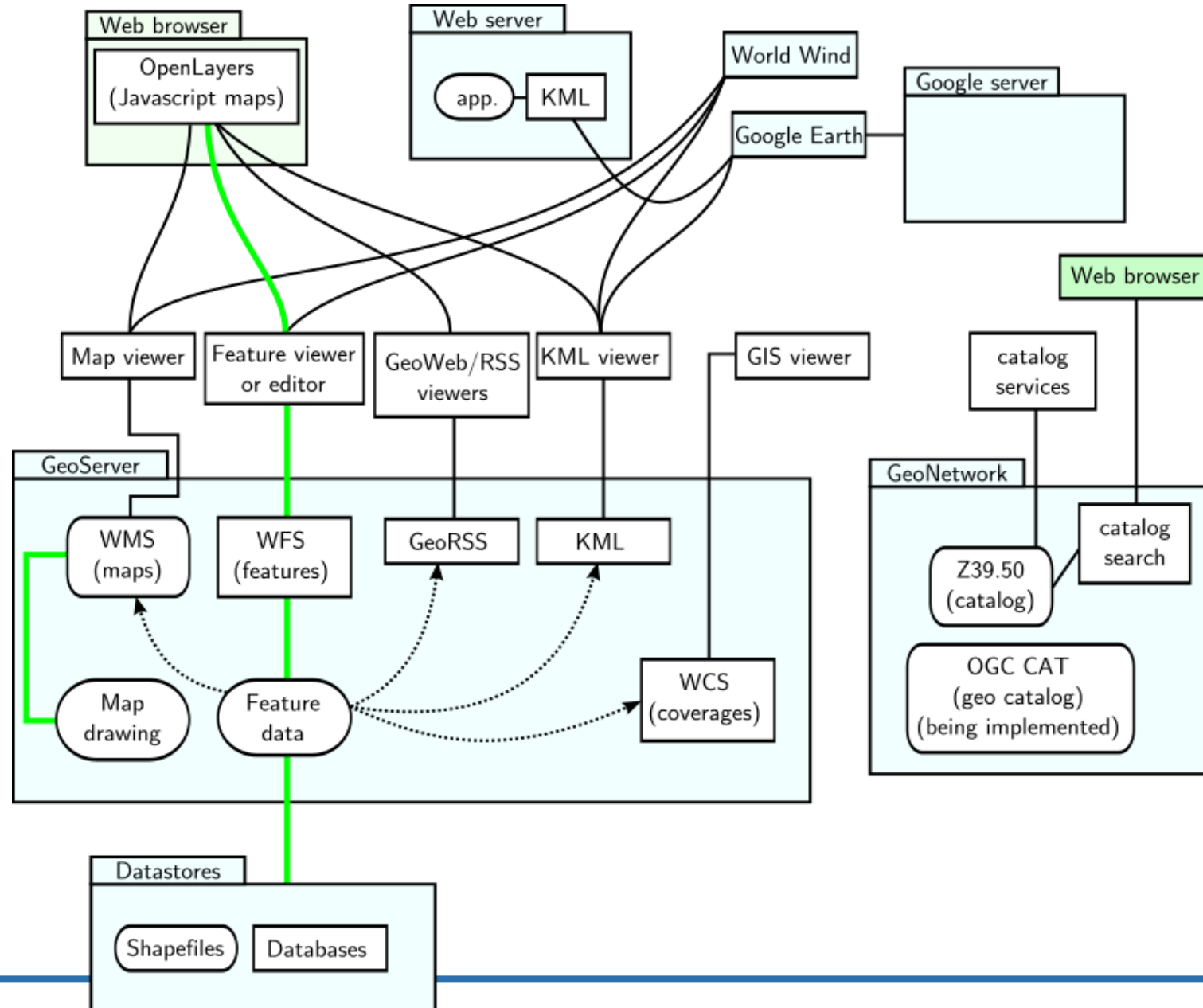


# OGC API: o novo paradigma da disponibilização da informação geográfica

**Danilo Furtado**

Direção-Geral do Território

# Infraestruturas de Informação Geográfica

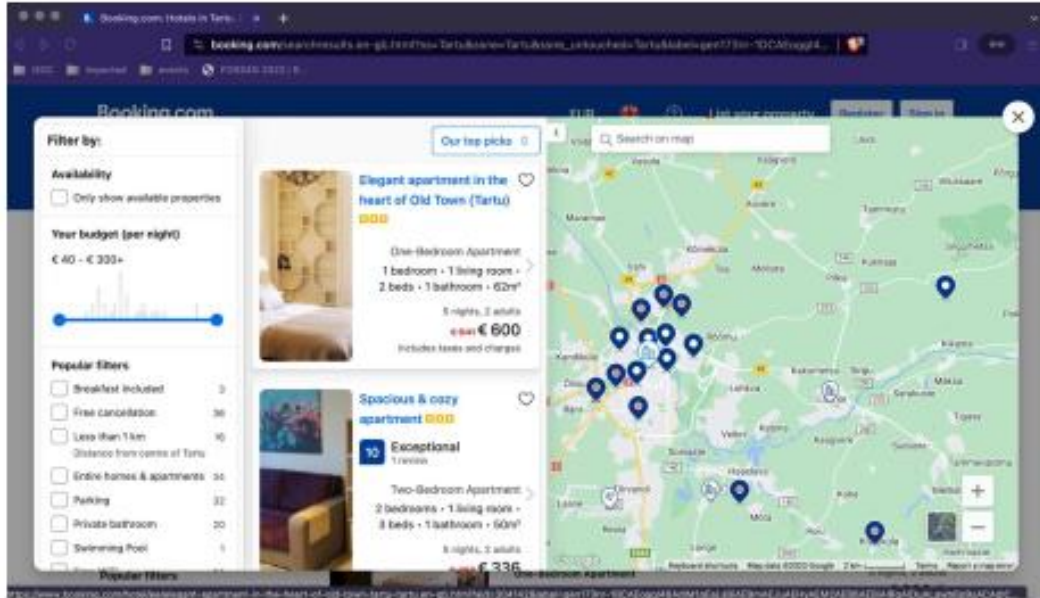


# 1ª Geração de Serviços de Web OGC (W\*s)

- WMS, WMTS, WFS, WPS, CWS, CSW
- 1990s/2000s
- SOAP/XML

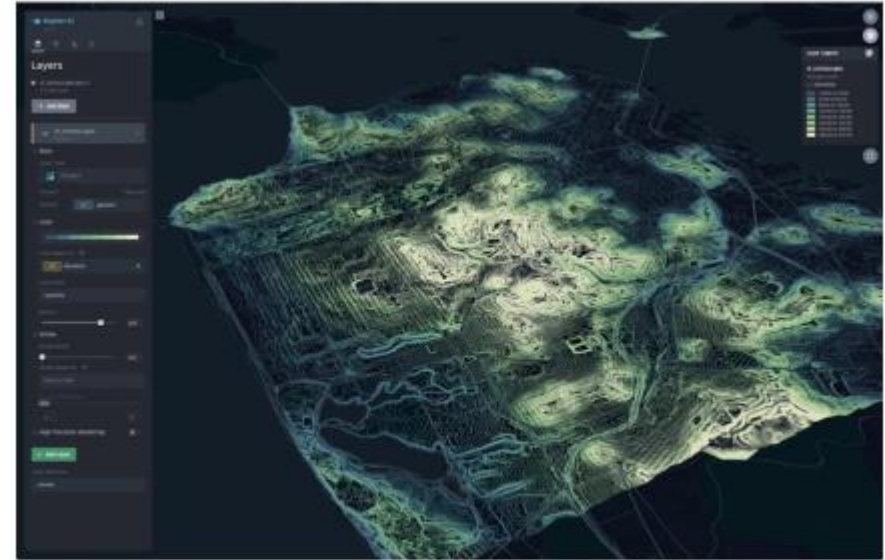
|  | WMS   | WFS | WCS | WPS | SOS | SPS | CSW | WMTS  |
|--|-------|-----|-----|-----|-----|-----|-----|-------|
| Use HTTP methods explicitly.                               | Y     | N   | Y*  | N   | N   | N   | N   | Y     |
| Be stateless.  | Y     | Y   | Y   | Y   | Y   | Y   | Y   | Y     |
| Expose directory structure-like URIs.                      | N     | N   | N   | N   | N   | N   | N   | Y     |
| Use HTTP Error codes                                       | N     | N   | N   | N   | N   | N   | N   | N     |
| Transfer XML, JavaScript Object Notation (JSON), or image. | Image | XML | Any | Any | XML | XML | XML | Image |

# Dados espaciais

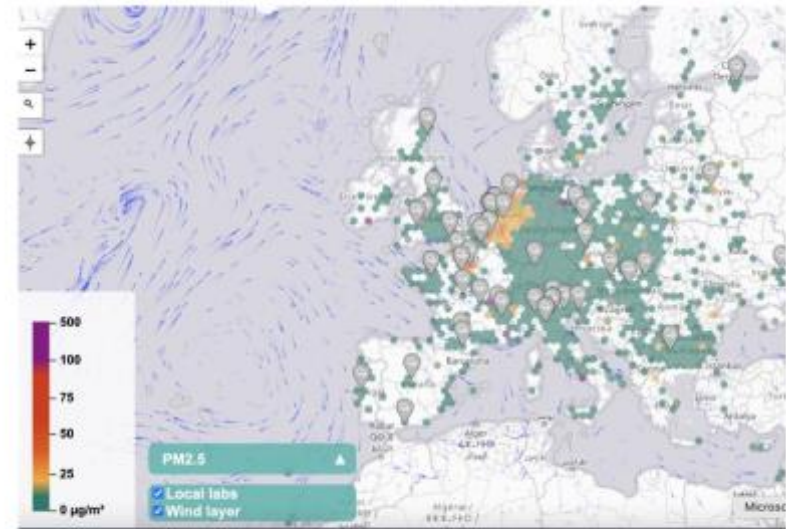


Booking

- Aumento exponencial de dados espaciais
- E de programadores

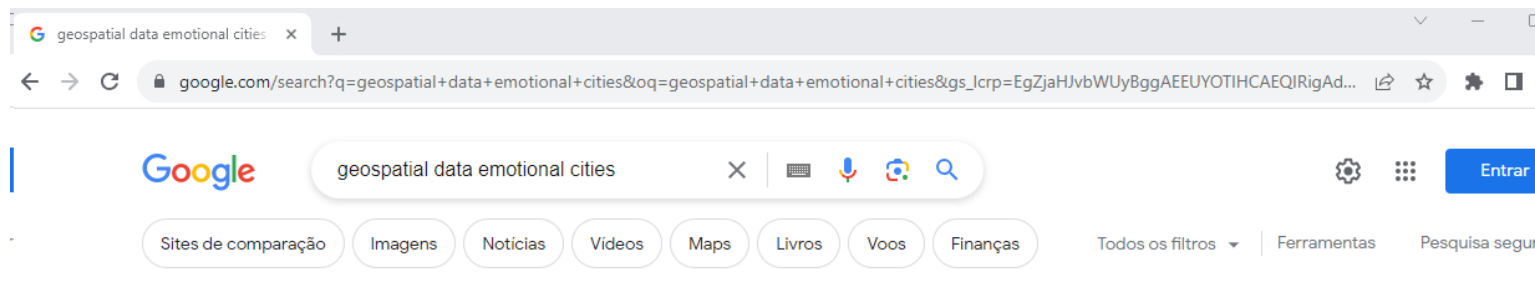


Uber



Sensor.community

# O que esperam os utilizadores nos dias de hoje?



Cerca de 2 470 000 resultados (0,34 segundos)

Artigos de âmbito escolar para **geospatial data emotional cities**

Open **geospatial data** contribution towards sentiment ... - de Oliveira - Citado por 7

... survey on determining urban **emotions** using **geo-data** ... - Choudhury - Citado por 8

**Emotion & stress mapping: Assembling an ambient** ... - De Oliveira - Citado por 24

byteroad.net  
<https://emotional.byteroad.net> · Traduzir esta página

## pygeoapi eMOTIONAL Cities instance

pygeoapi eMOTIONAL Cities instance. Provides an API to eMOTIONAL Cities geospatial data. geospatial data api eMOTIONAL Cities Neuroscience Urban Planning H2020.

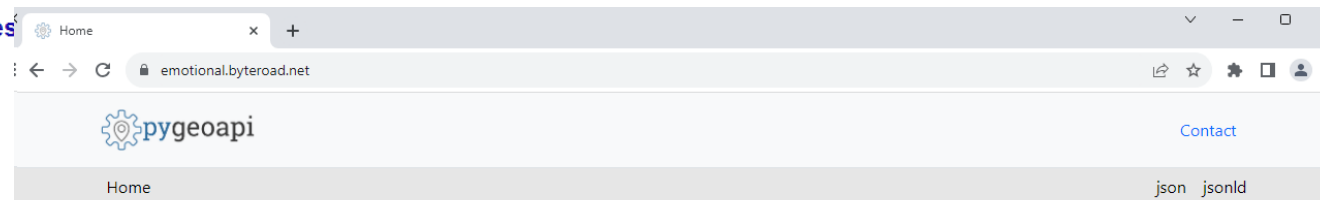
eMOTIONAL Cities  
<https://emotionalcities-h2020.eu> · Traduzir esta página

## eMOTIONAL Cities: Homepage

The eMOTIONAL Cities project aims to provide scientific evidence on how the natural and built urban environment shapes the neural system underlying human ...

Não inclui: geospatial | Tem de incluir: geospatial

eMOTIONAL Cities  
<https://emotionalcities-h2020.eu> · Traduzir esta página



## pygeoapi eMOTIONAL Cities instance

Provides an API to eMOTIONAL Cities geospatial data

geospatial data api eMOTIONAL Cities Neuroscience Urban Planning H2020

Terms of service <https://creativecommons.org/licenses/by/4.0/>  
License [CC-BY 4.0 license](https://creativecommons.org/licenses/by/4.0/)

## Collections

[View the collections in this service](#)

## API Definition

Documentation: [Swagger UI](#) [ReDoc](#)

[OpenAPI Document](#)

## Conformance

[View the conformance classes of this service](#)

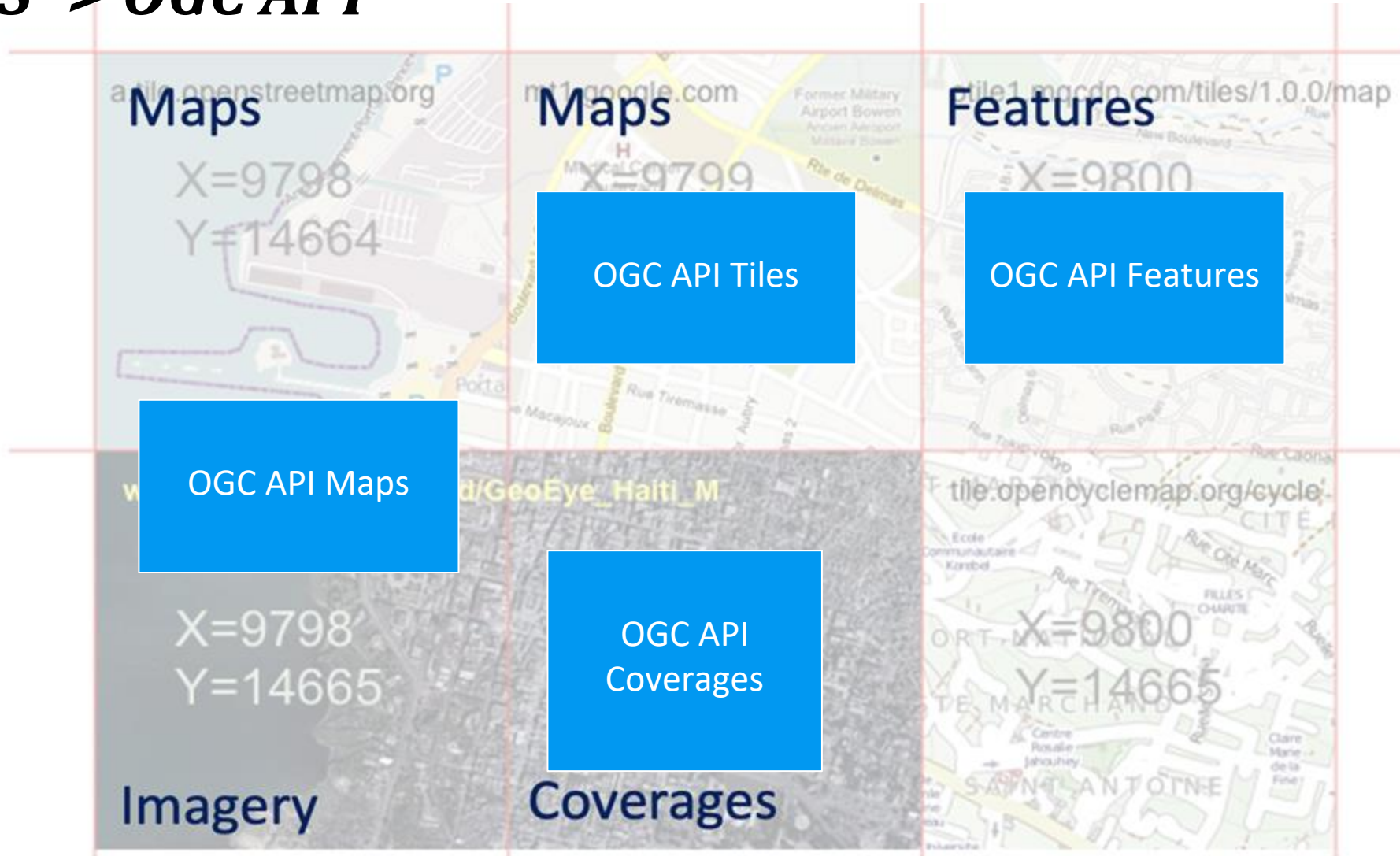
|   |
|---|
| <b>Provider</b>   |
| ByteRoad<br><a href="https://byteroad.net">https://byteroad.net</a>               |
| <b>Contact point</b>  |
| <b>Address</b><br>R. Ricardo Espírito Santo<br>Lisbon, Lisbon<br>1200<br>Portugal |
| <b>Email</b><br><a href="mailto:info@byteroad.net">info@byteroad.net</a>          |
| <b>Telephone</b><br><a href="tel:+351-210-300-0000">+351-210-300-0000</a>         |
| <b>Fax</b><br><a href="tel:+351-210-300-0000">+351-210-300-0000</a>               |
| <b>Contact URL</b><br><a href="https://byteroad.net">https://byteroad.net</a>     |
| <b>Hours</b><br>Hours of Service<br><a href="#">Contact instructions</a>          |

# OGC API

- Normas específicas para dados geoespaciais
- REST, HTTP methods, status codes, errors
- Padroniza como as máquinas solicitam e recebem dados geoespaciais
- Melhoram a experiência dos programadores
- Tiram partido da norma OpenAPI
- Formatos recomendados: JSON e HTML
- Substituir e melhorar os Serviços Web OGC (W\*s).



# OWS -> OGC API



OGC API Records

Discover via

Fonte: Suporte à OGC API no QGIS, estado atual e propostas de desenvolvimentos futuros, Joana Simões - OGC

# OGC API

OGC API –  
Discrete Global Grid Systems



OGC API –  
Records



OGC API - Maps



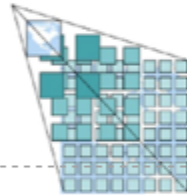
OGC API - Styles



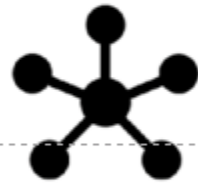
OGC API –  
Moving Features



OGC API - Tiles



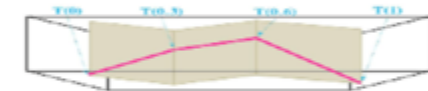
OGC API - Common



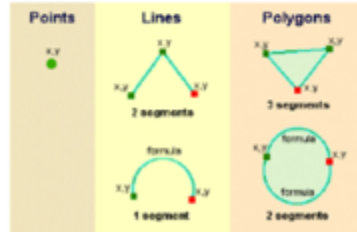
OGC API - Routes



OGC API –  
Environmental Data Retrieval



OGC API - Features



OGC API - Processes



OGC API – Coverages



OGC API –  
Joins



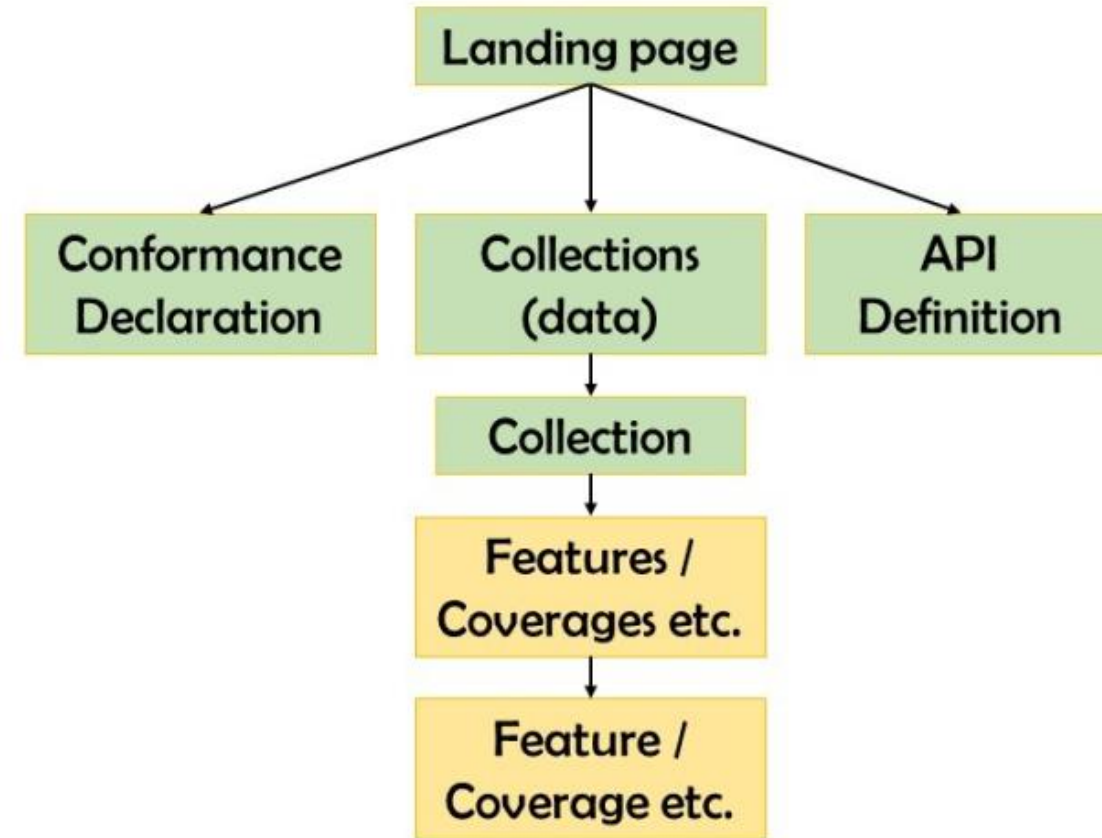
Green  
border  
means  
approved

Fonte: <https://ogcapi.ogc.org/>

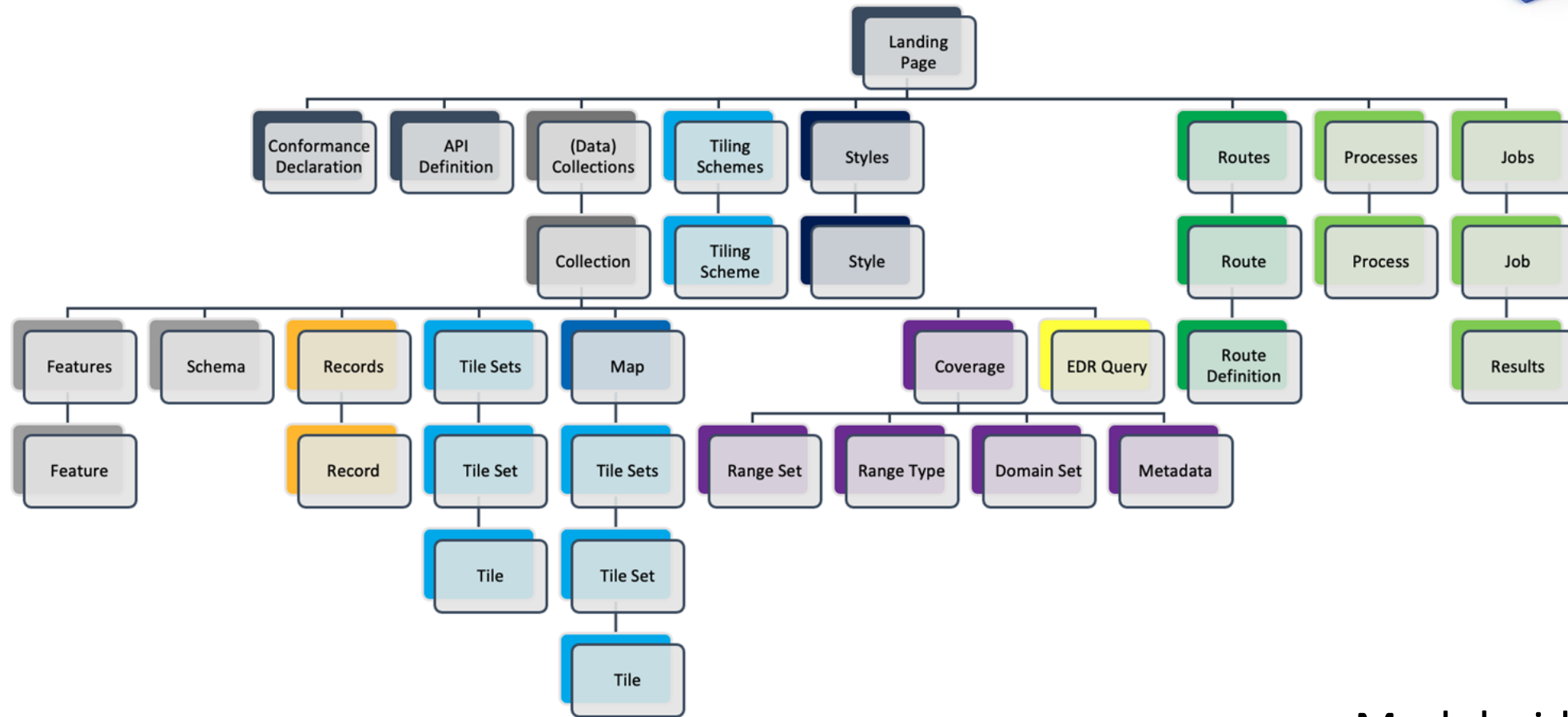


# Recursos das OGC API

- **Landing page** – ponto de partida para a utilização da API
- **API definition** – descrição da documentação da API, incluindo a página de destino e os seus subrecursos
- **Conformance declaration** – enumera as classes de conformidade dos *standards*
- **Collections** – os dados de um conjunto de dados.



# Recursos das OGC API



Fornecer uma forma **normalizada e uniforme** de acessar, consultar e manipular diferentes tipos de dados ou serviços geoespaciais.

- Modularidade
- Escalabilidade
- Interoperabilidade

# Recursos das OGC API

- Landing page

The screenshot shows the landing page for the OGC API of the Instituto Geográfico Nacional. The page features a header with the institute's logo and a 'Contact' link. A navigation bar includes 'Home' and a highlighted 'json json-ld' button. The main content area is titled 'API for downloading geographic objects (API-Features) of the National Geographic Institute' and includes a descriptive paragraph. Below this, there are three tags: 'geospatial', 'data', and 'api'. A table lists 'Terms of service' and 'License' with their respective URLs. The page also has sections for 'Collections', 'API Definition', and 'Conformance', each with a link to view more details. On the right side, there are two boxes: 'Provider' and 'Contact point', both containing contact information for the Instituto Geográfico Nacional de España.

Instituto Geográfico Nacional  
ORGANISMO AUTÓNOMO CENTRO NACIONAL DE INFORMACIÓN GEOGRÁFICA

Contact

Home json json-ld

## API for downloading geographic objects (API-Features) of the National Geographic Institute

API for downloading geographic objects from the National Geographic Institute from Boundary Lines, the Basic Geographic Gazetteer of Spain (NGBE) and vertices of the ERGNSS, REDNAP, REGENTE and ROI Geodetic Networks. The service is based on the OGC API-Features standard.

geospatial data api

|                  |   |
|------------------|---|
| Terms of service | <a href="https://creativecommons.org/licenses/by/4.0/">https://creativecommons.org/licenses/by/4.0/</a> |
| License          | <a href="https://creativecommons.org/licenses/by/4.0/">CC BY 4.0 ign.es</a>                             |

### Collections

[View the collections in this service](#)

### API Definition

Documentation: [Swagger UI](#) [ReDoc](#)

[OpenAPI Document](#)

### Conformance

[View the conformance classes of this service](#)

**Provider**

**Instituto Geográfico Nacional de España**  
<https://www.ign.es/>

**Contact point**

**Address**  
C/ General Ibáñez de Ibero, 3  
Madrid, Madrid  
28003  
España

**Email**  
[ign@mitma.es](mailto:ign@mitma.es)


**Telephone**  
[+34 91 597 96 46](tel:+34915979646)

**Fax**  
[+34 91 597 97 64](tel:+34915979764)

<https://api-features.ign.es/>

# Recursos das OGC API

- Collections

Contact

Home / Collections json json-ld

## Collections in this service

| Name  | Type    | Description  |
|---|---------|--|
| <a href="#">Administrative unit</a>                                     | feature | Unit of administration where a Member State has and/or exercises jurisdictional rights, for local, regional and national governance.                 |
| <a href="#">Administrative boundary</a>                                 | feature | A line of demarcation between administrative units.  |
| <a href="#">Named place</a>   | feature | Any real world entity referred to by one or several proper nouns.  |
| <a href="#">GNSS Reference Stations Network (ERGNSS)</a>                | feature | It contains the information about the GNSS Reference Stations Network (code, name of station and geodetic data sheets).                              |
| <a href="#">High Precision Leveling Network (REDNAP)</a>                | feature | It contains the information about the High Precision Leveling Network (number, name, geodetic data sheets, node, type, group and line).              |
| <a href="#">National Geodetic Network by Space Techniques (REGENTE)</a> | feature | It contains the information about the National Geodetic Network by Space Techniques (number, name, geodetic data sheets, municipality and province). |
| <a href="#">Lower Order Network (ROI)</a>                               | feature | It contains the information about the Lower Order Network (number, name, geodetic data sheets, municipality and province).                           |

<https://api-features.ign.es/collections?f=html>

# Recursos das OGC API


- Features

Instituto Geográfico Nacional [Contact](#)

Home / Collections / Administrative unit / Items json json-Id

## Administrative unit

Items in this collection.



Warning: Higher limits not recommended!  
Limit: 10 (default)   
[Next](#)

| id                     | nameunit             | nationallevel   | country | nationalcode | nationale |
|------------------------|----------------------|---|---------|--------------|-----------|
| <a href="#">950472</a> | Abla                 | <a href="https://inspire.ec.europa.eu/cod...">https://inspire.ec.europa.eu/cod...</a> | ES      | 34010404001  | Municipio |
| <a href="#">950473</a> | Abrucena             | <a href="https://inspire.ec.europa.eu/cod...">https://inspire.ec.europa.eu/cod...</a> | ES      | 34010404002  | Municipio |
| <a href="#">950474</a> | Adra                 | <a href="https://inspire.ec.europa.eu/cod...">https://inspire.ec.europa.eu/cod...</a> | ES      | 34010404003  | Municipio |
| <a href="#">950475</a> | Albanchez            | <a href="https://inspire.ec.europa.eu/cod...">https://inspire.ec.europa.eu/cod...</a> | ES      | 34010404004  | Municipio |
| <a href="#">950476</a> | Alboloduy            | <a href="https://inspire.ec.europa.eu/cod...">https://inspire.ec.europa.eu/cod...</a> | ES      | 34010404005  | Municipio |
| <a href="#">950477</a> | Albox                | <a href="https://inspire.ec.europa.eu/cod...">https://inspire.ec.europa.eu/cod...</a> | ES      | 34010404006  | Municipio |
| <a href="#">950478</a> | Alcolea              | <a href="https://inspire.ec.europa.eu/cod...">https://inspire.ec.europa.eu/cod...</a> | ES      | 34010404007  | Municipio |
| <a href="#">950479</a> | Alcóntar             | <a href="https://inspire.ec.europa.eu/cod...">https://inspire.ec.europa.eu/cod...</a> | ES      | 34010404008  | Municipio |
| <a href="#">950480</a> | Alcudia de Monteagud | <a href="https://inspire.ec.europa.eu/cod...">https://inspire.ec.europa.eu/cod...</a> | ES      | 34010404009  | Municipio |
| <a href="#">950481</a> | Alhabia              | <a href="https://inspire.ec.europa.eu/cod...">https://inspire.ec.europa.eu/cod...</a> | ES      | 34010404010  | Municipio |

<https://api-features.ign.es/collections/unidades-administrativas/AdministrativeUnit>

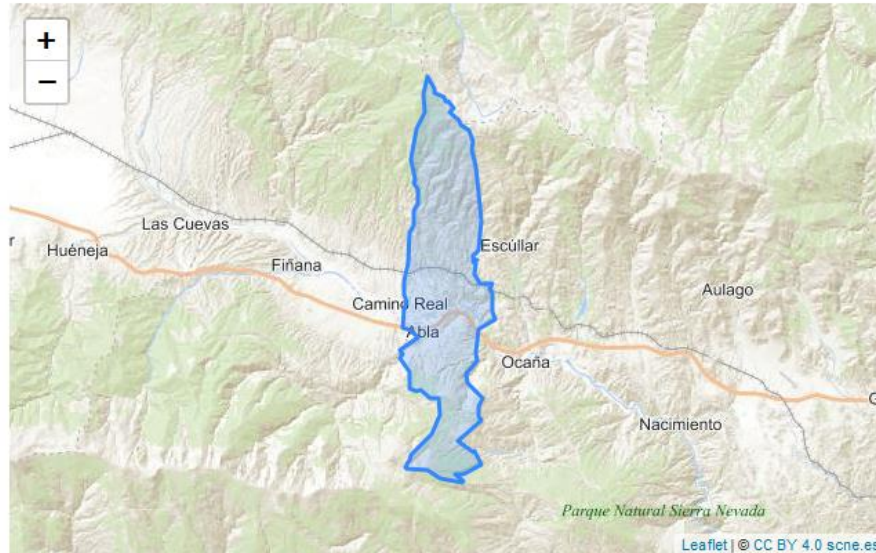
# Recursos das OGC API

- Feature

Instituto Geográfico Nacional [Contact](#)

Home / Collections / Administrative unit / Items / Item [json](#) [json-ld](#)

## Item



[Prev](#) [Next](#)

| Property          | Value  |
|-------------------|--|
| id                | 950472   |
| nameunit          | Abia   |
| nationallevel     | <a href="https://inspire.ec.europa.eu/codelist/AdministrativeHierarchyLevel/4thOrder">https://inspire.ec.europa.eu/codelist/AdministrativeHierarchyLevel/4thOrder</a>  |
| country           | ES   |
| nationalcode      | 34010404001  |
| nationallevelname | Municipio  |
| Links             | <ul style="list-style-type: none"><li><a href="#">The landing page of this server as JSON</a> (application/json)</li><li><a href="#">The landing page of this server as HTML</a> (text/html)</li><li><a href="#">This document as GeoJSON</a> (application/geo+json)</li><li><a href="#">This document as RDF (JSON-LD)</a> (application/ld+json)</li><li><a href="#">This document as HTML</a> (text/html)</li><li><a href="#">Administrative unit</a> (application/json)</li><li><a href="#">950472?f=html</a> (text/html)</li><li><a href="#">950473?f=html</a> (text/html)</li></ul> |

<https://api-features.ign.es/collections/unidades-administrativas/AdministrativeUnit/items/950472>

# Recursos das OGC API

```
JSON Raw Data Headers
Save Copy Collapse All Expand All Filter JSON
▼ collections:
  ▼ 0:
    id: "unidades-administrativas/AdministrativeUnit"
    title: "Administrative unit"
    description: "Unit of administration where a Member State has and/or exercises jurisdictional rights, for local, regional and national governance."
    keywords:
      0: "unidad"
      1: "administrativa"
    links:
      ▼ 0:
        type: "text/html"
        rel: "about"
        title: "Metadato de Divisiones Administrativas de España"
        href: "https://www.ideo.es/csw-codsi-ideo/srv/spa/cataLog.search#/metadato/spaianLLM"
        hreflang: "es"
      ▼ 1:
        type: "text/xml"
        rel: "about"
        title: "Metadato de Divisiones Administrativas de España"
        href: "https://www.ian.es/csw-inspire/srv/spa/csw?SERVICE=CSW&VERSION=2.0.2&REQUEST=GetRecordById&outputSchema=http://www.iso211.org/2005/amd&ElementSetName=FULL&ID=spianLLM"
        hreflang: "es"
      ▼ 2:
        type: "text/html"
        rel: "about"
        title: "Documentación Swagger UI "
        href: "https://api-features.ian.es/openapi?f=html"
        hreflang: "es"
      ▼ 3:
        type: "application/json"
        rel: "root"
        title: "The landing page of this server as JSON"
        href: "https://api-features.ian.es?f=json"
      ▼ 4:
        type: "text/html"
        rel: "root"
        title: "The landing page of this server as HTML"
        href: "https://api-features.ian.es?f=html"
```

# *Ecosistema de aplicações*

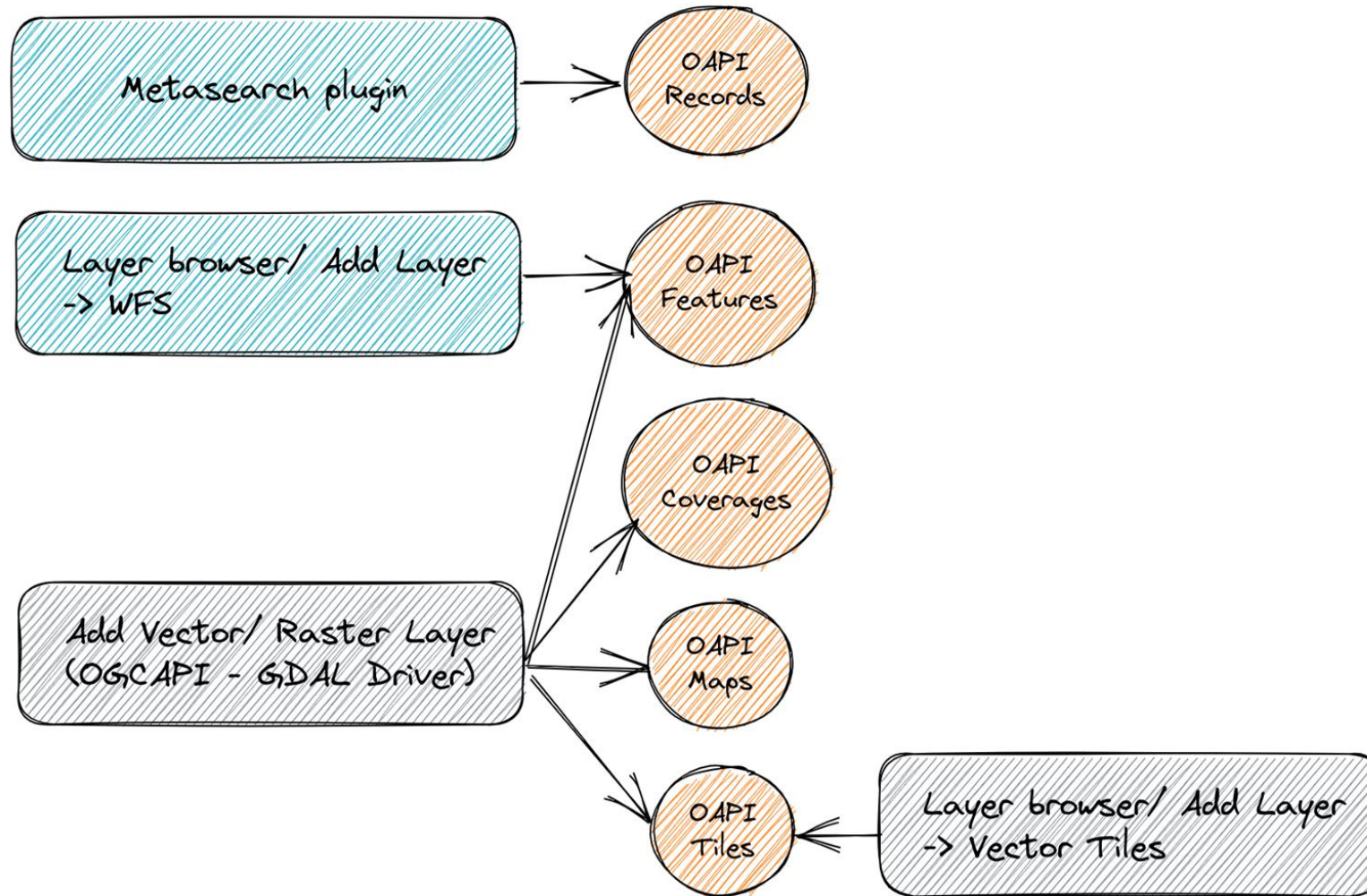
- OGC API - Features
- OGC API - Tiles
- OGC API Records
- OGC API - Processes
- OGC API - Maps
- OGC API - Coverages
- OGC API - EDR



Fonte: <https://github.com/opengeospatial/ogcapi-features/blob/master/implementations/README.adoc>



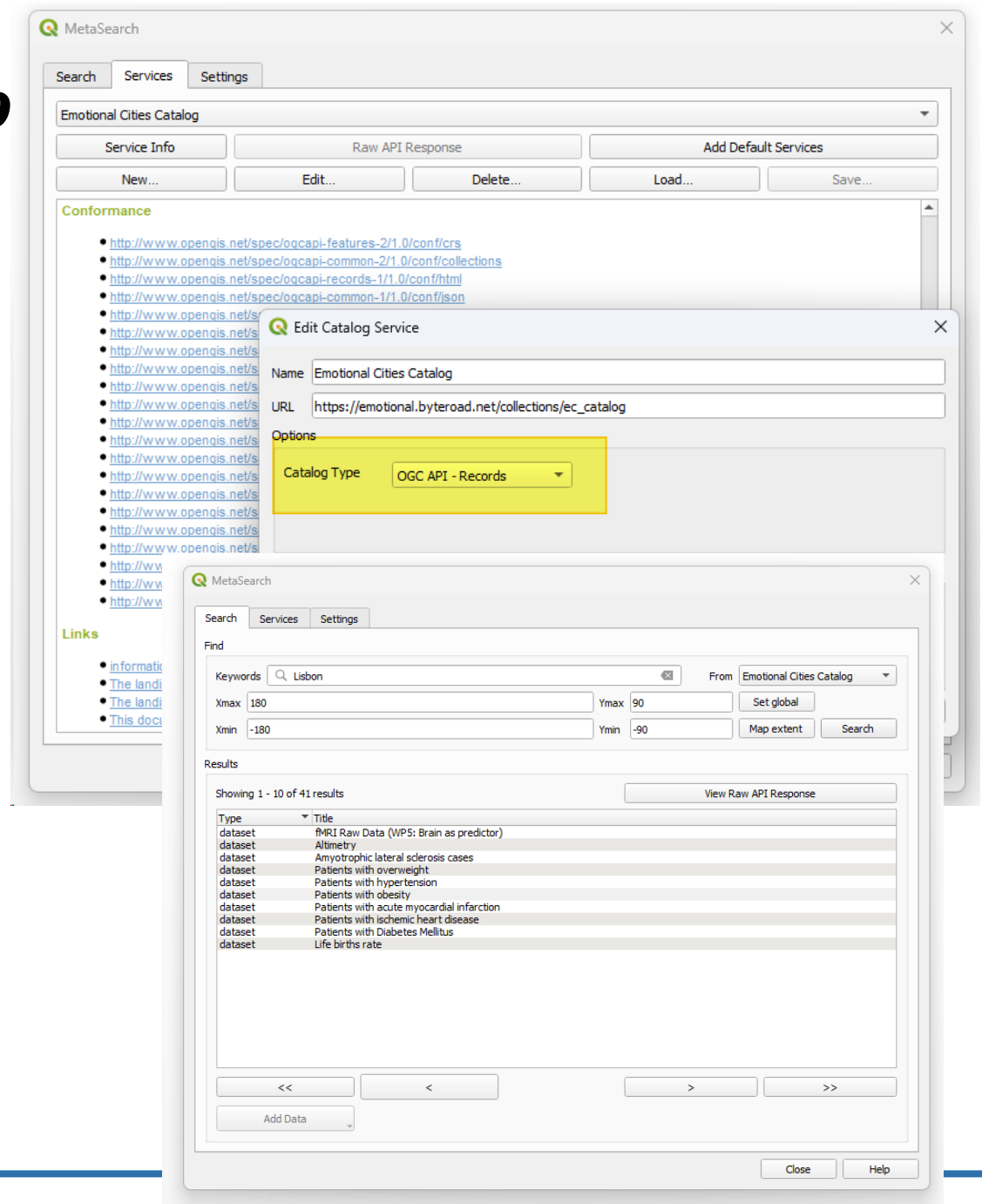
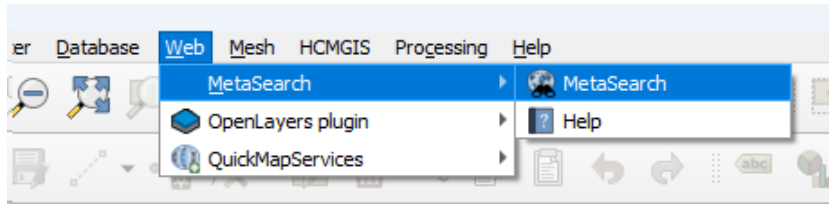
# Suporte à OGC API no QGIS Desktop (core)



Fonte: Suporte à OGC API no QGIS, estado atual e propostas de desenvolvimentos futuros, Joana Simões - OGC

# Suporte à OGC API no QGIS Desktop

- OGC API - Records

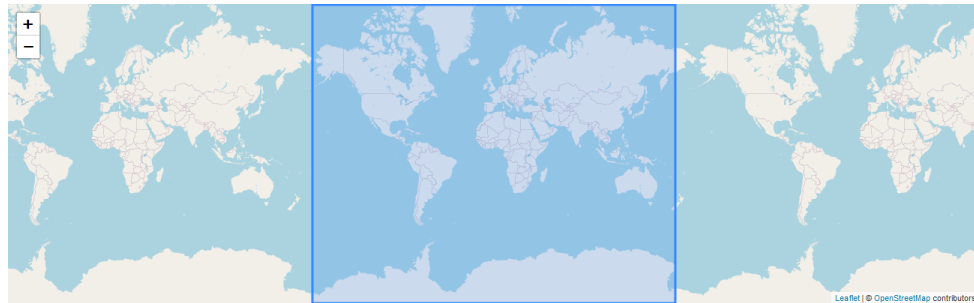


Home / Collections / eMOTIONAL Cities... json jsonld

## eMOTIONAL Cities Metadata catalog

eMOTIONAL Cities Metadata catalog (OGC API Records)

Measurements Environmental Lisbon London eMOTIONAL Cities Neuroscience Urban Planning H2020



Browse

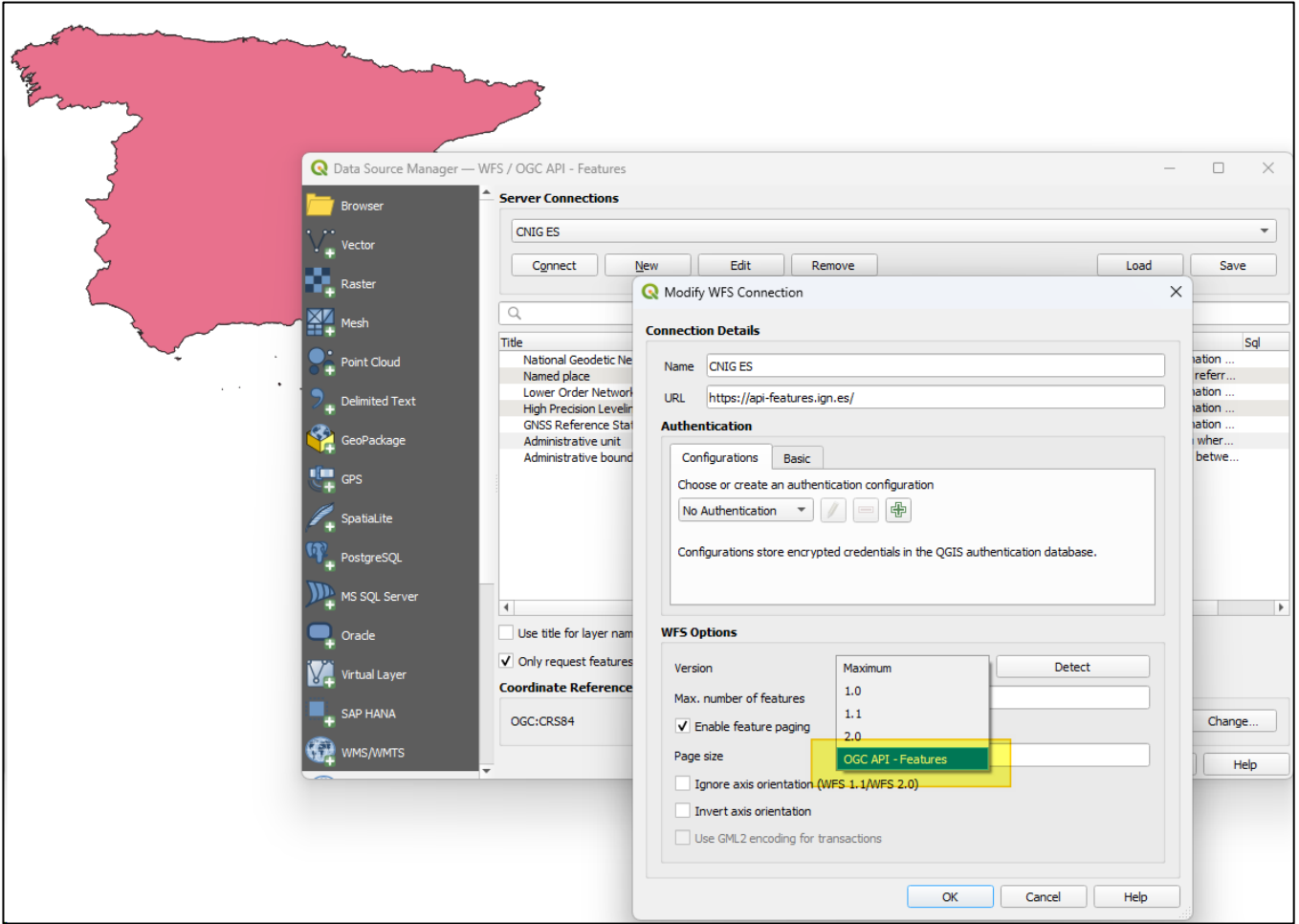
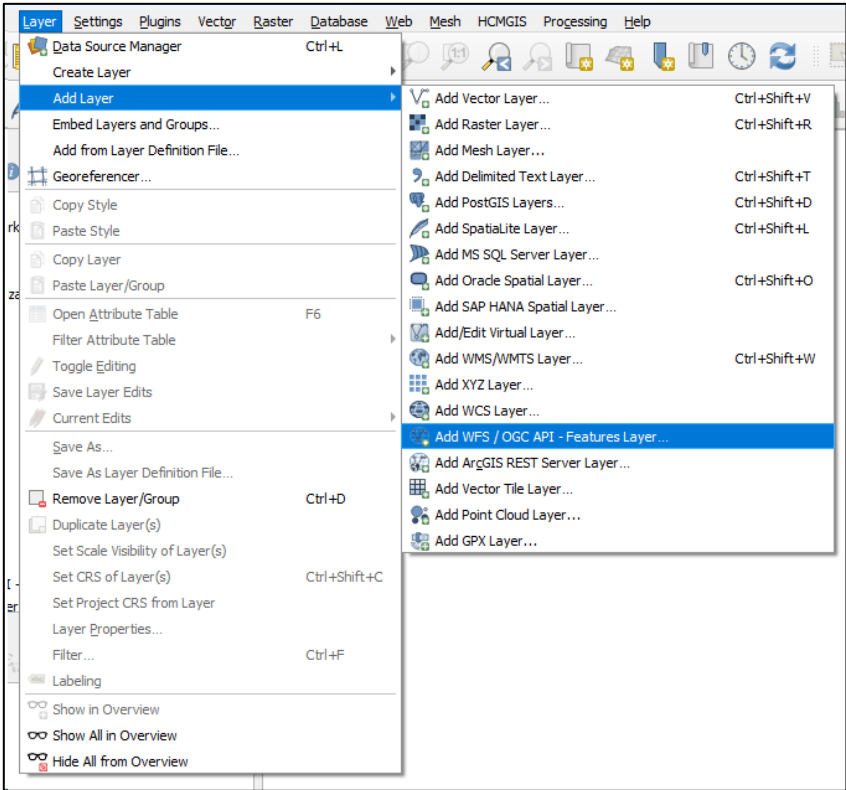
- [Browse through the items of "eMOTIONAL Cities Metadata catalog"](#)

Queryable

- [Display Queryables of "eMOTIONAL Cities Metadata catalog"](#)

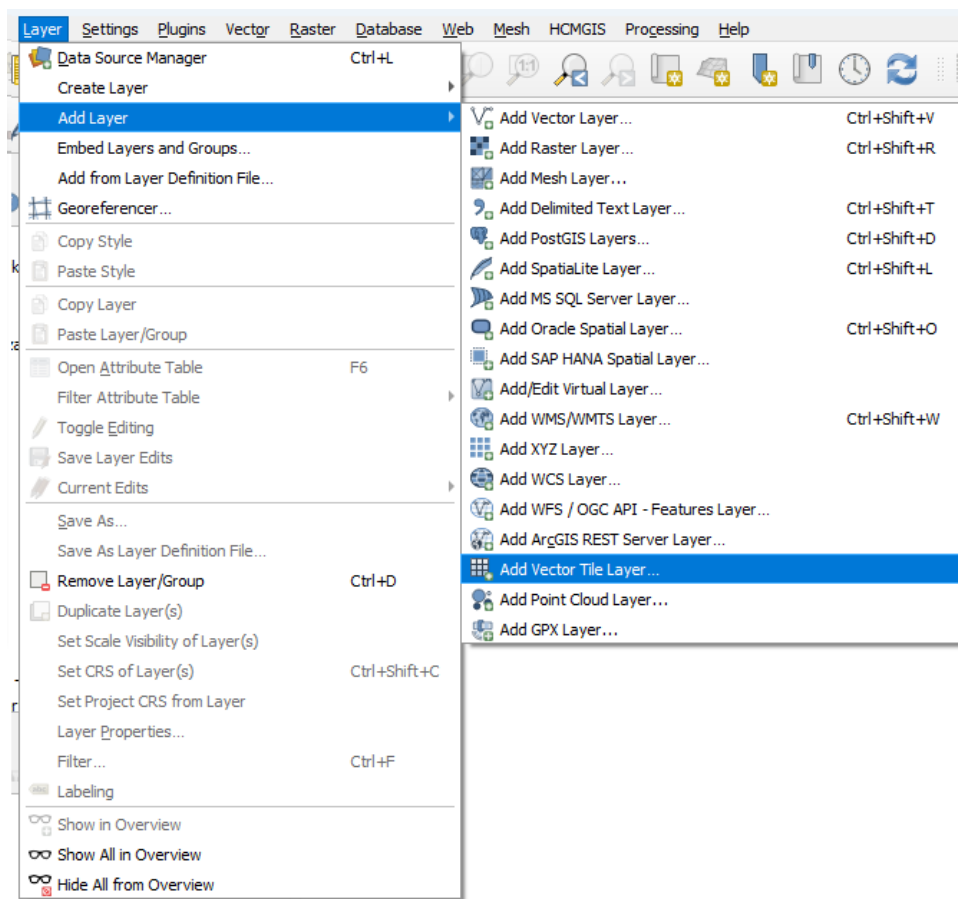
# Suporte à OGC API no QGIS Desktop (core)

- OGC API - Features



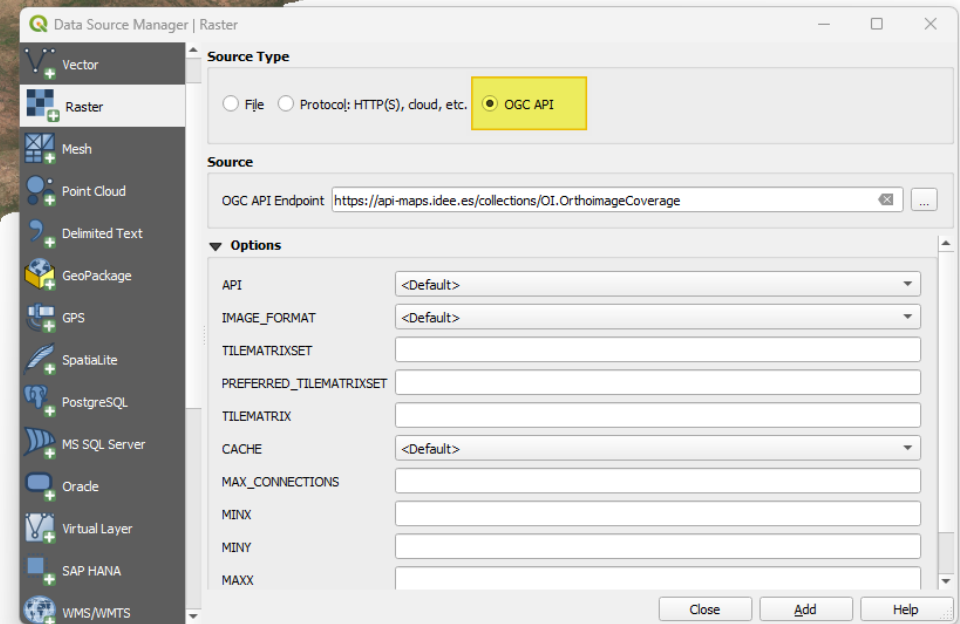
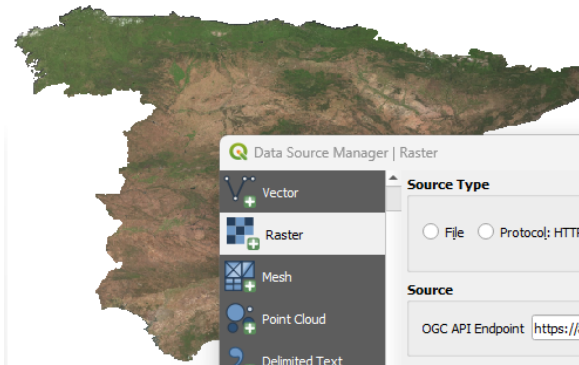
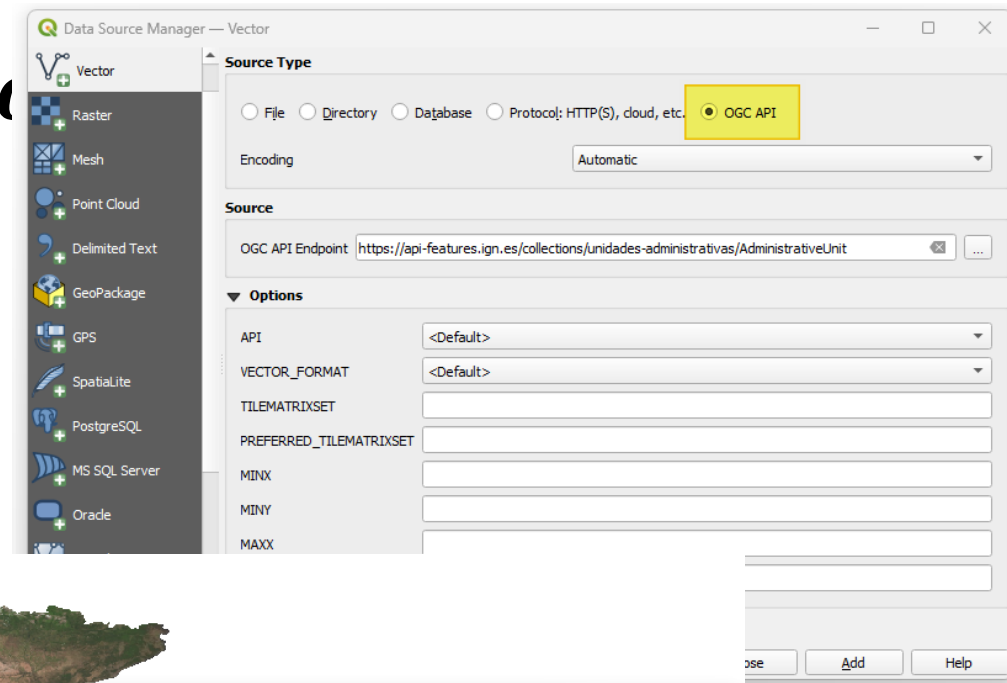
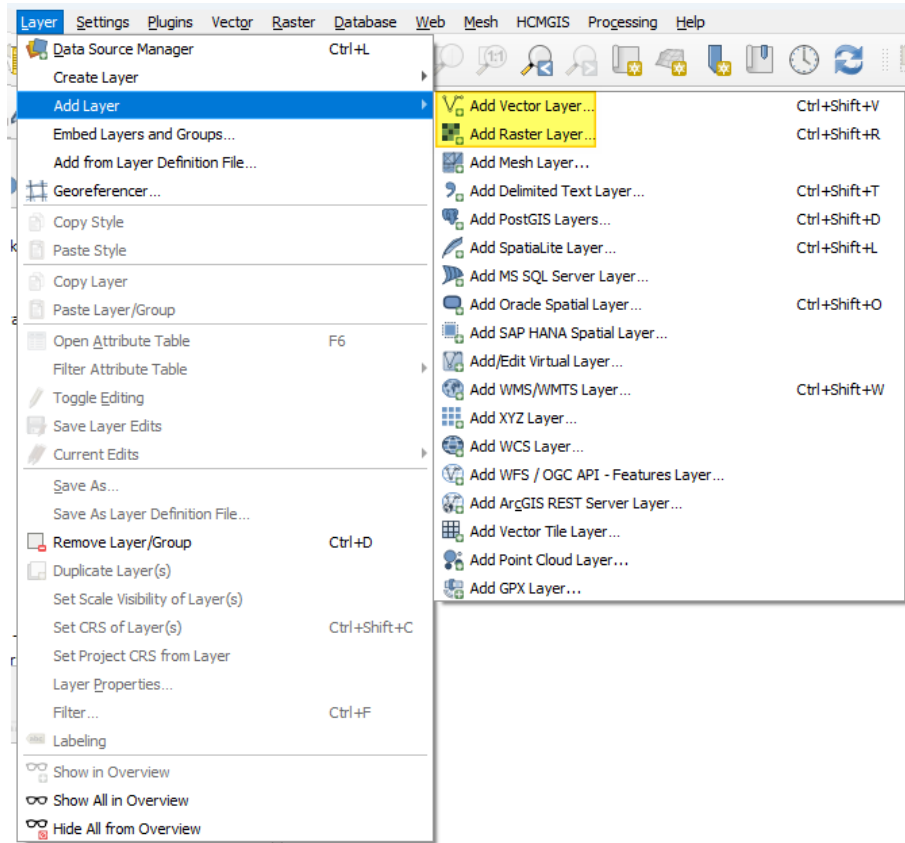
# Suporte à OGC API no QGIS Desktop (core)

- OGC API Vector Tiles



# Suporte à OGC API no QGIS Desktop (cont.)

- OGC API collection



**Obrigado!**