        "@version": 1.1,
        "xsd": "http://www.w3.org/2001/XMLSchema#",
        "dc": "http://purl.org/dc/terms/",
        "dcam": "http://purl.org/dc/dcam/"
      },

      "dc:accessRights": {},
      "dc:license": "https://data.example.org/collection/metar/licence-doc",
      "dc:source": {

```

```

        "dc:title": "datasource name",
        "dc:identifier" : "https://data.example.org/collection/metar/link-
for-more-details"
    },
    "dc:publisher" : "contact@example.org",
    "dcam:domainIncludes":
["temperature", "wind_speed", "wind_direction", "maximum_wind_gust_speed", "speci_visi
bility", "pressure", "pressure_msl", "raw_observation", "id"]

    },
    "itemType": "PointSeries",
    "supportedQueryTypes": {"point"},
    "links": [
        { "href": "http://data.example.org/collections/metars/initial_qc",
          "rel": "metadata", "type": "application/json",
          "title": "Metadata for QC'd Metar data" },
        { "href":
"http://data.example.org/collections/metars/initial_qc?outputFormat=html",
          "rel": "instances", "type": "text/html",
          "title": "Metadata for Qc'd Metar data" }
    ]
}
]
}

```

### Example 33. Collection metadata response document

This collection metadata example response in JSON lists the available instances of the DEM collection. It includes links to the collection resource in all formats that are supported by the API ([link relation type](#): "items").

There is a link to the feature collections response itself ([link relation type](#): "self").

Representations of this resource in other formats are referenced using [link relation type](#) "alternate".

An additional link is to a GML application schema for the dataset - using: <https://www.iana.org/assignments/link-relations/link-relations.xhtml> [[link relation type](#) "describedBy"].

A bulk download of all the features in the dataset is referenced using [link relation type](#) "enclosure"

Finally there are also links to the license information for the building data (using: <https://www.iana.org/assignments/link-relations/link-relations.xhtml> [[link relation type](#) "license"]).

Reference system information is not provided as the service provides geometries only in the default system (spatial: WGS 84 longitude/latitude; temporal: Gregorian calendar).

```
{
  "links": [
    { "href": "http://data.example.org/collections.json",
      "rel": "self", "type": "application/json", "title": "this document" },
    { "href": "http://data.example.org/collections.html",
      "rel": "alternate", "type": "text/html", "title": "this document as HTML" },
    { "href": "http://schemas.example.org/1.0/foobar.xsd",
      "rel": "describedBy", "type": "application/xml", "title": "XML schema for
Acme Corporation data" }
  ],
  "instances": [
    {
      "id": "data",
      "title": "data",
      "description": "Global Digital Elevation Model height data",
      "extent": {
        "spatial": [ -180.0, -89.9, 180, 89.9 ]
      },
      "dataDetails": {
        "@context": {
          "@version": 1.1,
          "xsd": "http://www.w3.org/2001/XMLSchema#",
          "dc": "http://purl.org/dc/terms/",
          "dcam": "http://purl.org/dc/dcam/"
        },
      },
    }
  ]
}
```

```

        "dc:accessRights": {},
        "dcam:domainIncludes": ["height"]
    },
    "itemType": "Grid",
    "links": [
        { "href": "http://data.example.org/collections/dem/data",
          "rel": "metadata", "type": "application/json",
          "title": "Metadata for the dem collection" },
        { "href": "https://data.example.org/collection/dem/link-for-more-details",
          "rel": "source", "type": "application/json",
          "title": "Further information about the DEM data" },
        { "href": "https://data.example.org/collection/dem/link-for-publisher-
details",
          "rel": "publisher", "type": "application/json",
          "title": "Further information about the data publisher" },
        { "href": "http://data.example.org/collections/dem/point",
          "rel": "point", "type": "application/json",
          "title": "Point query for the DEM collection" },
        { "href": "http://data.example.org/collections/dem/polygon",
          "rel": "polygon", "type": "application/json",
          "title": "Polygon query for the DEM collection" },
        { "href":
"http://data.example.org/collections/dem/data?outputFormat=html",
          "rel": "metadata", "type": "text/html",
          "title": "Metadata for the dem collection" },
        { "href": "https://data.example.org/collection/dem/licence-doc",
          "rel": "licence", "type": "text/html",
          "title": "Licence for the dem collection" }
    ]
}
]
}

```

## B.6. Collection Query Metadata Examples

#### Example 34. Collection instance metadata response document

This metadata example response in JSON is for a the latest instance of the fs\_time-height\_above\_ground-lat-lon collection. It includes links to the collection resource in all formats that are supported by the API (link relation type: "items").

There is a link to the feature collections response itself (link relation type: "self").

Representations of this resource in other formats are referenced using link relation type "alternate".

An additional link is to a GML application schema for the dataset - using:https://www.iana.org/assignments/link-relations/link-relations.xhtml[link relation type] "describedBy".

A bulk download of all the features in the dataset is referenced using link relation type "enclosure"

Finally there are also links to the license information for the building data (using:https://www.iana.org/assignments/link-relations/link-relations.xhtml[link relation type] "license").

Reference system information is not provided as the service provides geometries only in the default system (spatial: WGS 84 longitude/latitude; temporal: Gregorian calendar).

```
{
  "links": [
    {
      "href": "http://data.example.org/collections/gfs_025_time-
height_above_ground-lat-lon/latest?outputFormat=application%2Fjson",
      "rel": "self",
      "type": "application/json",
      "title": "latest document as json"
    },
    {
      "href": "http://data.example.org/collections/gfs_025_time-
height_above_ground-lat-lon/latest?outputFormat=application%2Fyaml",
      "rel": "alternate",
      "type": "application/x-yaml",
      "title": "latest document as yaml"
    },
    {
      "href": "http://data.example.org/collections/gfs_025_time-
height_above_ground-lat-lon/latest?outputFormat=text%2Fxml",
      "rel": "alternate",
      "type": "text/xml",
      "title": "latest document as xml"
    },
    {
      "href": "http://data.example.org/collections/gfs_025_time-
```

```

height_above_ground-lat-lon/latest?outputFormat=text%2Fhtml",
  "rel": "alternate",
  "type": "text/html",
  "title": "latest document as html"
},
{
  "href": "http://data.example.org/collections/gfs_025_time-
height_above_ground-lat-lon/latest/point",
  "rel": "self",
  "type": "point",
  "title": "Point query",
  "self": "Point"
},
{
  "href": "http://data.example.org/collections/gfs_025_time-
height_above_ground-lat-lon/latest/polygon",
  "rel": "self",
  "type": "polygon",
  "title": "Polygon query",
  "self": "Polygon"
}
],
"id": "gfs_time-height_above_ground-lat-lon-latest",
"title": "Latest Global Forecast System (GFS) time height_above_ground lat lon",
"description": "Lates Global Forecast System (GFS) Model Global 0.25 degree Data
time height_above_ground lat lon",
"parameters": {
  "Apparent_temperature_height_above_ground": {
    "description": {
      "en": "Apparent_temperature_height_above_ground"
    },
    "unit": {
      "label": {
        "en": "kelvin"
      },
      "symbol": {
        "value": "K",
        "type": "http://data.example.org/metadata/uom/UCUM/K"
      }
    },
    "observedProperty": {
      "id": "http://data.example.org/metadata/grib2/codeflag/4.2-0-0-21",
      "label": {
        "en": "Apparent_temperature_height_above_ground"
      }
    },
    "measurementType": {
      "method": "instantaneous"
    },
    "extent": {
      "horizontal": {

```

```

    "name": [
      "longitude",
      "latutude"
    ],
    "coordinates": [
      "x",
      "y"
    ],
    "geographic": "BB0X[359.875,90.125,-0.125,-90.125]"
  },
  "vertical": {
    "name": [
      "height_above_ground"
    ],
    "coordinates": [
      "z"
    ],
    "range": [
      "2.0"
    ]
  },
  "temporal": {
    "name": [
      "time"
    ],
    "coordinates": [
      "time"
    ],
    "range": [
      "2020-02-02T00:00:00Z",
      "2020-02-02T03:00:00Z",
      "2020-02-02T06:00:00Z",
      "2020-02-02T09:00:00Z",
      "2020-02-02T12:00:00Z",
      "2020-02-02T15:00:00Z",
      "2020-02-02T18:00:00Z",
      "2020-02-02T21:00:00Z",
      "2020-02-03T00:00:00Z",
      "2020-02-03T03:00:00Z",
      "2020-02-03T06:00:00Z",
      "2020-02-03T09:00:00Z",
      "2020-02-03T12:00:00Z",
      "2020-02-03T15:00:00Z",
      "2020-02-03T18:00:00Z",
      "2020-02-03T21:00:00Z",
      "2020-02-04T00:00:00Z",
      "2020-02-04T03:00:00Z",
      "2020-02-04T06:00:00Z",
      "2020-02-04T09:00:00Z",
      "2020-02-04T12:00:00Z",
      "2020-02-04T15:00:00Z",

```

"2020-02-04T18:00:00Z",  
"2020-02-04T21:00:00Z",  
"2020-02-05T00:00:00Z",  
"2020-02-05T03:00:00Z",  
"2020-02-05T06:00:00Z",  
"2020-02-05T09:00:00Z",  
"2020-02-05T12:00:00Z",  
"2020-02-05T15:00:00Z",  
"2020-02-05T18:00:00Z",  
"2020-02-05T21:00:00Z",  
"2020-02-06T00:00:00Z",  
"2020-02-06T03:00:00Z",  
"2020-02-06T06:00:00Z",  
"2020-02-06T09:00:00Z",  
"2020-02-06T12:00:00Z",  
"2020-02-06T15:00:00Z",  
"2020-02-06T18:00:00Z",  
"2020-02-06T21:00:00Z",  
"2020-02-07T00:00:00Z",  
"2020-02-07T03:00:00Z",  
"2020-02-07T06:00:00Z",  
"2020-02-07T09:00:00Z",  
"2020-02-07T12:00:00Z",  
"2020-02-07T15:00:00Z",  
"2020-02-07T18:00:00Z",  
"2020-02-07T21:00:00Z",  
"2020-02-08T00:00:00Z",  
"2020-02-08T03:00:00Z",  
"2020-02-08T06:00:00Z",  
"2020-02-08T09:00:00Z",  
"2020-02-08T12:00:00Z",  
"2020-02-08T15:00:00Z",  
"2020-02-08T18:00:00Z",  
"2020-02-08T21:00:00Z",  
"2020-02-09T00:00:00Z",  
"2020-02-09T03:00:00Z",  
"2020-02-09T06:00:00Z",  
"2020-02-09T09:00:00Z",  
"2020-02-09T12:00:00Z",  
"2020-02-09T15:00:00Z",  
"2020-02-09T18:00:00Z",  
"2020-02-09T21:00:00Z",  
"2020-02-10T00:00:00Z",  
"2020-02-10T03:00:00Z",  
"2020-02-10T06:00:00Z",  
"2020-02-10T09:00:00Z",  
"2020-02-10T12:00:00Z",  
"2020-02-10T15:00:00Z",  
"2020-02-10T18:00:00Z",  
"2020-02-10T21:00:00Z",  
"2020-02-11T00:00:00Z",



```

        "2020-02-11T03:00:00Z",
        "2020-02-11T06:00:00Z",
        "2020-02-11T09:00:00Z",
        "2020-02-11T12:00:00Z",
        "2020-02-11T15:00:00Z",
        "2020-02-11T18:00:00Z",
        "2020-02-11T21:00:00Z",
        "2020-02-12T00:00:00Z",
        "2020-02-12T12:00:00Z",
        "2020-02-13T00:00:00Z",
        "2020-02-13T12:00:00Z",
        "2020-02-14T00:00:00Z",
        "2020-02-14T12:00:00Z",
        "2020-02-15T00:00:00Z",
        "2020-02-15T12:00:00Z",
        "2020-02-16T00:00:00Z",
        "2020-02-16T12:00:00Z",
        "2020-02-17T00:00:00Z",
        "2020-02-17T12:00:00Z",
        "2020-02-18T00:00:00Z"
    ]
}
},
"Dewpoint_temperature_height_above_ground": {
    "description": {
        "en": "Dewpoint_temperature_height_above_ground"
    },
    "unit": {
        "label": {
            "en": "kelvin"
        },
        "symbol": {
            "value": "K",
            "type": "http://data.example.org/metadata/uom/UCUM/K"
        }
    },
    "observedProperty": {
        "id": "http://data.example.org/metadata/grib2/codeflag/4.2-0-0-6",
        "label": {
            "en": "Dewpoint_temperature_height_above_ground"
        }
    },
    "measurementType": {
        "method": "instantaneous"
    },
    "extent": {
        "horizontal": {
            "name": [
                "longitude",
                "latitude"
            ]
        }
    }
}

```

```

    ],
    "coordinates": [
        "x",
        "y"
    ],
    "geographic": "BBOX[359.875,90.125,-0.125,-90.125]"
},
"vertical": {
    "name": [
        "height_above_ground"
    ],
    "coordinates": [
        "z"
    ],
    "range": [
        "2.0"
    ]
},
"temporal": {
    "name": [
        "time"
    ],
    "coordinates": [
        "time"
    ],
    "range": [
        "2020-02-02T00:00:00Z",
        "2020-02-02T03:00:00Z",
        "2020-02-02T06:00:00Z",
        "2020-02-02T09:00:00Z",
        "2020-02-02T12:00:00Z",
        "2020-02-02T15:00:00Z",
        "2020-02-02T18:00:00Z",
        "2020-02-02T21:00:00Z",
        "2020-02-03T00:00:00Z",
        "2020-02-03T03:00:00Z",
        "2020-02-03T06:00:00Z",
        "2020-02-03T09:00:00Z",
        "2020-02-03T12:00:00Z",
        "2020-02-03T15:00:00Z",
        "2020-02-03T18:00:00Z",
        "2020-02-03T21:00:00Z",
        "2020-02-04T00:00:00Z",
        "2020-02-04T03:00:00Z",
        "2020-02-04T06:00:00Z",
        "2020-02-04T09:00:00Z",
        "2020-02-04T12:00:00Z",
        "2020-02-04T15:00:00Z",
        "2020-02-04T18:00:00Z",
        "2020-02-04T21:00:00Z",
        "2020-02-05T00:00:00Z",
    ]
}

```

"2020-02-05T03:00:00Z",  
"2020-02-05T06:00:00Z",  
"2020-02-05T09:00:00Z",  
"2020-02-05T12:00:00Z",  
"2020-02-05T15:00:00Z",  
"2020-02-05T18:00:00Z",  
"2020-02-05T21:00:00Z",  
"2020-02-06T00:00:00Z",  
"2020-02-06T03:00:00Z",  
"2020-02-06T06:00:00Z",  
"2020-02-06T09:00:00Z",  
"2020-02-06T12:00:00Z",  
"2020-02-06T15:00:00Z",  
"2020-02-06T18:00:00Z",  
"2020-02-06T21:00:00Z",  
"2020-02-07T00:00:00Z",  
"2020-02-07T03:00:00Z",  
"2020-02-07T06:00:00Z",  
"2020-02-07T09:00:00Z",  
"2020-02-07T12:00:00Z",  
"2020-02-07T15:00:00Z",  
"2020-02-07T18:00:00Z",  
"2020-02-07T21:00:00Z",  
"2020-02-08T00:00:00Z",  
"2020-02-08T03:00:00Z",  
"2020-02-08T06:00:00Z",  
"2020-02-08T09:00:00Z",  
"2020-02-08T12:00:00Z",  
"2020-02-08T15:00:00Z",  
"2020-02-08T18:00:00Z",  
"2020-02-08T21:00:00Z",  
"2020-02-09T00:00:00Z",  
"2020-02-09T03:00:00Z",  
"2020-02-09T06:00:00Z",  
"2020-02-09T09:00:00Z",  
"2020-02-09T12:00:00Z",  
"2020-02-09T15:00:00Z",  
"2020-02-09T18:00:00Z",  
"2020-02-09T21:00:00Z",  
"2020-02-10T00:00:00Z",  
"2020-02-10T03:00:00Z",  
"2020-02-10T06:00:00Z",  
"2020-02-10T09:00:00Z",  
"2020-02-10T12:00:00Z",  
"2020-02-10T15:00:00Z",  
"2020-02-10T18:00:00Z",  
"2020-02-10T21:00:00Z",  
"2020-02-11T00:00:00Z",  
"2020-02-11T03:00:00Z",  
"2020-02-11T06:00:00Z",  
"2020-02-11T09:00:00Z",

```

        "2020-02-11T12:00:00Z",
        "2020-02-11T15:00:00Z",
        "2020-02-11T18:00:00Z",
        "2020-02-11T21:00:00Z",
        "2020-02-12T00:00:00Z",
        "2020-02-12T12:00:00Z",
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        "2020-02-14T12:00:00Z",
        "2020-02-15T00:00:00Z",
        "2020-02-15T12:00:00Z",
        "2020-02-16T00:00:00Z",
        "2020-02-16T12:00:00Z",
        "2020-02-17T00:00:00Z",
        "2020-02-17T12:00:00Z",
        "2020-02-18T00:00:00Z"
    ]
}
},
"Relative_humidity_height_above_ground": {
    "description": {
        "en": "Relative_humidity_height_above_ground"
    },
    "unit": {
        "label": {
            "en": "percent"
        },
        "symbol": {
            "value": "%",
            "type": "http://data.example.org/metadata/uom/UCUM/%"
        }
    },
    "observedProperty": {
        "id": "http://data.example.org/metadata/grib2/codeflag/4.2-0-1-1",
        "label": {
            "en": "Relative_humidity_height_above_ground"
        }
    },
    "measurementType": {
        "method": "instantaneous"
    },
    "extent": {
        "horizontal": {
            "name": [
                "longitude",
                "latitude"
            ],
            "coordinates": [
                "x",

```

```

        "y"
    ],
    "geographic": "BBOX[359.875,90.125,-0.125,-90.125]"
},
"vertical": {
    "name": [
        "height_above_ground"
    ],
    "coordinates": [
        "z"
    ],
    "range": [
        "2.0"
    ]
},
"temporal": {
    "name": [
        "time"
    ],
    "coordinates": [
        "time"
    ],
    "range": [
        "2020-02-02T00:00:00Z",
        "2020-02-02T03:00:00Z",
        "2020-02-02T06:00:00Z",
        "2020-02-02T09:00:00Z",
        "2020-02-02T12:00:00Z",
        "2020-02-02T15:00:00Z",
        "2020-02-02T18:00:00Z",
        "2020-02-02T21:00:00Z",
        "2020-02-03T00:00:00Z",
        "2020-02-03T03:00:00Z",
        "2020-02-03T06:00:00Z",
        "2020-02-03T09:00:00Z",
        "2020-02-03T12:00:00Z",
        "2020-02-03T15:00:00Z",
        "2020-02-03T18:00:00Z",
        "2020-02-03T21:00:00Z",
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        "2020-02-17T12:00:00Z",
        "2020-02-18T00:00:00Z"
    ]
}
}
},
"outputCRS": [
{
    "id": "EPSG:4326",
    "wkt": "GEOGCS[\"WGS 84\", DATUM[\"WGS_1984\", SPHEROID[\"WGS
84\", 6378137, 298.257223563, AUTHORITY[\"EPSG\", \"7030\"]], AUTHORITY[\"EPSG\", \"6326
\"]], PRIMEM[\"Greenwich\", 0, AUTHORITY[\"EPSG\", \"8901\"]], UNIT[\"degree\", 0.017453
2925199433, AUTHORITY[\"EPSG\", \"9122\"]], AUTHORITY[\"EPSG\", \"4326\"]]"
}
],
"polygonQueryOptions": {
    "interpolationX": [
        "nearest_neighbour"
    ],
    "interpolationY": [
        "nearest_neighbour"
    ]
},
"pointQueryOptions": {
    "interpolation": [
        "nearest_neighbour"
    ]
},
"outputFormat": [
    "CoverageJSON"
],
"instanceAxes": {
    "x": {
        "label": "Longitude",
        "lowerBound": -180,
        "upperBound": 180,
        "uomLabel": "degrees"
    },

```

```

    "y": {
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      "lowerBound": -89.9,
      "upperBound": 89.9,
      "uomLabel": "degrees"
    },
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      "label": null,
      "lowerBound": 2,
      "upperBound": 2,
      "uomLabel": null
    },
    "t": {
      "label": "Time",
      "lowerBound": "2020-02-02T00:00:00Z",
      "upperBound": "2020-02-18T00:00:00Z",
      "uomLabel": "ISO8601"
    },
    "attributes": {
      "wkt": "GEOGCS[\"WGS 84\", DATUM[\"WGS_1984\", SPHEROID[\"WGS 84\", 6378137, 298.257223563, AUTHORITY[\"EPSG\", \"7030\"]], AUTHORITY[\"EPSG\", \"6326\"]], PRIMEM[\"Greenwich\", 0, AUTHORITY[\"EPSG\", \"8901\"]], UNIT[\"degree\", 0.017453 29251994328, AUTHORITY[\"EPSG\", \"9122\"]], AUTHORITY[\"EPSG\", \"4326\"]]",
      "proj4": "+proj=longlat +ellps=WGS84 +datum=WGS84 +no_defs"
    }
  },
  "name": "gfs_025_time-height_above_ground-lat-lon",
  "instance": "latest"
}

```



This metadata example response in JSON is for a the Raw instance of the "Metar" Collection. It includes links to the collection resource in all formats that are supported by the API ([link relation type](#): "items").

There is a link to the feature collections response itself ([link relation type](#): "self").

Representations of this resource in other formats are referenced using [link relation type](#) "alternate".

An additional link is to a GML application schema for the dataset - using: <https://www.iana.org/assignments/link-relations/link-relations.xhtml>[[link relation type](#)] "describedBy".

A bulk download of all the features in the dataset is referenced using [link relation type](#) "enclosure"

Finally there are also links to the license information for the building data (using: <https://www.iana.org/assignments/link-relations/link-relations.xhtml>[[link relation type](#)] "license").

Reference system information is not provided as the service provides geometries only in the default system (spatial: WGS 84 longitude/latitude; temporal: Gregorian calendar).

```
{
  "links": [
    {
      "href":
"http://data.example.org/collections/metar/raw?outputFormat=application%2Fjson",
      "rel": "self",
      "type": "application/json",
      "title": "raw document as json"
    },
    {
      "href":
"http://data.example.org/collections/metar/raw?outputFormat=application%2Fyaml",
      "rel": "alternate",
      "type": "application/x-yaml",
      "title": "raw document as yaml"
    },
    {
      "href":
"http://data.example.org/collections/metar/raw?outputFormat=text%2Fxml",
      "rel": "alternate",
      "type": "text/xml",
      "title": "raw document as xml"
    },
    {
      "href":
```

```

"http://data.example.org/collections/metar/raw?outputFormat=text%2Fhtml",
  "rel": "alternate",
  "type": "text/html",
  "title": "raw document as html"
},
{
  "href": "http://data.example.org/collections/metar/raw/point",
  "rel": "self",
  "type": "point",
  "title": "Point query",
  "self": "Point"
}
],
"id": "metar_raw",
"title": "Raw Metar observations",
"description": "Last 36 Hours of Global Raw Metar observations",
"parameters": {
  "air_temperature": {
    "description": {
      "en": "Temperature"
    },
    "unit": {
      "label": {
        "en": "degree Celsius"
      },
      "symbol": {
        "value": "°C",
        "type": "http://data.example.org/metadata/uom/UCUM/Cel"
      }
    },
    "observedProperty": {
      "id": "http://data.example.org/metadata/bufr4/d/307045-012023",
      "label": {
        "en": "Temperature"
      }
    },
    "measurementType": {
      "method": "instantaneous"
    },
    "extent": {
      "horizontal": {
        "name": [
          "longitude",
          "latitude"
        ],
        "coordinates": [
          "x",
          "y"
        ],
        "geographic": "BBOX[-180.0,-89.9,180.0,89.9]"
      },

```

```

    "temporal": {
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        "time"
      ],
      "coordinates": [
        "time"
      ],
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        "2020-02-01T04:00:00Z",
        "2020-02-01T05:00:00Z",
        "2020-02-01T06:00:00Z",
        "2020-02-01T07:00:00Z",
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      ]
    }
  },
  "dewpoint_temperature": {
    "description": {
      "en": "Dewpoint temperature"
    },
  },

```

```

"unit": {
  "label": {
    "en": "degree Celsius"
  },
  "symbol": {
    "value": "°C",
    "type": "http://data.example.org/metadata/uom/UCUM/Cel"
  }
},
"observedProperty": {
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    "en": "Dewpoint temperature"
  }
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  "method": "instantaneous"
},
"extent": {
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      "latitude"
    ],
    "coordinates": [
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      "y"
    ],
    "geographic": "BBBOX[-180.0,-89.9,180.0,89.9]"
  },
  "temporal": {
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    ],
    "coordinates": [
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}
},
"wind_speed": {
    "description": {
        "en": "Wind speed"
    },
    "unit": {
        "label": {
            "en": "unknown"
        },
        "symbol": {
            "value": "m/s",
            "type": ""
        }
    },
    "observedProperty": {
        "id": "http://data.example.org/metadata/bufr4/d/307045-011002",
        "label": {
            "en": "Wind speed"
        }
    },
    "measurementType": {
        "method": "mean",
        "period": "PT10M"
    },
    "extent": {
        "horizontal": {

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    "name": [
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    "coordinates": [
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      "y"
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    "geographic": "BBBOX[-180.0,-89.9,180.0,89.9]"
  },
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    ],
    "coordinates": [
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    ],
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        "2020-02-02T07:00:00Z",
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}
},
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    "description": {
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    },
    "unit": {
        "label": {
            "en": "unknown"
        },
        "symbol": {
            "value": "m/s",
            "type": ""
        }
    },
    "observedProperty": {
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        "label": {
            "en": "Maximum wind gust speed"
        }
    },
    "measurementType": {
        "method": "mean",
        "period": "PT10M"
    },
    "extent": {
        "horizontal": {
            "name": [
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                "latitude"
            ],
            "coordinates": [
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                "y"
            ],
            "geographic": "BBBOX[-180.0,-89.9,180.0,89.9]"
        },
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            ],
            "coordinates": [
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            "range": [
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    ]
}
},
"wind_from_direction": {
    "description": {
        "en": "Wind direction"
    },
    "unit": {
        "label": {
            "en": "unknown"
        },
        "symbol": {
            "value": "degree true",
            "type": ""
        }
    },
},
"observedProperty": {

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    "id": "http://data.example.org/metadata/bufr4/d/307045-011001",
    "label": {
      "en": "Wind direction"
    }
  },
  "measurementType": {
    "method": "mean",
    "period": "PT10M"
  },
  "extent": {
    "horizontal": {
      "name": [
        "longitude",
        "latitude"
      ],
      "coordinates": [
        "x",
        "y"
      ],
      "geographic": "BBOX[-180.0,-89.9,180.0,89.9]"
    },
    "temporal": {
      "name": [
        "time"
      ],
      "coordinates": [
        "time"
      ],
      "range": [
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        "2020-01-31T23:00:00Z",
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        "2020-02-01T17:00:00Z",
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        "2020-02-01T19:00:00Z",

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```

        "2020-02-01T20:00:00Z",
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        "2020-02-02T07:00:00Z",
        "2020-02-02T08:00:00Z"
    ]
}
},
"visibility": {
    "description": {
        "en": "METAR/SPECI visibility"
    },
    "unit": {
        "label": {
            "en": ""
        },
        "symbol": {
            "value": "",
            "type": ""
        }
    },
    "observedProperty": {
        "id": "http://data.example.org/metadata/bufr4/d/307051-307046",
        "label": {
            "en": "METAR/SPECI visibility"
        }
    },
    "measurementType": {
        "method": "instantaneous"
    },
    "extent": {
        "horizontal": {
            "name": [
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                "latitude"
            ],
            "coordinates": [
                "x",
                "y"
            ],
            "geographic": "BBBOX[-180.0,-89.9,180.0,89.9]"
        },
    },

```

```

    "temporal": {
      "name": [
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      ],
      "coordinates": [
        "time"
      ],
      "range": [
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        "2020-02-01T13:00:00Z",
        "2020-02-01T14:00:00Z",
        "2020-02-01T15:00:00Z",
        "2020-02-01T16:00:00Z",
        "2020-02-01T17:00:00Z",
        "2020-02-01T18:00:00Z",
        "2020-02-01T19:00:00Z",
        "2020-02-01T20:00:00Z",
        "2020-02-01T21:00:00Z",
        "2020-02-01T22:00:00Z",
        "2020-02-01T23:00:00Z",
        "2020-02-02T00:00:00Z",
        "2020-02-02T01:00:00Z",
        "2020-02-02T02:00:00Z",
        "2020-02-02T03:00:00Z",
        "2020-02-02T04:00:00Z",
        "2020-02-02T05:00:00Z",
        "2020-02-02T06:00:00Z",
        "2020-02-02T07:00:00Z",
        "2020-02-02T08:00:00Z"
      ]
    }
  },
  "pressure": {
    "description": {
      "en": "Pressure"
    },
  },

```

```

"unit": {
  "label": {
    "en": "pascal"
  },
  "symbol": {
    "value": "Pa",
    "type": "http://data.example.org/metadata/uom/UCUM/Pa"
  }
},
"observedProperty": {
  "id": "http://data.example.org/metadata/bufr4/d/302031-007004",
  "label": {
    "en": "Pressure"
  }
},
"measurementType": {
  "method": "instantaneous"
},
"extent": {
  "horizontal": {
    "name": [
      "longitude",
      "latitude"
    ],
    "coordinates": [
      "x",
      "y"
    ],
    "geographic": "BBOX[-180.0,-89.9,180.0,89.9]"
  },
  "temporal": {
    "name": [
      "time"
    ],
    "coordinates": [
      "time"
    ],
    "range": [
      "2020-01-31T22:00:00Z",
      "2020-01-31T23:00:00Z",
      "2020-02-01T00:00:00Z",
      "2020-02-01T01:00:00Z",
      "2020-02-01T02:00:00Z",
      "2020-02-01T03:00:00Z",
      "2020-02-01T04:00:00Z",
      "2020-02-01T05:00:00Z",
      "2020-02-01T06:00:00Z",
      "2020-02-01T07:00:00Z",
      "2020-02-01T08:00:00Z",
      "2020-02-01T09:00:00Z",
      "2020-02-01T10:00:00Z",

```

```

        "2020-02-01T11:00:00Z",
        "2020-02-01T12:00:00Z",
        "2020-02-01T13:00:00Z",
        "2020-02-01T14:00:00Z",
        "2020-02-01T15:00:00Z",
        "2020-02-01T16:00:00Z",
        "2020-02-01T17:00:00Z",
        "2020-02-01T18:00:00Z",
        "2020-02-01T19:00:00Z",
        "2020-02-01T20:00:00Z",
        "2020-02-01T21:00:00Z",
        "2020-02-01T22:00:00Z",
        "2020-02-01T23:00:00Z",
        "2020-02-02T00:00:00Z",
        "2020-02-02T01:00:00Z",
        "2020-02-02T02:00:00Z",
        "2020-02-02T03:00:00Z",
        "2020-02-02T04:00:00Z",
        "2020-02-02T05:00:00Z",
        "2020-02-02T06:00:00Z",
        "2020-02-02T07:00:00Z",
        "2020-02-02T08:00:00Z"
    ]
}
},
"msl_pressure": {
    "description": {
        "en": "Pressure reduced to mean sea level"
    },
    "unit": {
        "label": {
            "en": "pascal"
        },
        "symbol": {
            "value": "Pa",
            "type": "http://data.example.org/metadata/uom/UCUM/Pa"
        }
    },
    "observedProperty": {
        "id": "http://data.example.org/metadata/bufr4/d/302051-010051",
        "label": {
            "en": "Pressure reduced to mean sea level"
        }
    },
    "measurementType": {
        "method": "instantaneous"
    },
    "extent": {
        "horizontal": {
            "name": [

```

```

        "longitude",
        "latutude"
    ],
    "coordinates": [
        "x",
        "y"
    ],
    "geographic": "BBOX[-180.0,-89.9,180.0,89.9]"
},
"temporal": {
    "name": [
        "time"
    ],
    "coordinates": [
        "time"
    ],
    "range": [
        "2020-01-31T22:00:00Z",
        "2020-01-31T23:00:00Z",
        "2020-02-01T00:00:00Z",
        "2020-02-01T01:00:00Z",
        "2020-02-01T02:00:00Z",
        "2020-02-01T03:00:00Z",
        "2020-02-01T04:00:00Z",
        "2020-02-01T05:00:00Z",
        "2020-02-01T06:00:00Z",
        "2020-02-01T07:00:00Z",
        "2020-02-01T08:00:00Z",
        "2020-02-01T09:00:00Z",
        "2020-02-01T10:00:00Z",
        "2020-02-01T11:00:00Z",
        "2020-02-01T12:00:00Z",
        "2020-02-01T13:00:00Z",
        "2020-02-01T14:00:00Z",
        "2020-02-01T15:00:00Z",
        "2020-02-01T16:00:00Z",
        "2020-02-01T17:00:00Z",
        "2020-02-01T18:00:00Z",
        "2020-02-01T19:00:00Z",
        "2020-02-01T20:00:00Z",
        "2020-02-01T21:00:00Z",
        "2020-02-01T22:00:00Z",
        "2020-02-01T23:00:00Z",
        "2020-02-02T00:00:00Z",
        "2020-02-02T01:00:00Z",
        "2020-02-02T02:00:00Z",
        "2020-02-02T03:00:00Z",
        "2020-02-02T04:00:00Z",
        "2020-02-02T05:00:00Z",
        "2020-02-02T06:00:00Z",
        "2020-02-02T07:00:00Z",

```

```

        "2020-02-02T08:00:00Z"
    ]
}
},
"raw_ob": {
    "type": "Parameter",
    "description": {
        "en": "raw ob"
    },
    "unit": {
        "label": {
            "en": ""
        },
        "symbol": {
            "value": "",
            "type":
"https://www.wmo.int/pages/prog/www/WMOCodes/WMO306\_vI1/Publications/2014update/306\_vol\_I1\_2014\_en\_track.pdf"
        }
    },
    "observedProperty": {
        "id": "Raw Metar Observation",
        "label": {
            "en": "Raw Metar Observation"
        }
    },
    "measurementType": {
        "method": "instantaneous"
    },
    "extent": {
        "horizontal": {
            "name": [
                "longitude",
                "latutude"
            ],
            "coordinates": [
                "x",
                "y"
            ],
            "geographic": "BBOX[-180.0,-89.9,180.0,89.9]"
        },
        "temporal": {
            "name": [
                "time"
            ],
            "coordinates": [
                "time"
            ],
            "range": [
                "2020-01-31T22:00:00Z",

```

```

        "2020-01-31T23:00:00Z",
        "2020-02-01T00:00:00Z",
        "2020-02-01T01:00:00Z",
        "2020-02-01T02:00:00Z",
        "2020-02-01T03:00:00Z",
        "2020-02-01T04:00:00Z",
        "2020-02-01T05:00:00Z",
        "2020-02-01T06:00:00Z",
        "2020-02-01T07:00:00Z",
        "2020-02-01T08:00:00Z",
        "2020-02-01T09:00:00Z",
        "2020-02-01T10:00:00Z",
        "2020-02-01T11:00:00Z",
        "2020-02-01T12:00:00Z",
        "2020-02-01T13:00:00Z",
        "2020-02-01T14:00:00Z",
        "2020-02-01T15:00:00Z",
        "2020-02-01T16:00:00Z",
        "2020-02-01T17:00:00Z",
        "2020-02-01T18:00:00Z",
        "2020-02-01T19:00:00Z",
        "2020-02-01T20:00:00Z",
        "2020-02-01T21:00:00Z",
        "2020-02-01T22:00:00Z",
        "2020-02-01T23:00:00Z",
        "2020-02-02T00:00:00Z",
        "2020-02-02T01:00:00Z",
        "2020-02-02T02:00:00Z",
        "2020-02-02T03:00:00Z",
        "2020-02-02T04:00:00Z",
        "2020-02-02T05:00:00Z",
        "2020-02-02T06:00:00Z",
        "2020-02-02T07:00:00Z",
        "2020-02-02T08:00:00Z"
    ]
}
},
"icao_id": {
    "type": "Parameter",
    "description": {
        "en": "icao id"
    },
    "unit": {
        "label": {
            "en": ""
        },
        "symbol": {
            "value": "",
            "type": "https://en.wikipedia.org/wiki/ICAO_airport_code"
        }
    }
}

```



```

},
"observedProperty": {
  "id": "ICAO id",
  "label": {
    "en": "ICAO id"
  }
},
"measurementType": {
  "method": "instantaneous"
},
"extent": {
  "horizontal": {
    "name": [
      "longitude",
      "latutude"
    ],
    "coordinates": [
      "x",
      "y"
    ],
    "geographic": "BBOX[-180.0,-89.9,180.0,89.9]"
  },
  "temporal": {
    "name": [
      "time"
    ],
    "coordinates": [
      "time"
    ],
    "range": [
      "2020-01-31T22:00:00Z",
      "2020-01-31T23:00:00Z",
      "2020-02-01T00:00:00Z",
      "2020-02-01T01:00:00Z",
      "2020-02-01T02:00:00Z",
      "2020-02-01T03:00:00Z",
      "2020-02-01T04:00:00Z",
      "2020-02-01T05:00:00Z",
      "2020-02-01T06:00:00Z",
      "2020-02-01T07:00:00Z",
      "2020-02-01T08:00:00Z",
      "2020-02-01T09:00:00Z",
      "2020-02-01T10:00:00Z",
      "2020-02-01T11:00:00Z",
      "2020-02-01T12:00:00Z",
      "2020-02-01T13:00:00Z",
      "2020-02-01T14:00:00Z",
      "2020-02-01T15:00:00Z",
      "2020-02-01T16:00:00Z",
      "2020-02-01T17:00:00Z",
      "2020-02-01T18:00:00Z",

```

```

        "2020-02-01T19:00:00Z",
        "2020-02-01T20:00:00Z",
        "2020-02-01T21:00:00Z",
        "2020-02-01T22:00:00Z",
        "2020-02-01T23:00:00Z",
        "2020-02-02T00:00:00Z",
        "2020-02-02T01:00:00Z",
        "2020-02-02T02:00:00Z",
        "2020-02-02T03:00:00Z",
        "2020-02-02T04:00:00Z",
        "2020-02-02T05:00:00Z",
        "2020-02-02T06:00:00Z",
        "2020-02-02T07:00:00Z",
        "2020-02-02T08:00:00Z"
    ]
}
}
},
"outputCRS": [
{
    "id": "EPSG:4326",
    "wkt": "GEOGCS[\"WGS 84\", DATUM[\"WGS_1984\", SPHEROID[\"WGS
84\", 6378137, 298.257223563, AUTHORITY[\"EPSG\", \"7030\"]], AUTHORITY[\"EPSG\", \"6326
\"], PRIMEM[\"Greenwich\", 0, AUTHORITY[\"EPSG\", \"8901\"]], UNIT[\"degree\", 0.017453
2925199433, AUTHORITY[\"EPSG\", \"9122\"]], AUTHORITY[\"EPSG\", \"4326\"]]"
}
],
"polygonQueryOptions": {
    "interpolationX": [
        "nearest_neighbour"
    ],
    "interpolationY": [
        "nearest_neighbour"
    ]
},
"pointQueryOptions": {
    "interpolation": [
        "nearest_neighbour"
    ],
    "withinUnits": ["miles", "km"]
},
"outputFormat": [
    "CoverageJSON"
],
"instanceAxes": {
    "x": {
        "label": "Longitude",
        "lowerBound": -180,
        "upperBound": 180,
        "uomLabel": "degrees"
    }
}
}
}

```

```

    },
    "y": {
      "label": "Latitude",
      "lowerBound": -89.9,
      "upperBound": 89.9,
      "uomLabel": "degrees"
    },
    "attributes": {
      "wkt": "GEOGCS[\"WGS 84\",DATUM[\"WGS_1984\",SPHEROID[\"WGS 84\",6378137,298.257223563,AUTHORITY[\"EPSG\", \"7030\"]],AUTHORITY[\"EPSG\", \"6326\"]],PRIMEM[\"Greenwich\",0,AUTHORITY[\"EPSG\", \"8901\"]],UNIT[\"degree\",0.01745329251994328,AUTHORITY[\"EPSG\", \"9122\"]],AUTHORITY[\"EPSG\", \"4326\"]]",
      "proj4": "+proj=longlat +ellps=WGS84 +datum=WGS84 +no_defs"
    }
  },
  "name": "metar",
  "instance": "raw"
}

```

*Example 36. Collection instance metadata response document*

This metadata example response in JSON is for a the data instance of the "DEM" Collection. It includes links to the collection resource in all formats that are supported by the API ([link relation type](#): "items").

There is a link to the feature collections response itself ([link relation type](#): "self").

Representations of this resource in other formats are referenced using [link relation type](#) "alternate".

An additional link is to a GML application schema for the dataset - using: <https://www.iana.org/assignments/link-relations/link-relations.xhtml>[[link relation type](#)] "describedBy".

A bulk download of all the features in the dataset is referenced using [link relation type](#) "enclosure"

Finally there are also links to the license information for the building data (using: <https://www.iana.org/assignments/link-relations/link-relations.xhtml>[[link relation type](#)] "license").

Reference system information is not provided as the service provides geometries only in the default system (spatial: WGS 84 longitude/latitude; temporal: Gregorian calendar).

```
{
  "links": [
    {
      "href":
"http://data.example.org/collections/dem/data?outputFormat=application%2Fjson",
      "rel": "self",
      "type": "application/json",
      "title": "data document as json"
    },
    {
      "href":
"http://data.example.org/collections/dem/data?outputFormat=application%2Fyaml",
      "rel": "alternate",
      "type": "application/x-yaml",
      "title": "data document as yaml"
    },
    {
      "href":
"http://data.example.org/collections/dem/data?outputFormat=text%2Fxml",
      "rel": "alternate",
      "type": "text/xml",
      "title": "data document as xml"
    },
    {
      "href":
```

```

"http://data.example.org/collections/dem/data?outputFormat=text%2Fhtml",
  "rel": "alternate",
  "type": "text/html",
  "title": "data document as html"
},
{
  "href": "http://data.example.org/collections/dem/data/point",
  "rel": "self",
  "type": "point",
  "title": "Point query",
  "self": "Point"
}
],
"id": "dem_data",
"title": "DEM height values",
"description": "DEM height values",
"parameters": {
  "height": {
    "description": {
      "en": "Height"
    },
    "unit": {
      "label": {
        "en": "m"
      },
      "symbol": {
        "value": "m",
        "type": "http://data.example.org/metadata/uom/UCUM/m"
      }
    },
    "observedProperty": {
      "id": "",
      "label": {
        "en": ""
      }
    }
  },
  "extent": {
    "horizontal": {
      "name": [
        "longitude",
        "latitude"
      ],
      "coordinates": [
        "x",
        "y"
      ],
      "geographic": "BBBOX[-180.0,-89.9,180.0,89.9]"
    }
  }
}
},

```

```

"outputCRS": [
  {
    "id": "EPSG:4326",
    "wkt": "GEOGCS[\"WGS 84\", DATUM[\"WGS_1984\", SPHEROID[\"WGS
84\", 6378137, 298.257223563, AUTHORITY[\"EPSG\", \"7030\"]], AUTHORITY[\"EPSG\", \"6326
\"]], PRIMEM[\"Greenwich\", 0, AUTHORITY[\"EPSG\", \"8901\"]], UNIT[\"degree\", 0.017453
2925199433, AUTHORITY[\"EPSG\", \"9122\"]], AUTHORITY[\"EPSG\", \"4326\"]]"
  }
],
"polygonQueryOptions": {
  "interpolationX": [
    "nearest_neighbour"
  ],
  "interpolationY": [
    "nearest_neighbour"
  ]
},
"pointQueryOptions": {
  "interpolation": [
    "nearest_neighbour"
  ],
  "withinUnits": ["miles", "km"]
},
"outputFormat": [
  "CoverageJSON"
],
"instanceAxes": {
  "x": {
    "label": "Longitude",
    "lowerBound": -180,
    "upperBound": 180,
    "uomLabel": "degrees"
  },
  "y": {
    "label": "Latitude",
    "lowerBound": -89.9,
    "upperBound": 89.9,
    "uomLabel": "degrees"
  },
  "attributes": {
    "wkt": "GEOGCS[\"WGS 84\", DATUM[\"WGS_1984\", SPHEROID[\"WGS
84\", 6378137, 298.257223563, AUTHORITY[\"EPSG\", \"7030\"]], AUTHORITY[\"EPSG\", \"6326
\"]], PRIMEM[\"Greenwich\", 0, AUTHORITY[\"EPSG\", \"8901\"]], UNIT[\"degree\", 0.017453
29251994328, AUTHORITY[\"EPSG\", \"9122\"]], AUTHORITY[\"EPSG\", \"4326\"]]",
    "proj4": "+proj=longlat +ellps=WGS84 +datum=WGS84 +no_defs"
  }
},
"name": "dem",
"instance": "data"
}

```

---

## B.7. Collection Information Examples

**NOTE** | `include::examples/tbd.adoc[]`

# Annex C: Revision History

Date	Release	Editor	Primary clauses modified	Description
2019-10-31	October 2019 snapshot	C. Heazel	all	Baseline update



# Annex D: Bibliography

- Open Geospatial Consortium: The Specification Model — A Standard for Modular specifications, [OGC 08-131](#)
- W3C/OGC: Spatial Data on the Web Best Practices, W3C Working Group Note 28 September 2017, <https://www.w3.org/TR/sdw-bp/>
- W3C: Data on the Web Best Practices, W3C Recommendation 31 January 2017, <https://www.w3.org/TR/dwbp/>
- W3C: Data Catalog Vocabulary, W3C Recommendation 16 January 2014, <https://www.w3.org/TR/vocab-dcat/>
- IANA: Link Relation Types, <https://www.iana.org/assignments/link-relations/link-relations.xml>