

From OGC Web Services to OGC APIs

ESTGIS

Tallinn October 2025

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Background: Millions of Geospatial Datasets on

OGC Web Services (OWS)

Web Map Service (WMS)

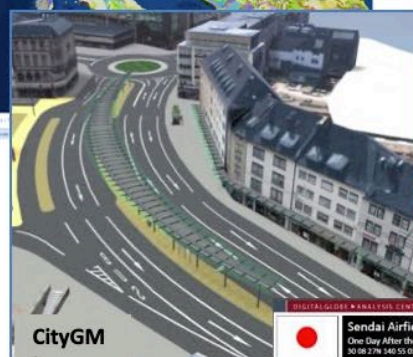
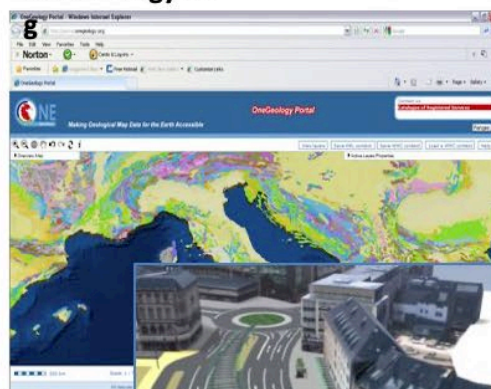
Web Map Tile Service (WMTS)

Web Feature Service (WFS)

Web Coverage Service (WCS)

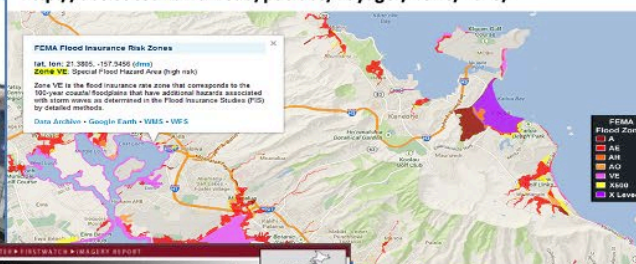
OpenIOOS.Org

OneGeology.Or

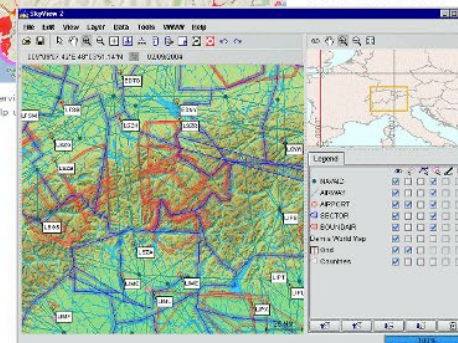


**Emergency /
Disaster
Management**

<http://oos.soest.hawaii.edu/pacioos/voyager/news/2013/>

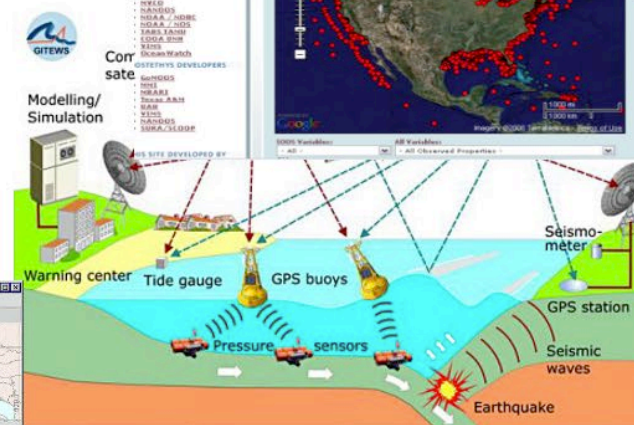


DigitalGlobe



Aviation Flight Information / Safety

Eurocontrol



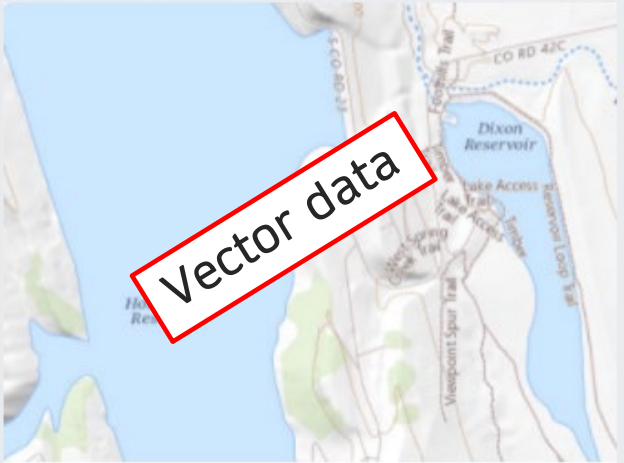
Meteorology, Hydrology, Ocean Monitoring



**OGC
APIs**

Building Blocks for Location

Vector, maps, metadata, ...



A vector map showing a reservoir, trails, and roads. A red box with the text "Vector data" is overlaid on the map.

Features

Approved Standard 

OGC API - Features - Part 1: Core and Part 2: Coordinate Reference Systems by Reference are both publicly available.



An aerial photograph of a landscape with a river, fields, and some buildings. A red box with the text "Map images" is overlaid on the image.

Maps

OGC API - Maps offers a modern approach to the OGC Web Map Service (WMS) standard for provision map and raster content.



A photograph of a row of file folders in a filing cabinet. A red box with the text "Search" is overlaid on the image.

Records

OGC API - Records updates OGC's Catalog Services for the Web by building on the simple access to content in OGC API - Features.

Processing, coverages, ...



Processing

Processes

OGC API - Processes allows for processing tools to be called and combined from many sources and applied to data in other OGC API resources through a simple API.



Coverages

Coverages

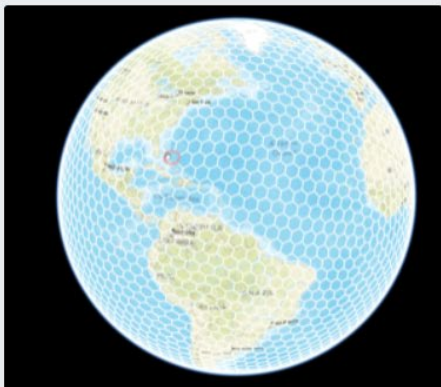
OGC API - Coverages allows discovery, visualization and query of complex raster stacks and data cubes.



Environmental Data

EDR

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.



DGGS

Approved Standard 

Specifies an API for accessing data organised according to a Discrete Global Grid Reference System (DGGRS).



Routes

Enables applications to request routes in a manner independent of the underlying routing data set, routing engine or algorithm.



Joins

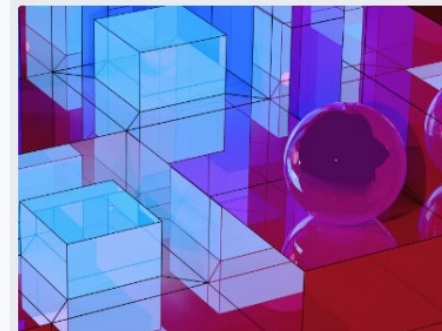
OGC API - Joins supports the joining of data, from multiple sources, with feature collections or directly with other input files.

And more ...



Styles

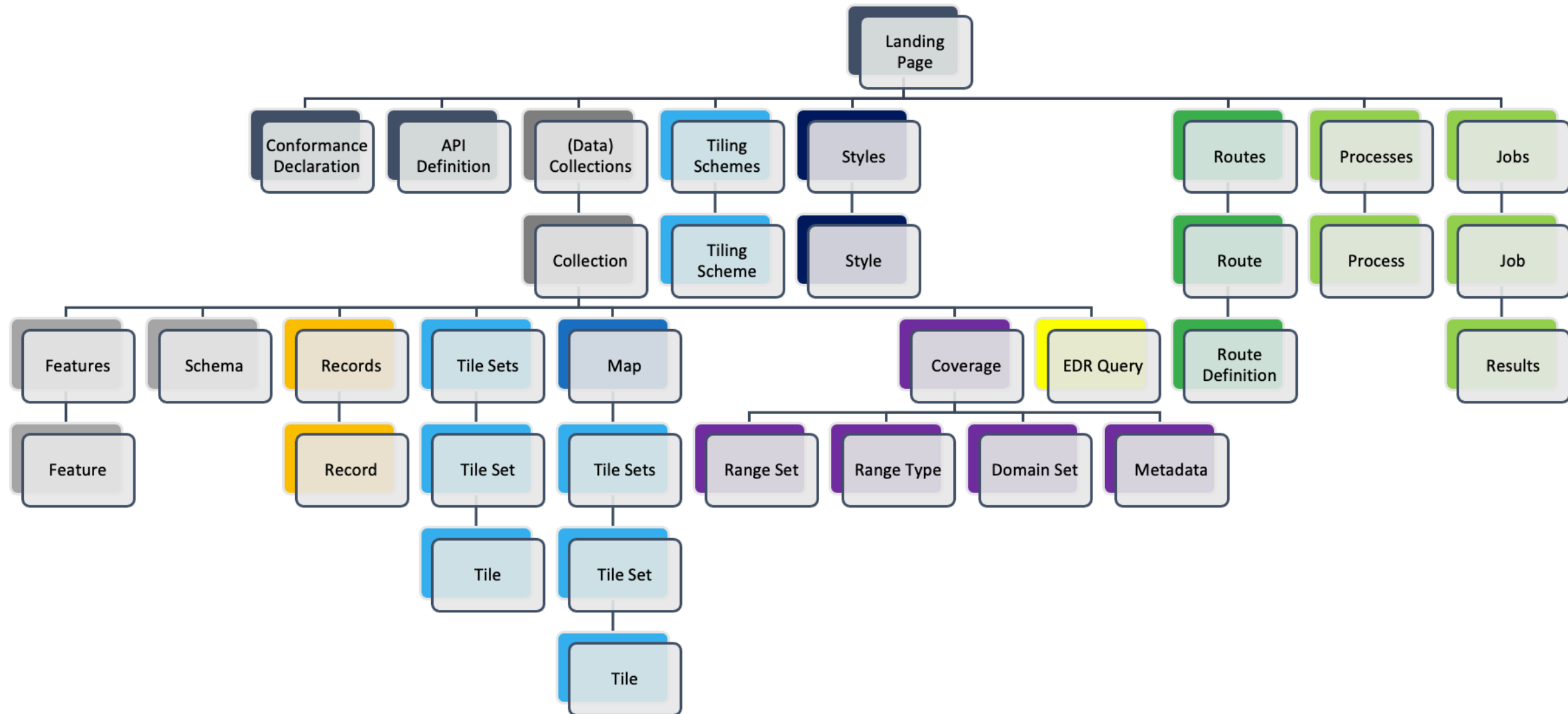
The OGC API - Styles defines a Web API that enables map servers, clients as well as visual style editors, to manage and fetch styles.



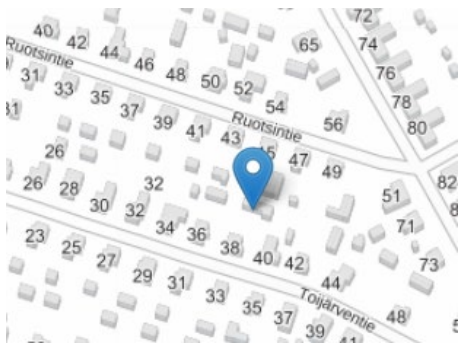
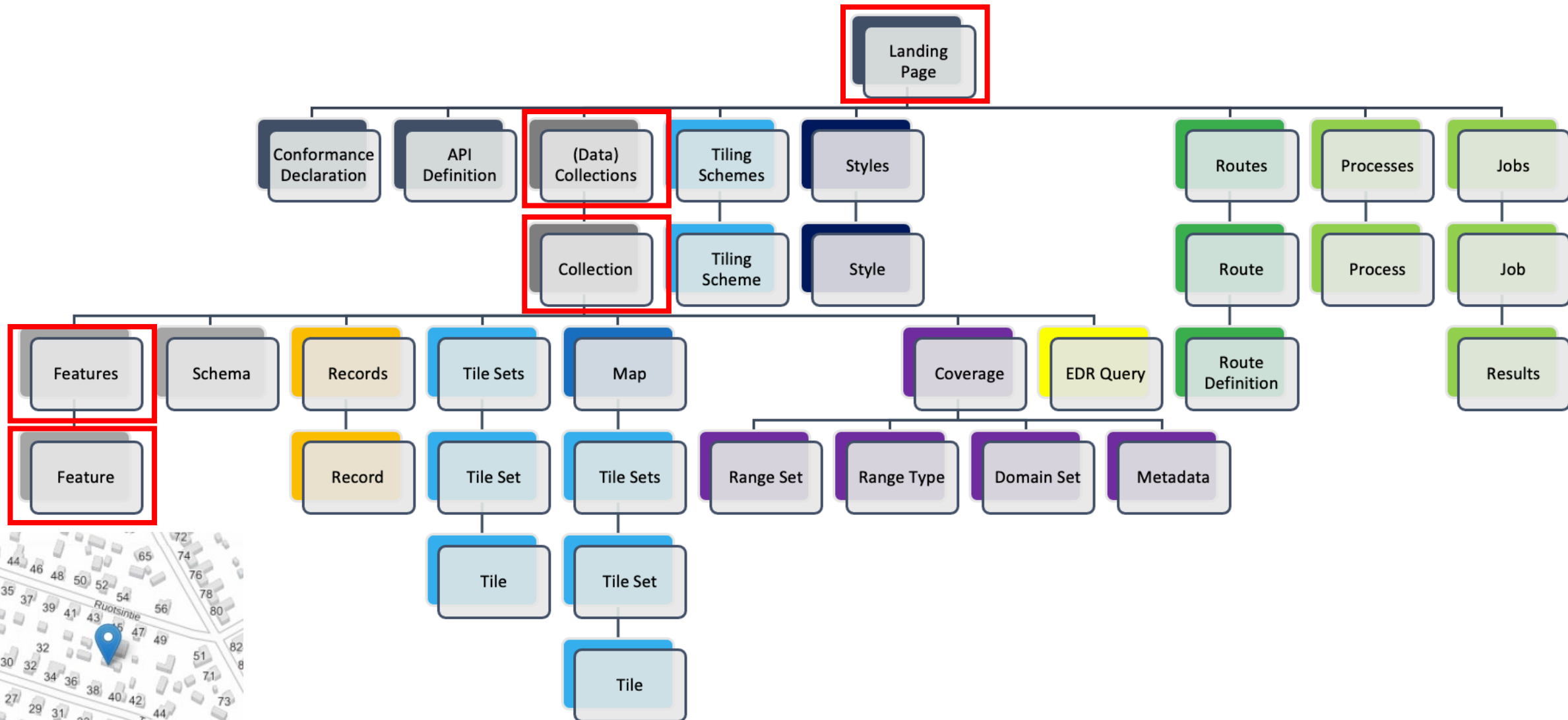
3D GeoVolumes

OGC API - 3D GeoVolumes facilitates efficient discovery of and access to 3D content in multiple formats based on a space-centric perspective.

Building blocks (image by OGC)



Features (image by OGC)



OGC API Features

- Part 1: Core
 - ISO 19168-1 Geospatial API for Features
- Part 2: Coordinate Reference Systems by Reference
 - In ISO process ISO 19168-2
- Part 3: Filtering
- Part 4: Create, Replace, Update and Delete
- Part 5: Schemas
- Part 6: Property Selection
- Part 7: Geometry Simplification



Approved as INSPIRE Good Practice
Download Service



Examples - spatial information

Find cemeteries from Finland

<.../terrain/features/v1/collections/cemetery>

Cultivated land from this region

[.../terrain/features/v1/collections/cultivated_land/items?limit=10000
&bbox=336981,6971749,339757,6976463](.../terrain/features/v1/collections/cultivated_land/items?limit=10000&bbox=336981,6971749,339757,6976463)

One building

<.../features/v1/collections/buildings/items?limit=1>

```
{
  "type": "FeatureCollection",
  "features": [
    {
      "type": "Feature",
      "id": "459985d8-eb5e-488c-9f38-42ae8f1f778d:1",
      "geometry": {
        "type": "MultiPolygon",
        "coordinates": [
          [
            [
              [27.9506429, 63.0952404],
              [27.9505738, 63.0952764],
              [27.9506372, 63.0953013],
              [27.9507062, 63.0952653],
              [27.9506429, 63.0952404]
            ]
          ]
        ]
      },
      "properties": {
        "featureClass": "Building",
        "kmtkId": "459985d8-eb5e-488c-9f38-42ae8f1f778d",
        "version": 1,
        "VTJprt": null,
        "sourceId": "2101647874",
        "PNRplaceId": null,
        "startTime": "2022-02-20T10:40:13.822Z",
        "versionStartTime": "2022-02-20T10:40:13.822Z",
        "versionEndTime": null,
        "endTime": null,
        "dataSource": 1000,
        "sourceModification": null
      }
    }
  ]
}
```

DEMO

[INSPIRE Simple Addresses, Finland - Home](#)



Use case - OGC API Processes

- Make from 2D data
LOD1 3D building
- Execution
 - Inputs - outputs

Extrude building

Extrude 2D building to a LOD1 3D building

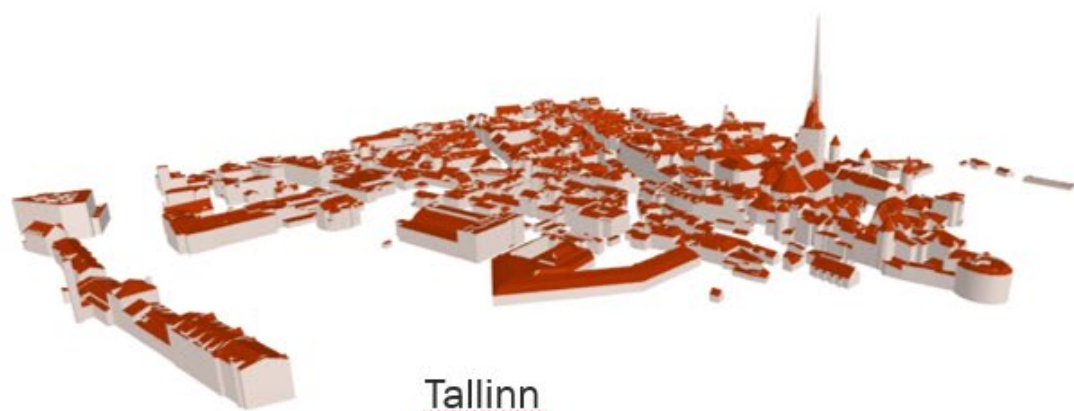
extrude 3D building

Inputs

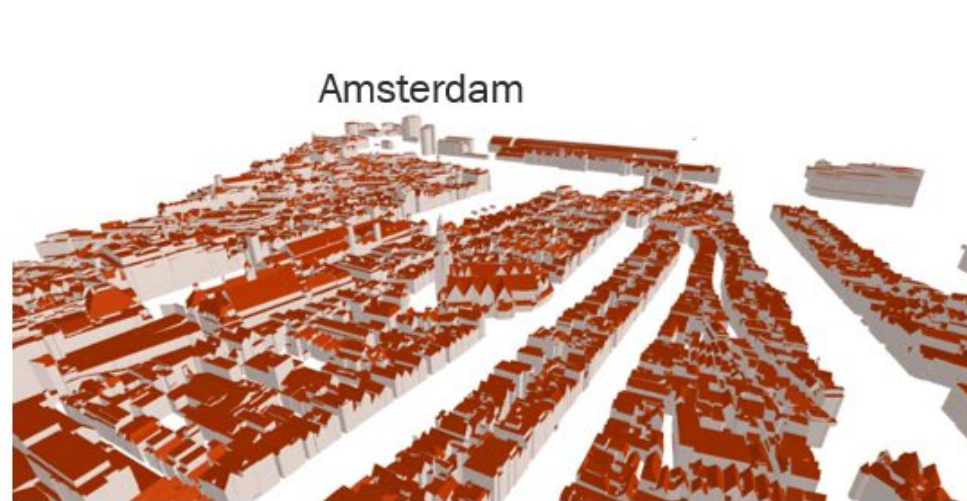
Id	Title	Data Type	Description
country	Country	string	Country from which the building is queried (two-letter country code)
id	ID	string	The Feature ID of the building to be processed

Outputs

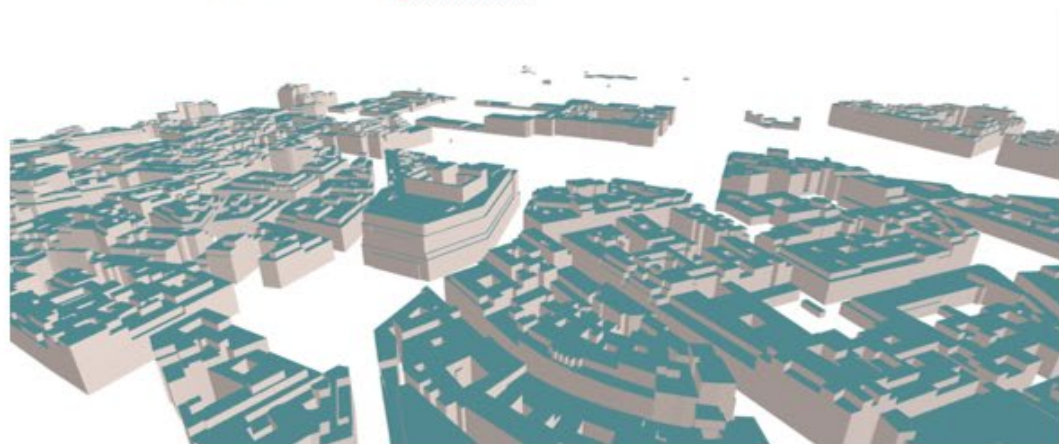
Id	Title	Description
cityjson	CityJSON	CityJSON -encoded 3D model of the building



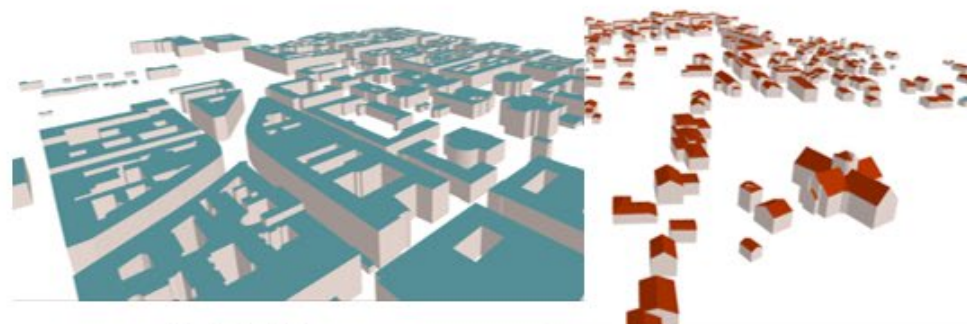
Tallinn



Amsterdam



Madrid



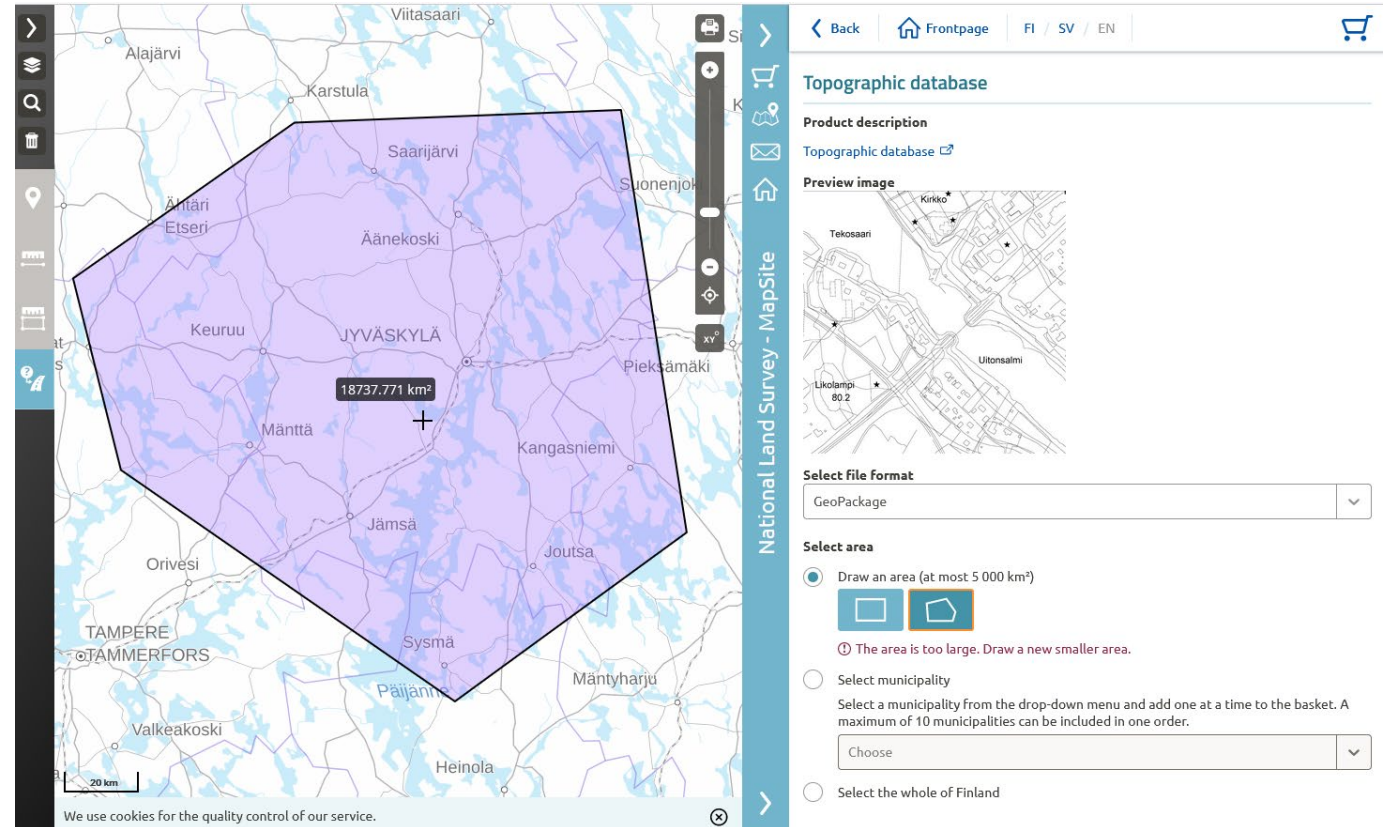
Helsinki

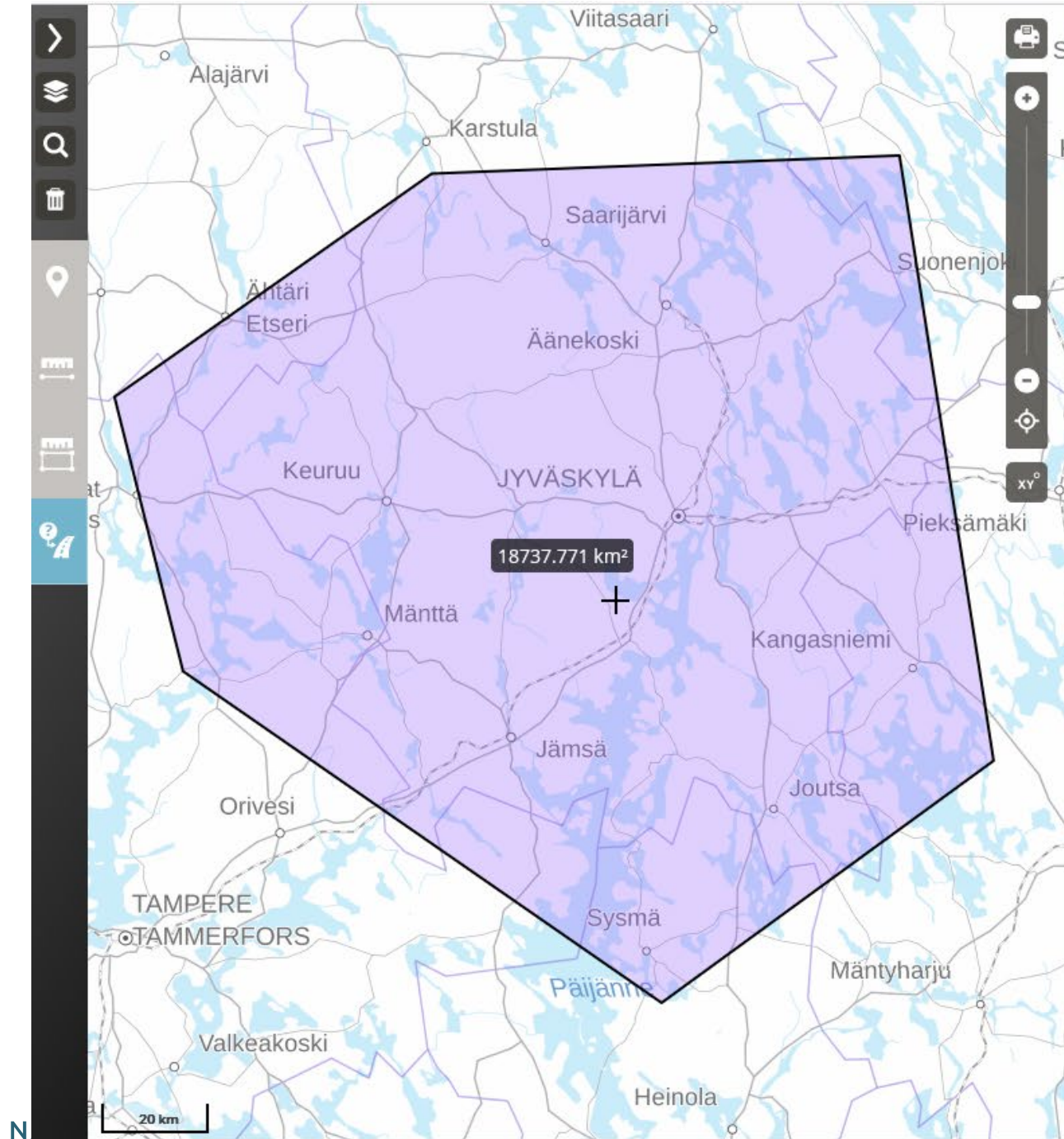


Ikaalinen

Use case - OGC API Processes

- Download data via OGC API Processes



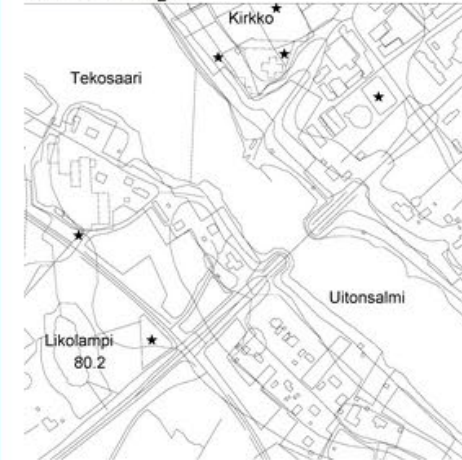
[< Back](#)[Frontpage](#)[FI](#) / [SV](#) / [EN](#)

Topographic database

Product description

[Topographic database](#)

Preview image



Select file format

GeoPackage

Select area

☒ Draw an area (at most 5 000 km²)



The area is too large. Draw a new smaller area.

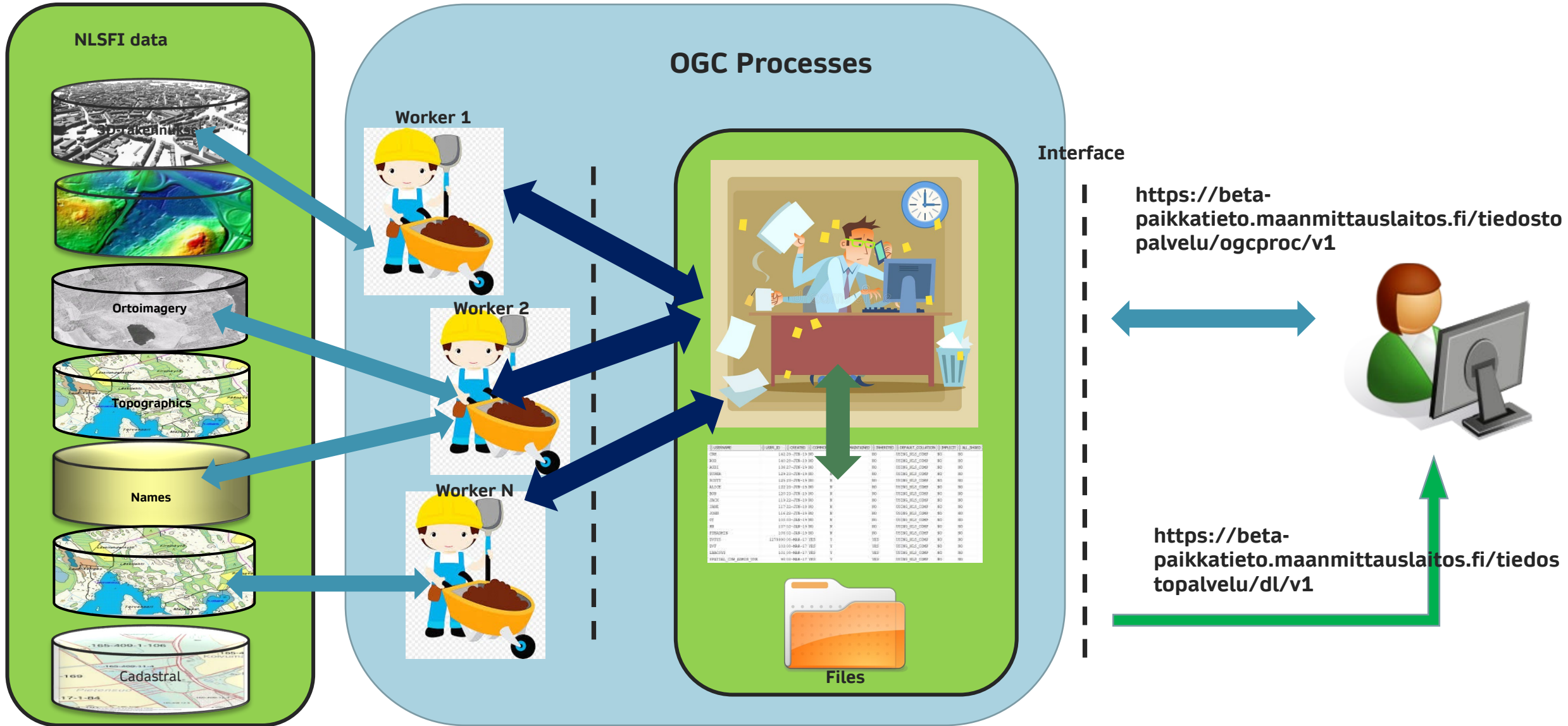
☐ Select municipality

Select a municipality from the drop-down menu and add one at a time to the basket. A maximum of 10 municipalities can be included in one order.

Choose

☐ Select the whole of Finland

OGC API Processes – NLSFI download service



Use case - OGC API Coverages

- DTM and DSM
 - Finland, Norway, The Netherlands, Spain, Estonia (no DSM)
- Façade on top of existing WCS-services



Use caseOGC API Joins

- Combine geospatial data and tabular data
- E.g Administrative Units and statistical information

The GeoE3 Data Joining Service

Select a language

English

Select a database

Kuntien_avainluvut

Select a topic

With the 2019 regional division

Select a table

Municipal key figures 1987-2018

Municipal key figures by Region 2019, Information and Year

Region 2019

Municipalities 2019

Information

Population

Year

1992

Join

Return

The GeoE3 Data Joining Service

Date

Collection:

Attribute data:

12.09.2022 17:16

kunnat-2019

stat-fi-file.csv

Joined rows (i):	310	Show rows
Unjoined rows (i):	1	Show rows
Additional rows (i):	1	Show rows
Duplicate rows (i):	0	Show rows

csv

geojson

kml

Download file

Download file

Download file

Map legend

NaN - 3426

3426 - 7067

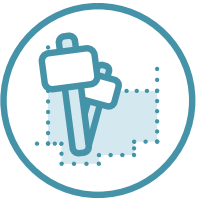
7067 - 14516

14516 - 501514



Test yourself...





Set-up a service - example



Install in 5 minutes

```
python3 -m venv pygeoapi
cd pygeoapi
. bin/activate
git clone https://github.com/geopython/pygeoapi.git
cd pygeoapi
pip3 install -r requirements.txt
python3 setup.py install
cp pygeoapi-config.yml example-config.yml
vi example-config.yml # edit as required
export PYGEOAPI_CONFIG=example-config.yml
export PYGEOAPI_OPENAPI=example-openapi.yml
pygeoapi openapi generate $PYGEOAPI_CONFIG > $PYGEOAPI_OPENAPI
pygeoapi serve
# in another terminal
curl http://localhost:5000 # or open in a web browser
```


pygeoapi

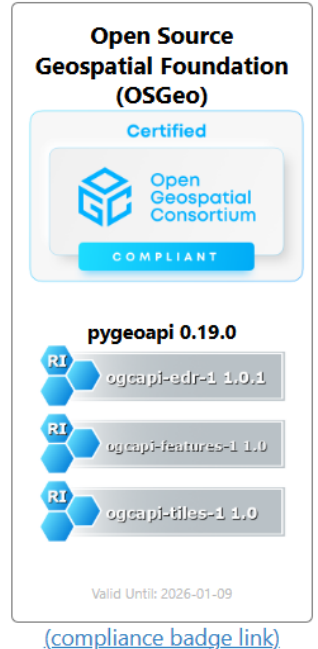
Supports

- OGC API Features
- OGC API Maps
- OGC API Tiles
- OGC API Coverages
- OGC API EDR
- OGC API Records

pygeoapi Product Details

Name: **pygeoapi**
Version: **0.19.0**
Type: **Server**
Implemented: **2025-01-05**
URL: [Product Website](#)
Platform(s): **Platform Independent**
Contact: [Tzotsos, Angelos - Open Source Geospatial Foundation](#)

Implemented Specifications / Interfaces / Alternatives	OGC Compliance Status
OGC API - Environmental Data Retrieval Standard 1.0.1  Official Reference Implementation	✔ Compliant 2025-01-10
OGC API - Environmental Data Retrieval Standard: Collections 1.0.1  Official Reference Implementation	✔ Compliant 2025-01-10
OGC API - Environmental Data Retrieval Standard: CoverageJSON 1.0.1  Official Reference Implementation	✔ Compliant 2025-01-10
OGC API - Environmental Data Retrieval Standard: EDRGeoJSON 1.0.1  Official Reference Implementation	✔ Compliant 2025-01-10
OGC API - Environmental Data Retrieval Standard: GeoJSON 1.0.1  Official Reference Implementation	✔ Compliant 2025-01-10
OGC API - Environmental Data Retrieval Standard: HTML 1.0.1  Official Reference Implementation	✔ Compliant 2025-01-10
OGC API - Environmental Data Retrieval Standard: JSON 1.0.1  Official Reference Implementation	✔ Compliant 2025-01-10
OGC API - Features - Part 1: Core 1.0  Official Reference Implementation	✔ Compliant 2025-01-10
OGC API - Maps - Part 1: Core 1.0	Implementing
OGC API - Processes - Part 1: Core 1.0	Implementing
OGC API - Tiles - Part 1: Core 1.0  Official Reference Implementation	✔ Compliant 2025-01-10
OGC API - Tiles - Part 1: DatasetTilesets 1.0  Official Reference Implementation	✔ Compliant 2025-01-10
OGC API - Tiles - Part 1: GeoDataTilesets 1.0  Official Reference Implementation	✔ Compliant 2025-01-10



Kuntarajat

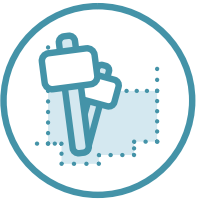
Items in this collection.



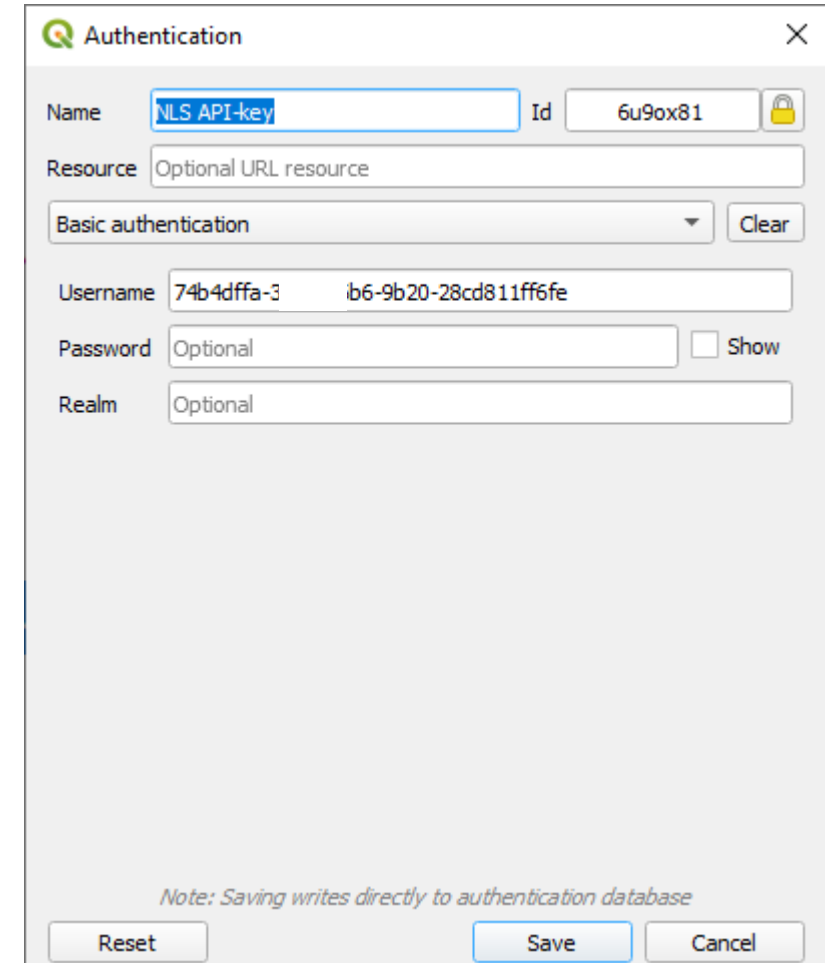
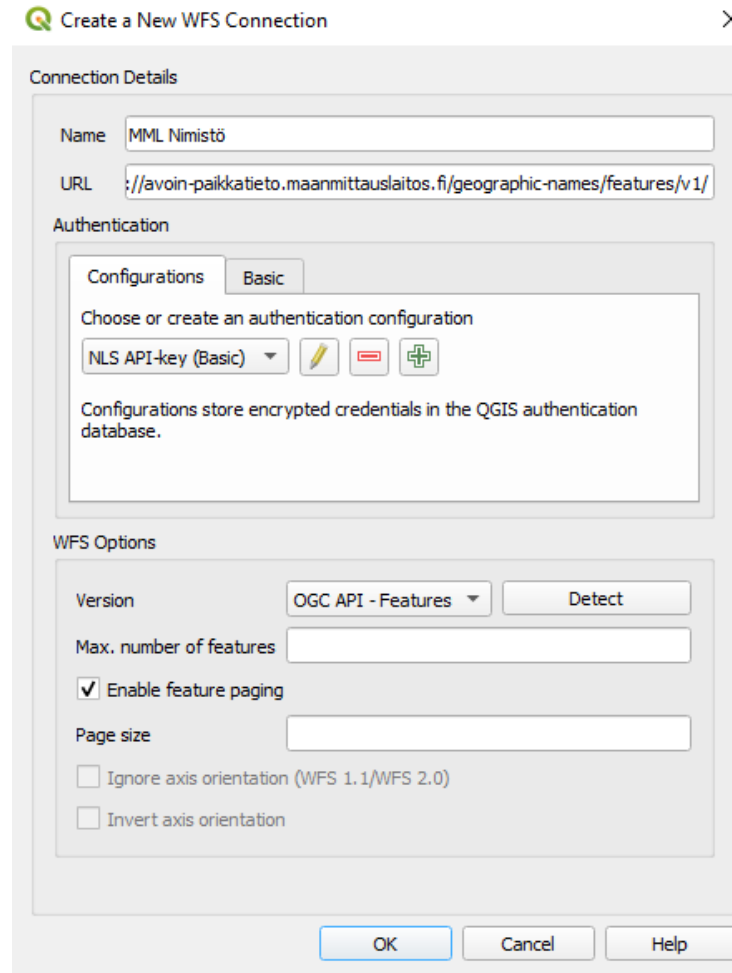
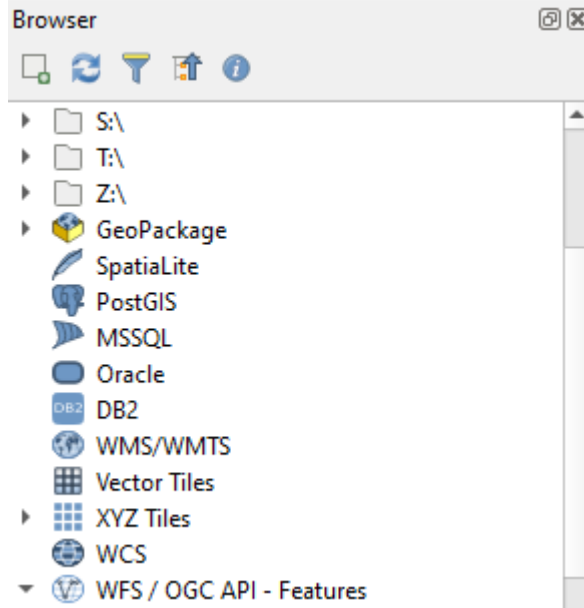
Warning: Higher limits not recommended!

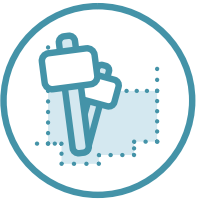
Limit:

id	gml_id	natcode	namefin	nameswe
1	16012005...	402	Lapinlahti	Lapinlahti
2	16012001...	498	Muonio	Muonio
3	16012004...	280	Korsnäs	Korsnäs
4	16012005...	305	Kuusamo	Kuusamo
5	16012005...	500	Muurame	Muurame
6	16012000...	438	Lumparland	Lumparland
7	16012000...	072	Hailuoto	Karlö
8	16012001...	562	Orivesi	Orivesi

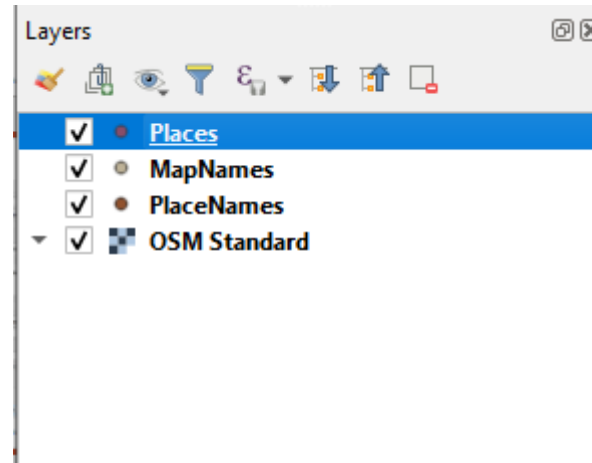
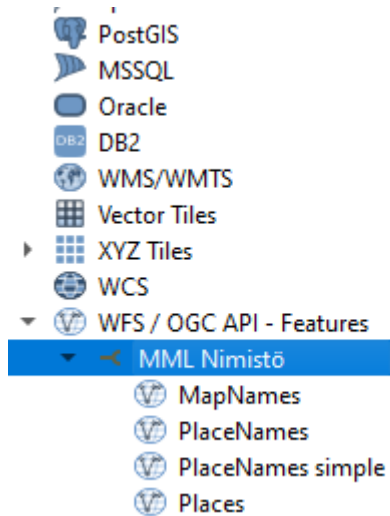


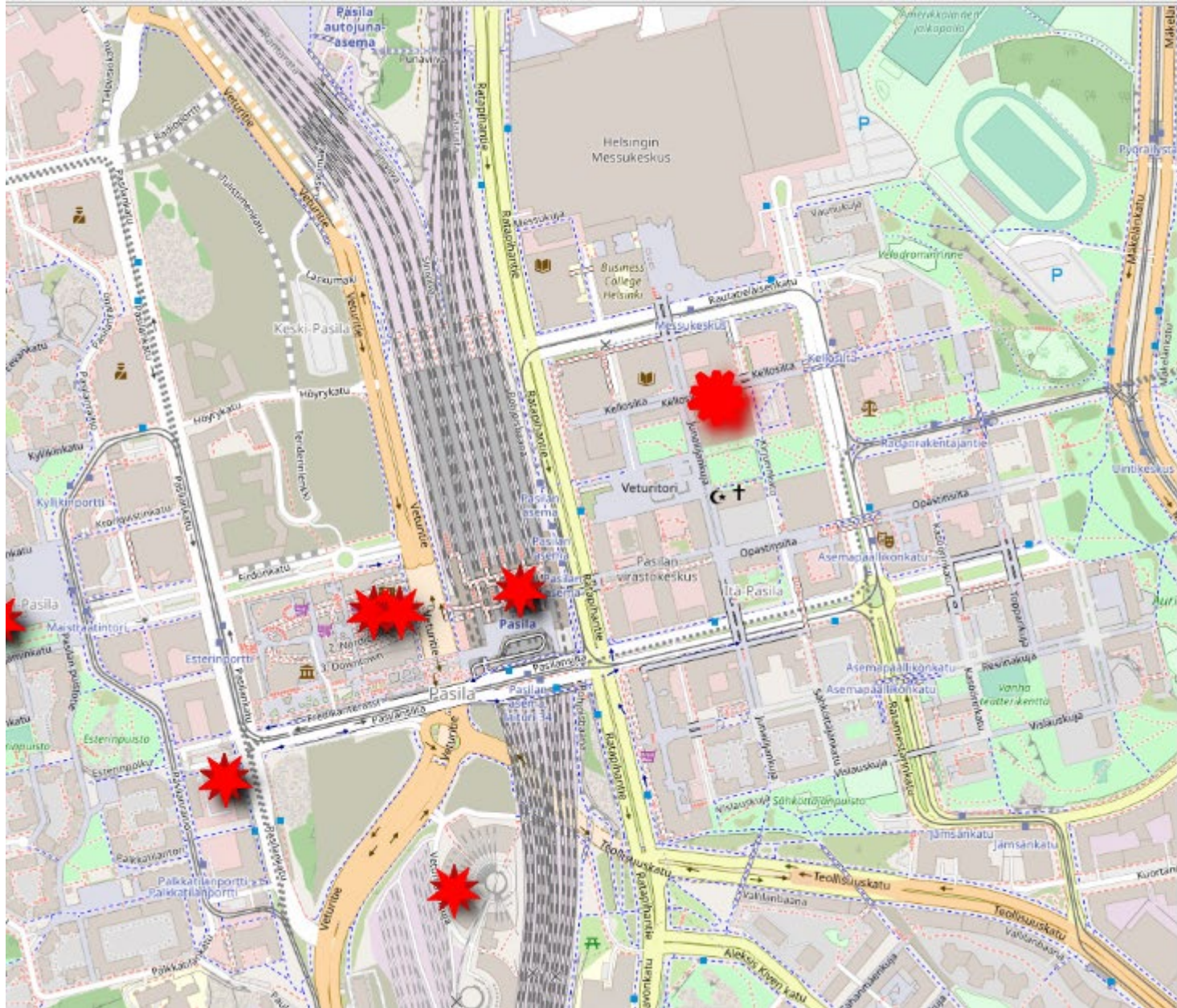
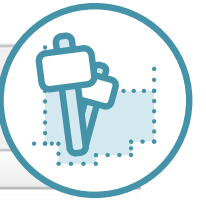
Client access – QGIS:





QGIS - layers





Identify Results	
Feature	Value
▼ PlaceNames [2]	
▼ placeNameId	40342683
▶ (Derived)	
▶ (Actions)	
id	PN_40342683
placeNameId	40342683
placeNameVersionId	1
spelling	Itä-Pasila
language	fin
languageOfficiality	1
languageDominance	1
placeNameSource	1
placeNameStatus	5
placeNameCreation...	2008-12-05 22:00:00
placeNameModifica...	2008-12-05 22:00:00
placeNameDeletion...	NULL
placeId	10342683
placeVersionId	2
placeType	3020105
placeTypeDescription	3020105
placeTypeCategory	3
placeTypeGroup	302
placeTypeSubgroup	30201
placeElevation	25
tm35MapSheet	L4133B4
gslsMapSheet	203406B
rescueGridSquare	1904A1
municipality	091
subregion	011
region	01
scaleRelevance	100000
placeCreationTime	2008-12-05 22:00:00
placeModificationTi...	2016-06-30 09:16:32
placeDeletionTime	NULL
▶ placeNameId	40342684

Mode Current Layer

Thanks!

 @JariReini

 <https://www.linkedin.com/in/reini/>



We know the Earth
– we secure the future

