



Open
Geospatial
Consortium

OGC API Features

The 123rd OGC Member Meeting

Clemens Portele, interactive instruments
17 June 2022

Meeting sponsor



European Union Satellite Centre

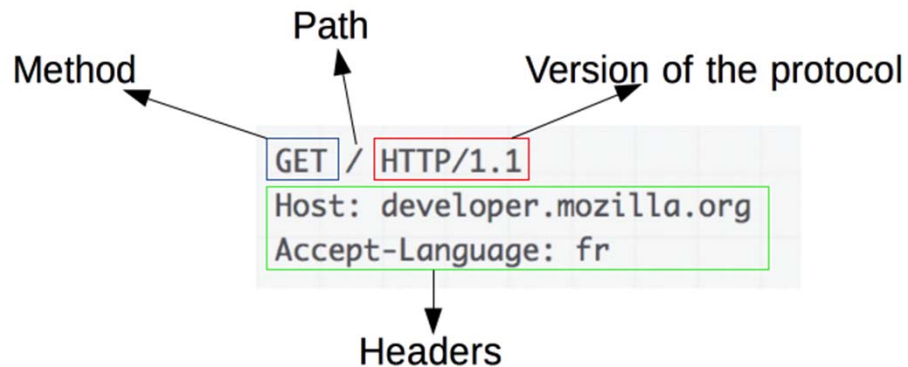


OGC API Standards

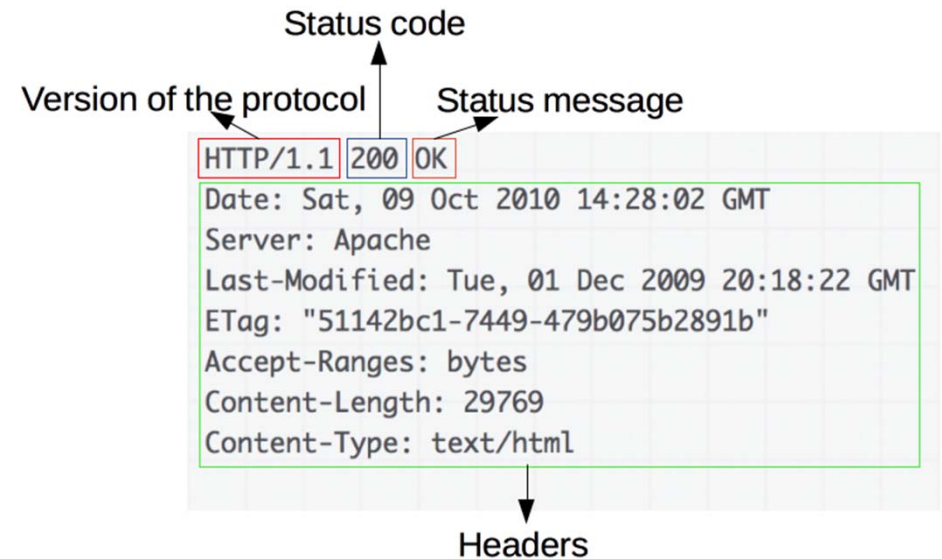
- OGC API standards define modular **API building blocks** to **spatially enable Web APIs** in a consistent way
- Consistent with the **Web** architecture, in particular **HTTP** and **Web Linking**
 - Even without reading the OGC spec, web developers can understand the general semantics of the requests, 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



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](#)

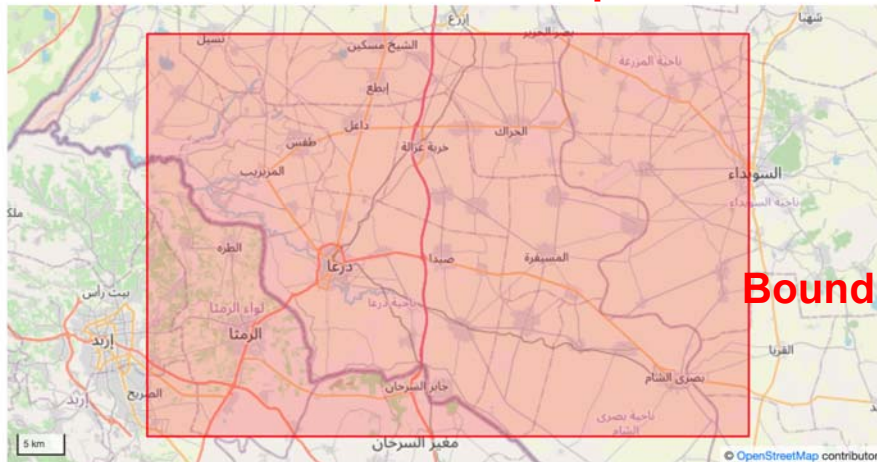
[Access the data as tiles](#)

[Styles to render the data in maps](#)

Information about the collection

Number of Features 101

Spatial Extent



Temporal Extent 12/31/10 - 12/23/14

Temporal Extent

Description

Links to related resources

Spatial Extent

Bounding Box

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

« < 1 2 3 4 5 > »

No Information **a Feature**

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

No Information **another Feature**

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 **another Feature**

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



Feature in a Data Collection

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

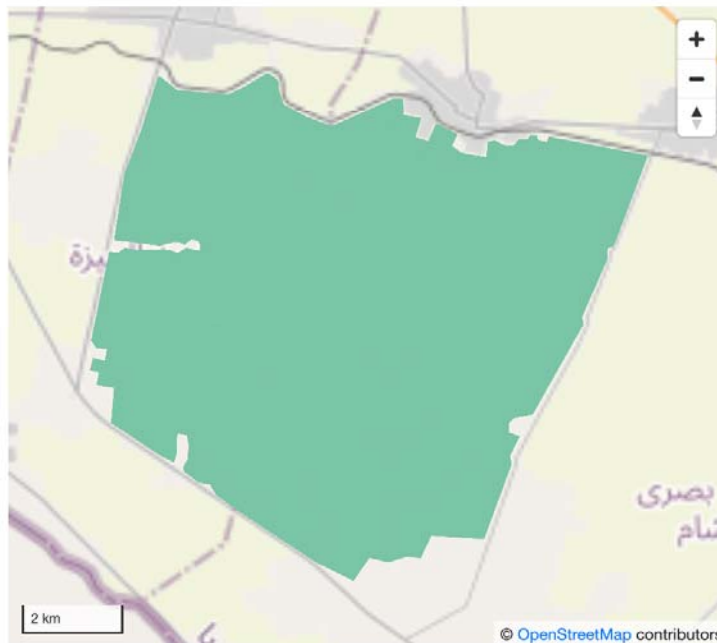
Resource

GET

Mature

No Information

| | |
|---------------------------------|--------------------------------------|
| id | 1 |
| Feature Type Code | Crop Land |
| Last Change | 02/25/2013, 00:56:24 UTC |
| Unique Entity Identifier | b0f1a043-eeec-41af-b232-c67485c3fa81 |
| Name | No Information |
| Feature Subtype Code | 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-eeec-41af-b232-c67485c3fa81",
        "ZI005_FNA": "No Information",
        "FCSUBTYPE": 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",
        "FCSUBTYPE": 100380
      }
    },
    {
      "type": "Feature",
      "id": 3,
```

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

« < 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-eeec-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-85b6-0de63726c6bc |



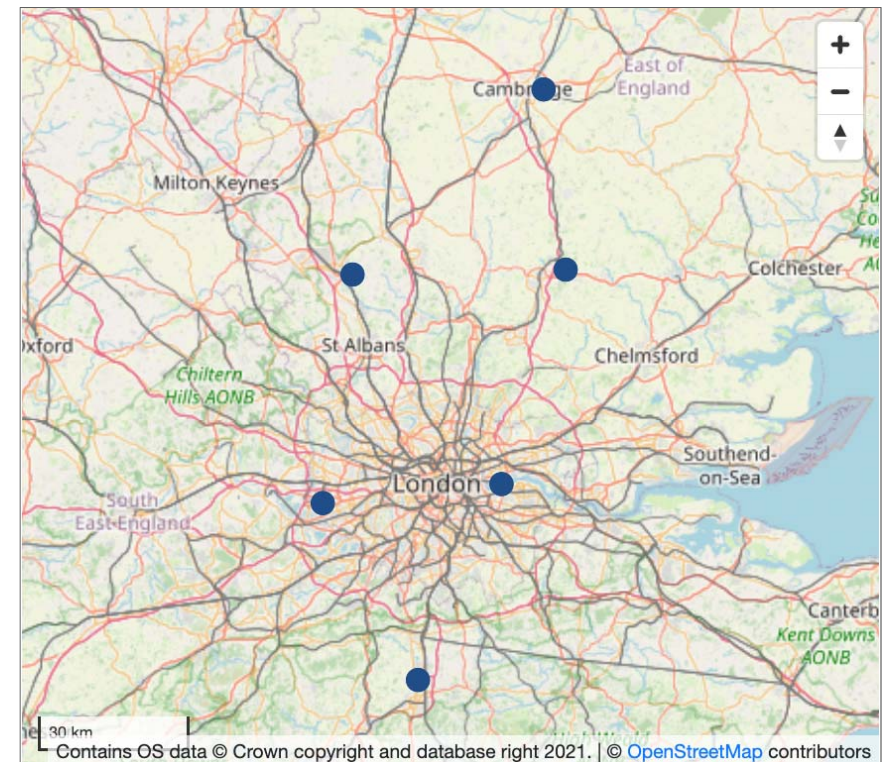
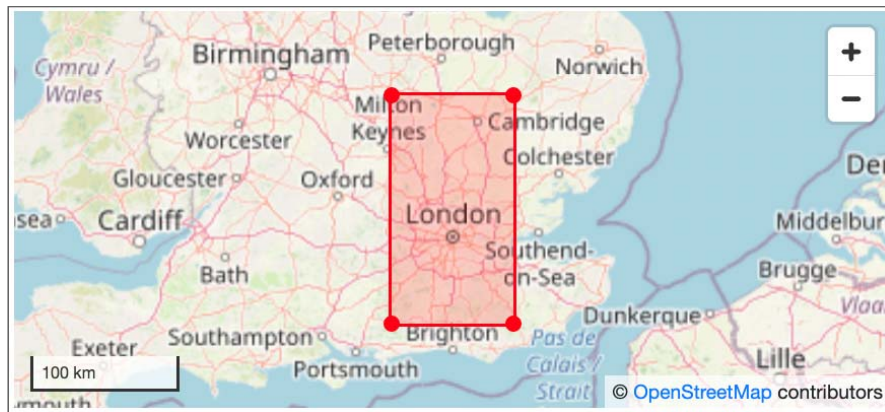
bbox

Filter

Mature

Select features in an axis-aligned bounding box

GET /collections/{collectionId}/items



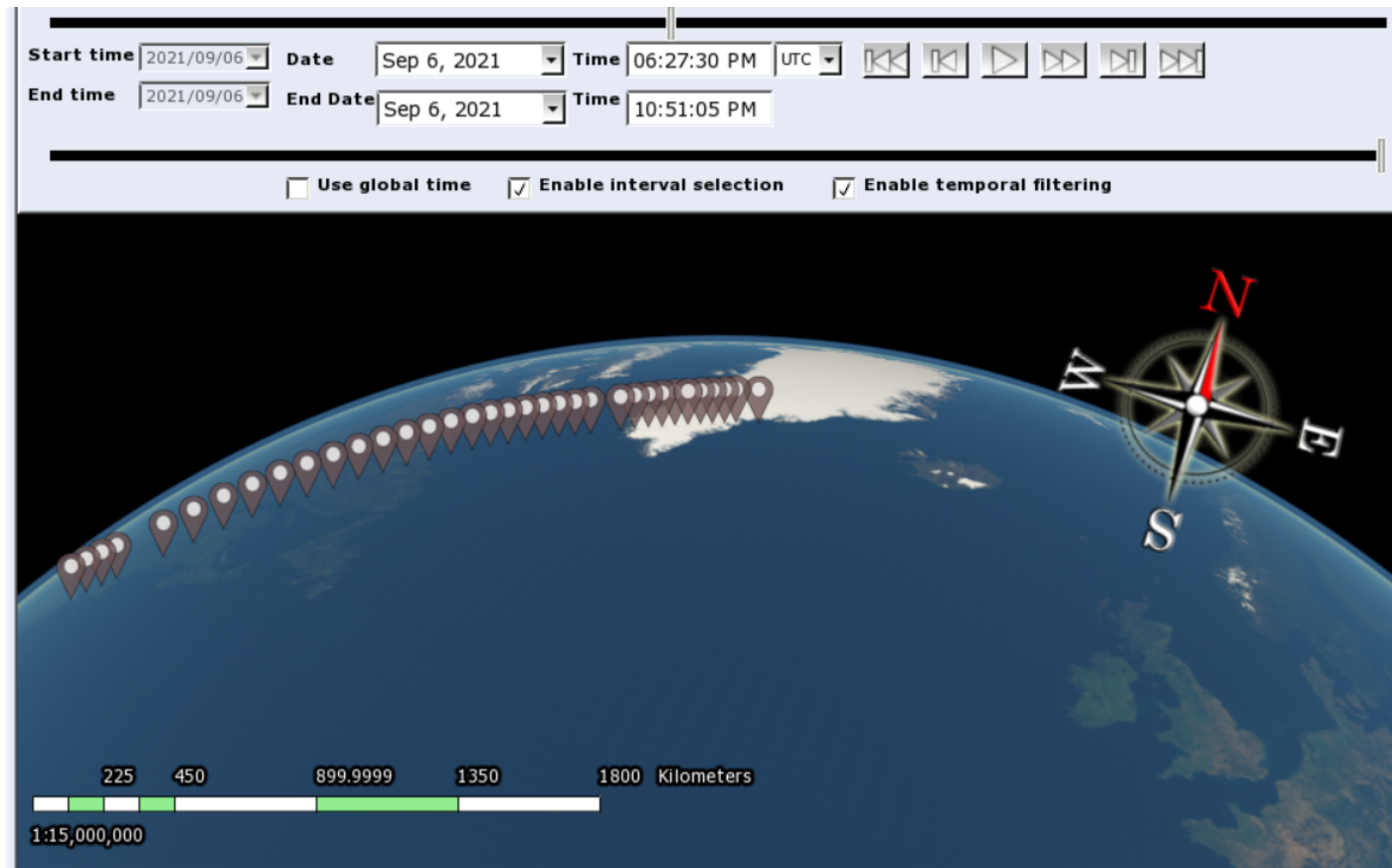
datetime

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) |

filter

Filter

Candidate

Select features with rich filter expressions

[GET /collections/{collectionId}/items](#)

Select Notices to Airmen (NOTAMs) related to runways/taxiways/airspace 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'))
```


Queryable: 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

Queryable

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

| | |
|-------------------------|---|
| notam_keyword | 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 |
| notam_function | NOTAM Function: Function of the NOTAM (New, Replacement, Cancelled) Data type: string Values: NOTAMN; NOTAMR; NOTAMC |
| valid_time_begin | Valid time (begin) Data type: date-time |
| valid_time_end | Valid time (end) Data type: date-time |
| text | Text: NOTAM condition text. Data type: string |

limit

Presentation

Mature

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

« < 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-eeec-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 |

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": [417057.93, 1159772.20]}, "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 Resource GET Mature
 - Basic information about the API and hypermedia controls for the API
- Conformance Declaration Resource GET Mature
 - Lists OGC API conformance classes implemented by an OGC Web API
- Sortables Resource GET Candidate
 - specifies the properties of a Feature in a Geospatial Data Collection that can be used in the 'sortby' parameter
- Returnables Resource GET Proposal
 - 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 POST Candidate
 - Create a new feature
- Feature PUT PATCH DELETE Candidate
 - Replace, update, or delete a feature
- Query Resource GET POST PUT DELETE Proposal
 - 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: `Queryable`s, `filter`, `filter-lang`, `filter-crs`, `q`
- Need for sorting? Add: `Sortable`s, `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...

Contact Us

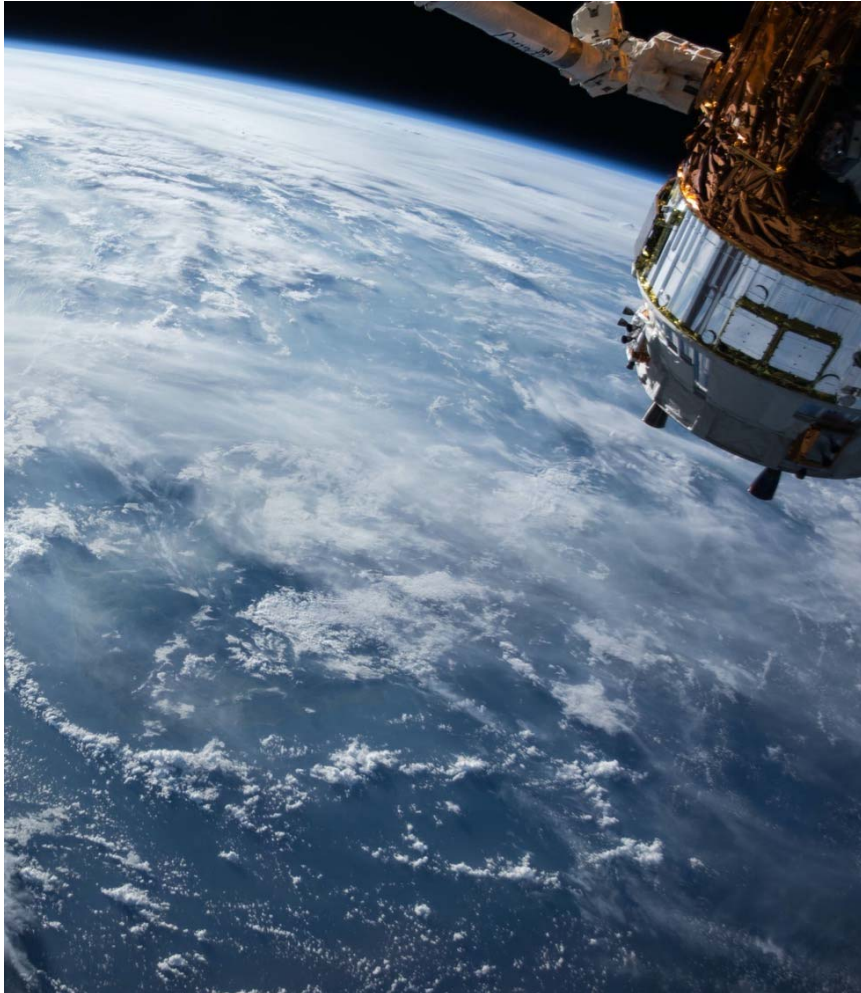
Clemens Portele (interactive instruments)

- 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

