



# OGC API Features

## The 123<sup>rd</sup> OGC Member Meeting

Clemens Portele, interactive instruments  
17 June 2022

Meeting sponsor



# OGC API Standards

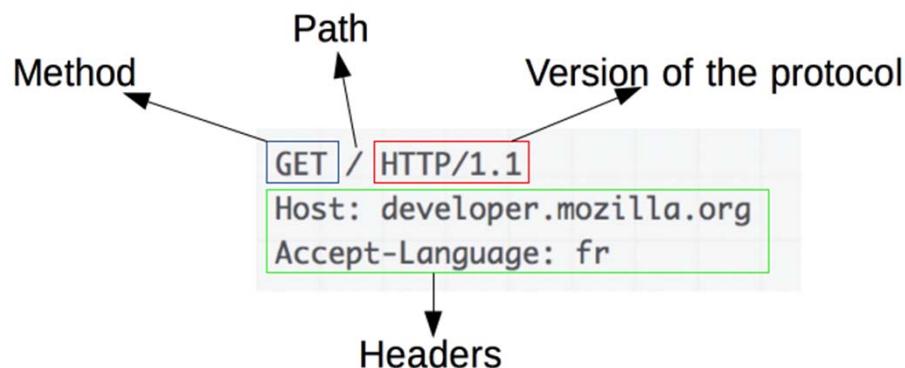
- OGC API standards define modular **API building blocks** to **spatially enable Web APIs** in a consistent way
- Consistent with the **Web** architecture, in particular **HTTP** and **Web Linking**
  - Even without reading the OGC spec, web developers can understand the general semantics of the requests, the response status, how to access a specific format, the meaning of links, etc.
- Focus on **geospatial**
  - Add utility building blocks only where necessary (e.g., no widely used IETF RFC is available)

Geospatial

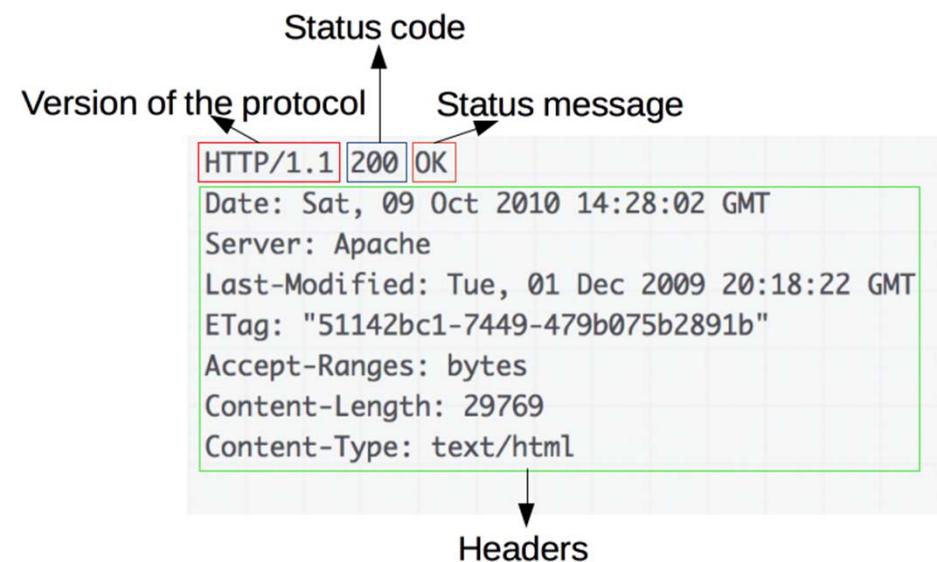
Utility

# HTTP – Request / Response

## Request



## Response



<https://developer.mozilla.org/en-US/docs/Web/HTTP/Overview>

# API Building Blocks

- Resources: identified by a URI, e.g. Landing Page, Collection, Feature
- Operations: HTTP methods on a resource, e.g., GET
- Parameters: in a HTTP URI query to filter resources or change the presentation of the resource, e.g., bbox, datetime, limit, crs, filter
- Headers: request, response or payload HTTP fields, e.g., Content-Crs
- Encodings: to represent payloads, e.g., GeoJSON, JSON-FG, OGC Collection

Resource

GET

Filter

Presentation

Payload

Encoding

# A Modular Standard

- Part 1: Core Mature
  - published in October 2019
  - The API capabilities that almost every one needs
- Part 2: Coordinate Reference Systems by Reference Stable
  - published in October 2020
  - Support beyond WGS84 for well-known CRS
- Part 3: Filtering Candidate
  - release candidate, approval process will start when we have three implementations
  - Filter expressions on features from a single feature collection
- Part 4: Create, Replace, Update and Delete Candidate
  - draft, needs more implementations and testing
  - Mutations, one feature per request
- Work on additional parts in progress Proposal

# Geospatial Data Collection

GET /collections/{collectionId}

Resource

GET

Mature

## Agricultural (Surfaces) Title

Agricultural: Information about activities and man-made features involved in the raising of crops and animals, for food and non-food purposes.

### Links to the main resources

Access the features in the collection 'Agricultural (Surfaces)' as HTML

Access a web map with the data

Access the data as tiles

Styles to render the data in maps

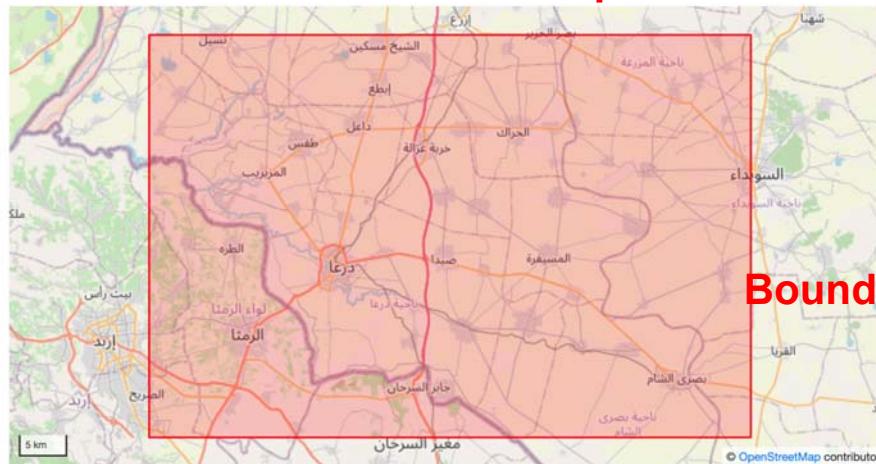
### Description

### Links to related resources

### Information about the collection

Number of Features 101

#### Spatial Extent



### Spatial Extent

### Bounding Box

#### Temporal Extent

12/31/10 - 12/23/14

### Temporal Extent

also (not shown here):

- id (the collectionId)
- Item Type ('feature')
- CRS information
- License (link)
- Feature Type (link)
- Bulk download (link)
- Metadata (link)
- ... extend as needed

# Features in a Data Collection

GET /collections/{collectionId}/items

Resource

GET

Mature

## Agricultural (Surfaces)

Agricultural: Information about activities and man-made features involved in the raising of crops and animals, for food and non-food purposes.

Filter

Edit

« < 1 2 3 4 5 > »

### No Information a Feature

<b>id</b>	1
<b>Feature Type Code</b>	Crop Land
<b>Last Change</b>	02/25/2013, 00:56:24 UTC
<b>Unique Entity Identifier</b>	b0f1a043-eec-41af-b232-c67485c3fa81
<b>Name</b>	No Information
<b>Feature Subtype Code</b>	100380

### No Information another Feature

<b>id</b>	2
<b>Feature Type Code</b>	Crop Land
<b>Last Change</b>	02/25/2013, 00:56:25 UTC
<b>Unique Entity Identifier</b>	b795ee4f-8bbf-4715-8ea6-46f601a3f544
<b>Name</b>	No Information
<b>Feature Subtype Code</b>	100380

### No Information another Feature

<b>id</b>	3
<b>Feature Type Code</b>	Crop Land
<b>Last Change</b>	06/24/2012, 00:51:08 UTC
<b>Unique Entity Identifier</b>	83350995-a7f8-43df-85b6-0de63726c6cb



# Feature in a Data Collection

GET /collections/{collectionId}/items/{featureId}

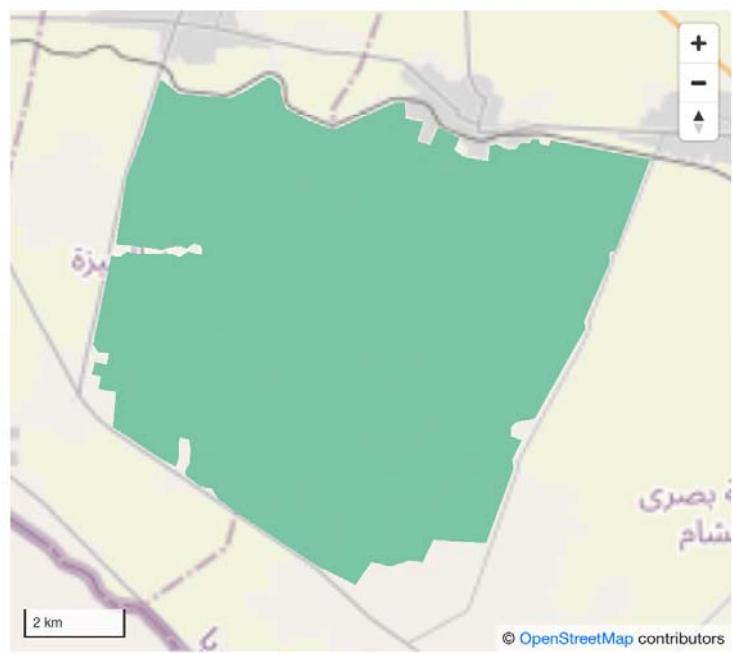
Resource

GET

Mature

## No Information

<b>id</b>	1
<b>Feature Type Code</b>	Crop Land
<b>Last Change</b>	02/25/2013, 00:56:24 UTC
<b>Unique Entity Identifier</b>	b0f1a043-eeec-41af-b232-c67485c3fa81
<b>Name</b>	No Information
<b>Feature Subtype Code</b>	100380



# GeoJSON

Resources: Features, Feature

Encoding

Mature

# HTML

Resources: all

Encoding

Mature

```
{  
  "type": "FeatureCollection",  
  "numberReturned": 10,  
  "numberMatched": 101,  
  "timeStamp": "2022-06-13T09:34:09Z",  
  "features": [  
    {  
      "type": "Feature",  
      "id": 1,  
      "geometry": {  
        "type": "MultiPolygon",  
        "coordinates": [ [ ] ]  
      },  
      "properties": {  
        "F_CODE": "EA010",  
        "ZI001_SDV": "2013-02-25T00:56:24Z",  
        "UFI": "b0f1a043-eec-41af-b232-c67485c3fa81",  
        "ZI005_FNA": "No Information",  
        "FCSTYPE": 100380  
      }  
    },  
    {  
      "type": "Feature",  
      "id": 2,  
      "geometry": {  
        "type": "MultiPolygon",  
        "coordinates": [ [ ] ]  
      },  
      "properties": {  
        "F_CODE": "EA010",  
        "ZI001_SDV": "2013-02-25T00:56:25Z",  
        "UFI": "b795ee4f-8bbf-4715-8ea6-46f601a3f544",  
        "ZI005_FNA": "No Information",  
        "FCSTYPE": 100380  
      }  
    },  
    {  
      "type": "Feature",  
      "id": 3,  
      "geometry": {  
        "type": "MultiPolygon",  
        "coordinates": [ [ ] ]  
      },  
      "properties": {  
        "F_CODE": "EA010",  
        "ZI001_SDV": "2013-02-25T00:56:26Z",  
        "UFI": "b795ee4f-8bbf-4715-8ea6-46f601a3f544",  
        "ZI005_FNA": "No Information",  
        "FCSTYPE": 100380  
      }  
    },  
    {  
      "type": "Feature",  
      "id": 4,  
      "geometry": {  
        "type": "MultiPolygon",  
        "coordinates": [ [ ] ]  
      },  
      "properties": {  
        "F_CODE": "EA010",  
        "ZI001_SDV": "2013-02-25T00:56:27Z",  
        "UFI": "b795ee4f-8bbf-4715-8ea6-46f601a3f544",  
        "ZI005_FNA": "No Information",  
        "FCSTYPE": 100380  
      }  
    },  
    {  
      "type": "Feature",  
      "id": 5,  
      "geometry": {  
        "type": "MultiPolygon",  
        "coordinates": [ [ ] ]  
      },  
      "properties": {  
        "F_CODE": "EA010",  
        "ZI001_SDV": "2013-02-25T00:56:28Z",  
        "UFI": "b795ee4f-8bbf-4715-8ea6-46f601a3f544",  
        "ZI005_FNA": "No Information",  
        "FCSTYPE": 100380  
      }  
    },  
    {  
      "type": "Feature",  
      "id": 6,  
      "geometry": {  
        "type": "MultiPolygon",  
        "coordinates": [ [ ] ]  
      },  
      "properties": {  
        "F_CODE": "EA010",  
        "ZI001_SDV": "2013-02-25T00:56:29Z",  
        "UFI": "b795ee4f-8bbf-4715-8ea6-46f601a3f544",  
        "ZI005_FNA": "No Information",  
        "FCSTYPE": 100380  
      }  
    },  
    {  
      "type": "Feature",  
      "id": 7,  
      "geometry": {  
        "type": "MultiPolygon",  
        "coordinates": [ [ ] ]  
      },  
      "properties": {  
        "F_CODE": "EA010",  
        "ZI001_SDV": "2013-02-25T00:56:30Z",  
        "UFI": "b795ee4f-8bbf-4715-8ea6-46f601a3f544",  
        "ZI005_FNA": "No Information",  
        "FCSTYPE": 100380  
      }  
    },  
    {  
      "type": "Feature",  
      "id": 8,  
      "geometry": {  
        "type": "MultiPolygon",  
        "coordinates": [ [ ] ]  
      },  
      "properties": {  
        "F_CODE": "EA010",  
        "ZI001_SDV": "2013-02-25T00:56:31Z",  
        "UFI": "b795ee4f-8bbf-4715-8ea6-46f601a3f544",  
        "ZI005_FNA": "No Information",  
        "FCSTYPE": 100380  
      }  
    },  
    {  
      "type": "Feature",  
      "id": 9,  
      "geometry": {  
        "type": "MultiPolygon",  
        "coordinates": [ [ ] ]  
      },  
      "properties": {  
        "F_CODE": "EA010",  
        "ZI001_SDV": "2013-02-25T00:56:32Z",  
        "UFI": "b795ee4f-8bbf-4715-8ea6-46f601a3f544",  
        "ZI005_FNA": "No Information",  
        "FCSTYPE": 100380  
      }  
    },  
    {  
      "type": "Feature",  
      "id": 10,  
      "geometry": {  
        "type": "MultiPolygon",  
        "coordinates": [ [ ] ]  
      },  
      "properties": {  
        "F_CODE": "EA010",  
        "ZI001_SDV": "2013-02-25T00:56:33Z",  
        "UFI": "b795ee4f-8bbf-4715-8ea6-46f601a3f544",  
        "ZI005_FNA": "No Information",  
        "FCSTYPE": 100380  
      }  
    }  
  ]  
}
```

## Agricultural (Surfaces)

Agricultural: Information about activities and man-made features involved in the raising of crops and animals, for food and non-food purposes.

Filter [Edit](#)

« < 1 2 3 4 5 > »

### No Information

**id** 1  
**Feature Type Code** Crop Land

**Last Change** 02/25/2013, 00:56:24 UTC  
**Unique Entity Identifier** b0f1a043-eec-41af-b232-c67485c3fa81

**Name** No Information  
**Feature Subtype Code** 100380

### No Information

**id** 2  
**Feature Type Code** Crop Land

**Last Change** 02/25/2013, 00:56:25 UTC  
**Unique Entity Identifier** b795ee4f-8bbf-4715-8ea6-46f601a3f544

**Name** No Information  
**Feature Subtype Code** 100380

### No Information

**id** 3  
**Feature Type Code** Crop Land

**Last Change** 06/24/2012, 00:51:08 UTC  
**Unique Entity Identifier** 83350995-a7f8-43df-85b6-0de63726c6cb



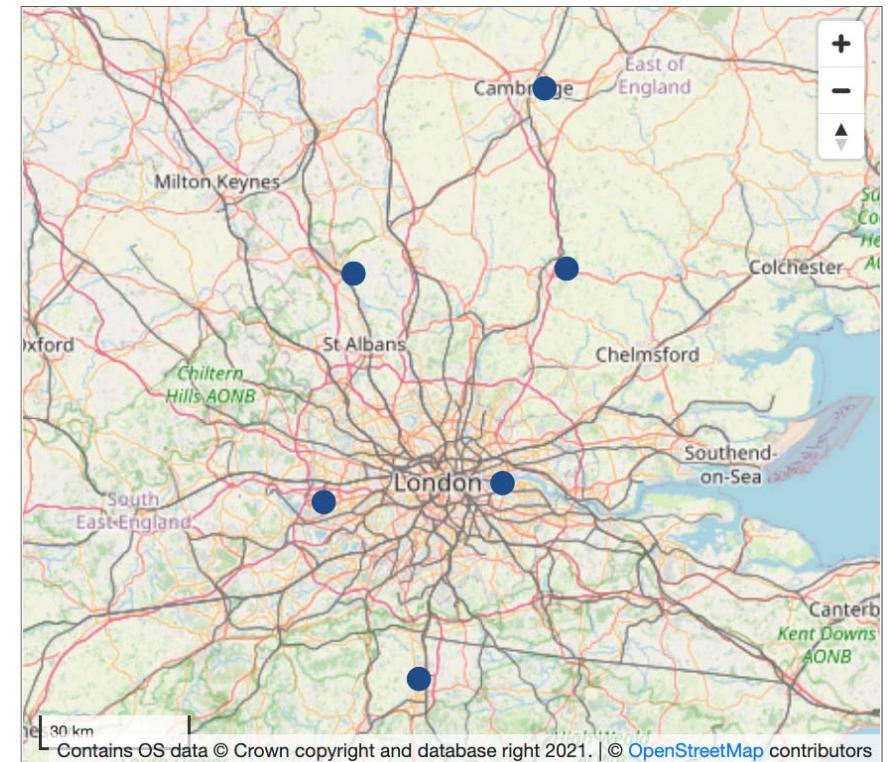
bbox

Filter

Mature

## Select features in an axis-aligned bounding box

GET /collections/{collectionId}/items



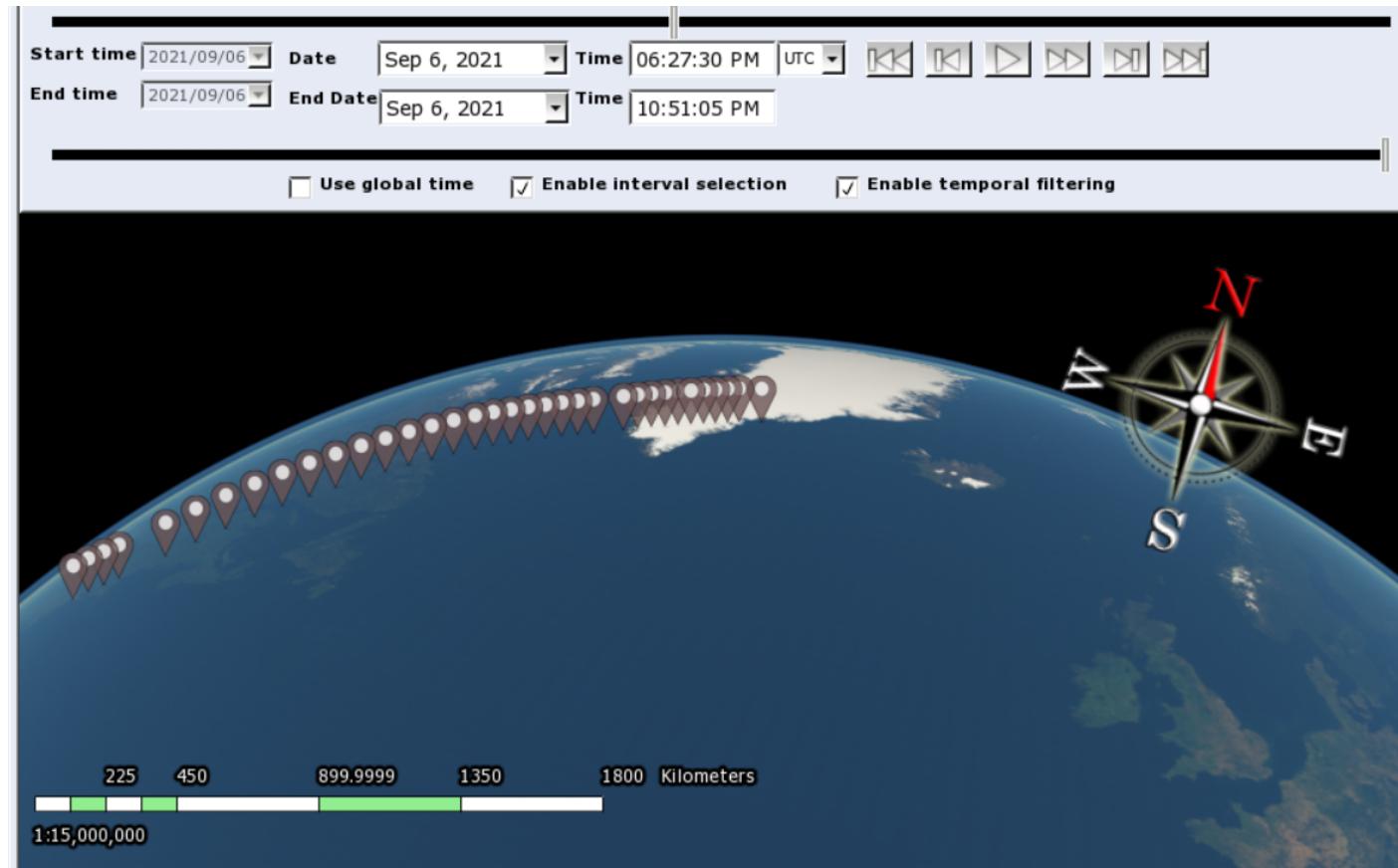
**datetime**

**Filter**

**Mature**

## Select features at a time / in a time period

GET /collections/{collectionId}/items



# property name

Filter

Stable

## Select features based on the value of an attribute (optional)

GET /collections/{collectionId}/items

Filter   **Apply**   **Cancel**

FIELD

Village(s)  **Add**



« < 1 > »

### Niederberg-Helden (Lieser)

Vineyard register number	410345
Vineyard name	Niederberg-Helden
Area in hectares	29.9
Wine-growing region	Mosel
Sub-region (Bereich)	Bereich Bernkastel
Vineyard cluster (Großlage)	Kurfürstlay
Village(s)	Lieser
Cadastral district(s)	Lieser
Search field (option 2)	Niederberg-Helden (Lieser)

### Schloßberg (Lieser)

Vineyard register number	410318
Vineyard name	Schloßberg
Area in hectares	82.4
Wine-growing region	Mosel
Sub-region (Bereich)	Bereich Bernkastel
Vineyard cluster (Großlage)	Kurfürstlay
Village(s)	Lieser
Cadastral district(s)	Lieser
Search field (option 2)	Schloßberg (Lieser)

### Rosenlay (Lieser)

Vineyard register number	410343
Vineyard name	Rosenlay
Area in hectares	16.9
Wine-growing region	Mosel
Sub-region (Bereich)	Bereich Bernkastel
Vineyard cluster (Großlage)	Kurfürstlay
Village(s)	Lieser
Cadastral district(s)	Lieser
Search field (option 2)	Rosenlay (Lieser)



© Bundesamt für Kartographie und Geodäsie (2020), Datenquellen: © Landwirtschaftskammer RLP (2020), [di-de/by-2-0](#), [weinlagen.lwk-rlp.de](#), Regelungen zu Gewährleistung und Haftung

# filter

Filter

Candidate

## Select features with rich filter expressions

GET /collections/{collectionId}/items

Select Notices to Airmen (NOTAMs) related to runways/taxiways/airspaces that were effective between 6PM and 10PM UTC on 2021-07-12 in an area:

S\_INTERSECTS(geometry, POLYGON( . . . ))

AND

notam\_keyword IN ('RWY', 'TWY', 'AIRSPACE')

AND

T\_INTERSECTS(INTERVAL(valid\_time\_begin, valid\_time\_end),  
INTERVAL('2021-07-12T18:00:00Z', '2021-07-12T22:00:00Z'))

# Queryables: describes the properties of a Feature in a Geospatial Data Collection that can be used in the 'filter' parameter

GET /collections/{collectionId}/queryables

Resource

GET

Candidate

## Queryables

"Queryables" are attributes that can be used in search or selection expressions, for example, in queries or styling rules.

<b>notam_keyword</b>	NOTAM Keyword: Keyword associated with the NOTAM Data type: string Values: AD; APRON; AIRSPACE; CHART; COM; IAP; NAV; OBST; ODP; ROUTE; RWY; SECURITY; SID; SPECIAL; STAR; SVC; TWY; VFP; CONSTRUCTION; LTA
<b>notam_function</b>	NOTAM Function: Function of the NOTAM (New, Replacement, Cancelled) Data type: string Values: NOTAMN; NOTAMR; NOTAMC
<b>valid_time_begin</b>	Valid time (begin) Data type: date-time
<b>valid_time_end</b>	Valid time (end) Data type: date-time
<b>text</b>	Text: NOTAM condition text. Data type: string

# Select features in pages

GET /collections/{collectionId}/items

Access to the next page  
(and maybe other pages, too)

## Agricultural (Surfaces)

Agricultural: Information about activities and man-made features involved in the raising of crops and animals, for food and non-food purposes.

Filter [Edit](#)

**1**

### No Information

<b>id</b>	1
<b>Feature Type Code</b>	Crop Land
<b>Last Change</b>	02/25/2013, 00:56:24 UTC
<b>Unique Entity Identifier</b>	b0f1a043-eeec-41af-b232-c67485c3fa81
<b>Name</b>	No Information
<b>Feature Subtype Code</b>	100380

### No Information

<b>id</b>	2
<b>Feature Type Code</b>	Crop Land
<b>Last Change</b>	02/25/2013, 00:56:25 UTC
<b>Unique Entity Identifier</b>	b795ee4f-8bbf-4715-8ea6-46f601a3f544
<b>Name</b>	No Information
<b>Feature Subtype Code</b>	100380

### No Information

<b>id</b>	3
<b>Feature Type Code</b>	Crop Land
<b>Last Change</b>	06/24/2012, 00:51:08 UTC
<b>Unique Entity Identifier</b>	83350995-a7f8-43df-85b6-0de63726c6cb



**crs**

Presentation

Stable

**Content-Crs**

Payload

Stable

## Present features with coordinates in a specific Coordinate Reference System

GET /collections/{collectionId}/items, GET /collections/{collectionId}/items/{featureId}

```
https://.../collections/airports/items/1?crs=http://www.opengis.net/def/crs/EPSG/0/27700
```

HTTP/1.1 200

Content-Crs: <http://www.opengis.net/def/crs/EPSG/0/27700>

Content-Type: application/geo+json

Content-Length: 1034

...

```
{ "type": "Feature", "id": 1, "geometry": { "type": "Point", "coordinates": [41.705793, 115.977220] }, "properties": { "name": "Papa Stour Airstrip" }, "links": [ . . . ] }
```

# properties

Presentation

Proposal

## Present only the selected properties

GET /collections/{collectionId}/items

<https://.../collections/vineyards/items?properties=name,village>

```
{"type": "FeatureCollection", "features": [  
  {"type": "Feature", "id": 460270, "geometry": null, "properties": {"name": "Hölle", "village": "Wiltingen"}},  
  {"type": "Feature", "id": 511147, "geometry": null, "properties": {"name": "Felsenberg", "village": "Schloßböckelheim"}},  
  {"type": "Feature", "id": 320502, "geometry": null, "properties": {"name": "Brünnchen", "village": "Nochern"}},  
  {"type": "Feature", "id": 730705, "geometry": null, "properties": {"name": "Wartberg", "village": "Alzey, Kettenheim"}},  
  {"type": "Feature", "id": 820511, "geometry": null, "properties": {"name": "Spielberg", "village": "Meckenheim"}},  
  {"type": "Feature", "id": 820503, "geometry": null, "properties": {"name": "Kirchenstück", "village": "Ellerstadt"}},  
  {"type": "Feature", "id": 440411, "geometry": null, "properties": {"name": "Adler", "village": "Bullay, Zell (Mosel)"}},  
  {"type": "Feature", "id": 440223, "geometry": null, "properties": {"name": "Höll", "village": "Ediger-Eller"}},  
  {"type": "Feature", "id": 320111, "geometry": null, "properties": {"name": "Rheinhöller", "village": "Linz a. Rhein"}},  
  {"type": "Feature", "id": 460237, "geometry": null, "properties": {"name": "Rosenberg", "village": "Konz"}}  
, "links": [...]}
```

# sortby

Presentation

Candidate

## Present features ordered by property values

GET /collections/{collectionId}/items

<https://.../collections/vineyards/items?properties=name,village&sortby=village,-name>

```
{"type": "FeatureCollection", "features": [  
  {"type": "Feature", "id": 110108, "geometry": null, "properties": {"name": "Übigberg", "village": "Ahrbrück, Altenahr"}},  
  {"type": "Feature", "id": 810402, "geometry": null, "properties": {"name": "Latt", "village": "Albersweiler"}},  
  {"type": "Feature", "id": 720602, "geometry": null, "properties": {"name": "Hundskopf", "village": "Albig"}},  
  {"type": "Feature", "id": 720601, "geometry": null, "properties": {"name": "Homberg", "village": "Albig"}},  
  {"type": "Feature", "id": 720603, "geometry": null, "properties": {"name": "Schloß Hammerstein", "village": "Albig, Alzey"}},  
  {"type": "Feature", "id": 821501, "geometry": null, "properties": {"name": "Heiligenborn", "village": "Albisheim (Pfrimm)"}},  
  {"type": "Feature", "id": 440207, "geometry": null, "properties": {"name": "Kronenberg", "village": "Alf"}},  
  {"type": "Feature", "id": 440206, "geometry": null, "properties": {"name": "Katzenkopf", "village": "Alf"}},  
  {"type": "Feature", "id": 440205, "geometry": null, "properties": {"name": "Kapellenberg", "village": "Alf"}},  
  {"type": "Feature", "id": 440204, "geometry": null, "properties": {"name": "Hölle", "village": "Alf"}}  
, "links": [...]}
```

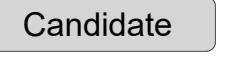
# Other Building Blocks: Resources

- Landing Page   
  - Basic information about the API and hypermedia controls for the API
- Conformance Declaration   
  - Lists OGC API conformance classes implemented by an OGC Web API
- Sortables   
  - specifies the properties of a Feature in a Geospatial Data Collection that can be used in the ‘sortby’ parameter
- Returnables   
  - the schema of a Feature for a Geospatial Data Collection
  - the schema of a Feature Collection for a Geospatial Data Collection

# Other Building Blocks: Filter parameters

- bbox-crs Filter Stable
  - Declare the Coordinate Reference System of the coordinates in the ‘bbox’ parameter (default is OGC:CRS84 / OGC:CRS84h)
- filter-crs Filter Candidate
  - Declare the Coordinate Reference System of the coordinates in the ‘filter’ parameter (default is OGC:CRS84 / OGC:CRS84h)
- filter-lang Filter Candidate
  - Declare the Filter Language used in the ‘filter’ parameter (default is CQL2-Text)
- q Filter Candidate
  - Free-text filtering on multiple properties

# Other Building Blocks: Mutations

- Features  
  - Create a new feature
- Feature    
  - Replace, update, or delete a feature
- Query      
  - Queries stored on the server, can be parameterized

# tl;dr

- The main building blocks:
  - Resources: Feature, Features, Data Collection
  - Encodings: GeoJSON/JSON, HTML
  - Filtering: bbox, datetime, attributes with discrete values
  - Presentation: limit
- Need for other CRS beside WGS 84? Add: crs, bbox-crs, Content-Crs
- Need for richer filtering? Add: Queryables, filter, filter-lang, filter-crs, q
- Need for sorting? Add: Sortables, sortby
- Need to understand the feature types and their schema? Add: Returnables
- Need to restrict the properties in the response? Add: properties
- Need to change data? Add: support for POST, PUT, DELETE, PATCH methods

# Implementations

## Servers

- Idproxy\*
- CubeWerx Suite
- pygeoapi\*
- GeoServer\*
- GNOSIS Map Server
- QGIS Server\*
- pg\_featureserv\*
- deegree\*
- and many more ...

\* = Open Source

## Clients – Desktop

- QGIS\*
- ArcGIS Pro
- FME

## Clients – Libraries

- GDAL/OGR\*
- OWSLib\*
- ArcGIS Runtime

## Clients – JavaScript

- ArcGIS API for JavaScript

Any implementation that can use GeoJSON...

<https://github.com/opengeospatial/ogcapi-features/tree/master/implementations>

# Contact Us

Clemens Portele (interactive instruments)

- portele [at] interactive-instruments.de

Panagiotis (Peter) A. Vretanos (CubeWerx Inc.)

- pvretano [at] cubewerx.com

<https://github.com/opengeospatial/ogcapi-features>



# Thank You

## Community

500+ International Members  
110+ Member Meetings  
60+ Alliance and Liaison partners  
50+ Standards Working Groups  
45+ Domain Working Groups  
25+ Years of Not for Profit Work  
10+ Regional and Country Forums

## Innovation

120+ Innovation Initiatives  
380+ Technical reports  
Quarterly Tech Trends monitoring

## Standards

65+ Adopted Standards  
300+ products with 1000+ certified implementations  
1,700,000+ Operational Data Sets  
Using OGC Standards



Copyright © 2022 Open Geospatial Consortium