



Managing Urban Shallow Geothermal Energy

Project number GeoE.171.006

Deliverable D5.4

Guideline on the use of the SGE web platform tools
at the Information Platform

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General description of the deliverable according to the application form

The present deliverable describes all functionalities of the SGE web platform developed in GeoERA. It will be used in the end-user training and published for future application in urban areas outside MUSE.

Version

| Version | Description |
|------------|-----------------|
| 09-09-2021 | Initial version |

List of abbreviations

| Abbreviation | Full name |
|---------------|---|
| EGDI | European Geological Data Infrastructure |
| GeoERA | Establishing the European Geological Surveys Research Area to deliver a Geological Service for Europe |
| GIP-P | GeoERA Information Platform project |
| MUSE | Managing Urban Shallow Geothermal Energy |
| SGE | Shallow geothermal energy |
| WMS | Web map services |
| WFS | Web feature services |



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Figure 6. Box that opens when users activate a layer, containing a welcome text with a short explanation about the data, links to documents and websites associated with the layer, and access to legends and metadata. Note that users can change the transparency of layers and put them in front of others from this dialogue box. Layers can also be export.

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1 INTRODUCTION

The [MUSE](#) project is one of the six projects of the [Geo-energy theme](#) of the multidisciplinary [GeoERA](#) project. GeoERA will contribute to the optimal use and management of the subsurface, by maximising its added value for energy, raw materials, and groundwater, while minimizing environmental impacts and footprint. In this context, MUSE will produce data describing resources, possible conflicts of use and limitations to the use of shallow geothermal energy (SGE) in 14 European urban areas, which were selected as pilot areas to serve as role models for the implementation of similar web platforms for other European regions.

In MUSE, we aim at implementing efficient and user-friendly webservice and related GIS-platforms for planning and managing the use and installation of shallow geothermal systems. With that purpose, a series of web pages and services have been created in the framework of the project.

This requires the following **functionalities**:

- i. display of GIS-based datasets (grid-based and vector datasets),
- ii. simple interactive data extraction.

Initially, as described in the “*White book of the web platform related to MUSE*” (D 5.1), a location specific data query of (i) leading to automated PDF report generation was planned. This could not be implemented, due to slow communication with GIP and lack of resources.

The webservice and related GIS platform have been created by the [GIP-P](#), which has undertaken an extension of EGDI to house the data that have been generated by the different GeoERA projects (including MUSE).

The present deliverable describes the functionalities of the WebGIS platform of MUSE developed in GeoERA. It is intended as manual for end-users and also as inspiration for future web information systems about shallow geothermal energy in urban areas outside of MUSE.

The **official pan-European EGDI MapViewer for MUSE** can be addressed from the following [LINK](#)

It shows all data sets produced for MUSE in all pilot areas. Besides this map MUSE/WP5 has created 14 separate maps focused on each urban pilot area in MUSE i.e., Vienna, Cardiff, Glasgow, Girona, Zagreb, Prague, Cork, Brussels, Ljubljana, Zaragoza, Linkoping, Warsaw, Bratislava, and Aarhus. These maps can also be addressed from the EGDI/MUSE pan-European MapViewer, see section 3.3. Since the results of MUSE are no pan-European maps, but - on the contrary - cover small areas distributed all over Europe, those separate maps are more suitable to display the project results to our also local stakeholders. The pilot area specific maps intend to serve as showcases for web information systems for other regions outside of MUSE.



2 GENERAL NAVIGATION

The MapViewer consists of a map window with the usual navigation tools. It starts in a full pan-European view. To the left is a panel with thematically ordered data layers that can be "turn on" and "turn off" by the user (Figure 1). Within the layer search one can search all layer names for specific content. In case of a match the respective name of the layer changes its colour to green.

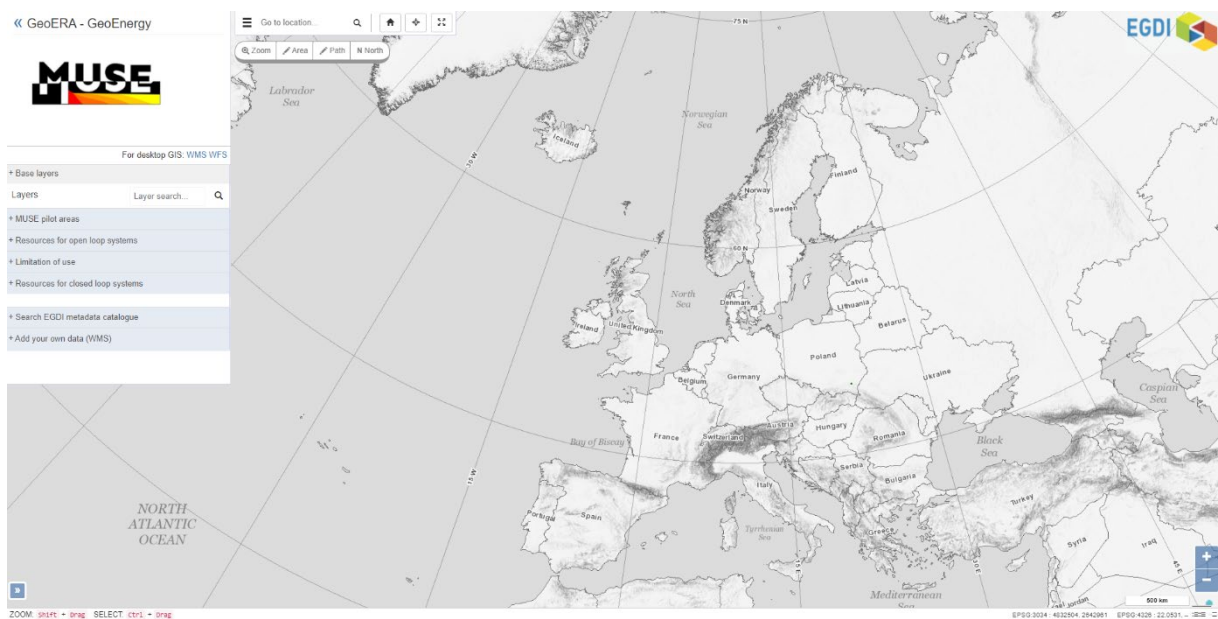


Figure 1. The pan-European MapViewer for MUSE with navigation tools and a panel with thematically ordered data layers to the left.

2.1 Navigation tools

The navigation tools are described below.

In the top left corner of the map is a MUSE logo, which is connected to a hyperlink to the GeoERA/MUSE [webpage](#), where general information about MUSE is available.

[webpage](#) .

Two zoom buttons and a scalebar is located to the lower right on top of the bottom panel where the cursor coordinates are shown.

To the lower left it is possible to open and close a small overview map that shows the position of the present map zoom on a pan-European map. (Figure 2).

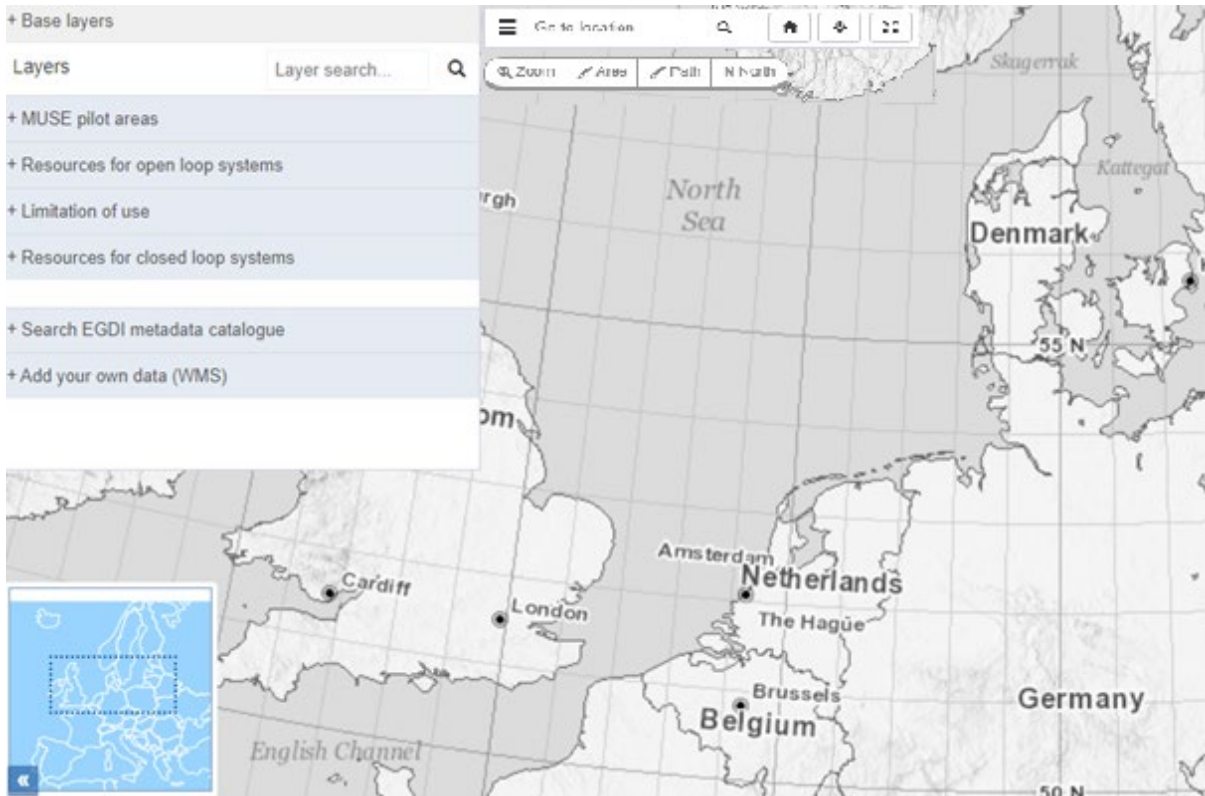
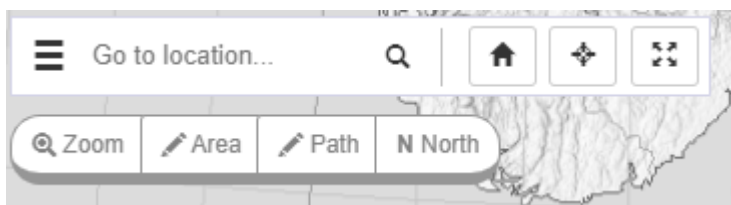


Figure 2. Zoomed map with small overview in the lower left corner and the thematically ordered layer panel above.

Further navigation tools (Figure 3) are found to right of the layer panel. The function of each tool is explained when the user places the cursor on the individual tool.





3 DATA SELECTION AND PRESENTATION

3.1 Data structure in MapViewer(s)

In the general EGD/MUSE map data from all pilot areas are available. The data are addressed in the layer panel to the left where they are found classified by category (group) and by parameter (subgroup). Hence, if users are interested in all data produced in the framework of MUSE, they can consult them all in the general EGD/MUSE map. Whilst, if a user is only interested in the data available for one urban pilot area, he/she can consult only those in the specific MapViewer created for that area, see section 3.3. This is especially of importance for local stakeholders.

The **main data categories** are

- MUSE pilot areas
- Resources for open loop systems
- Resources for closed loop systems
- Limitation of use

When the user clicks on a data group the content (e.g. list of pilot areas) opens and items can be selected for presentation on the map. If the user clicks on the data set on the map, an additional green “Details” window opens, which provides links to further information like attached data sets.

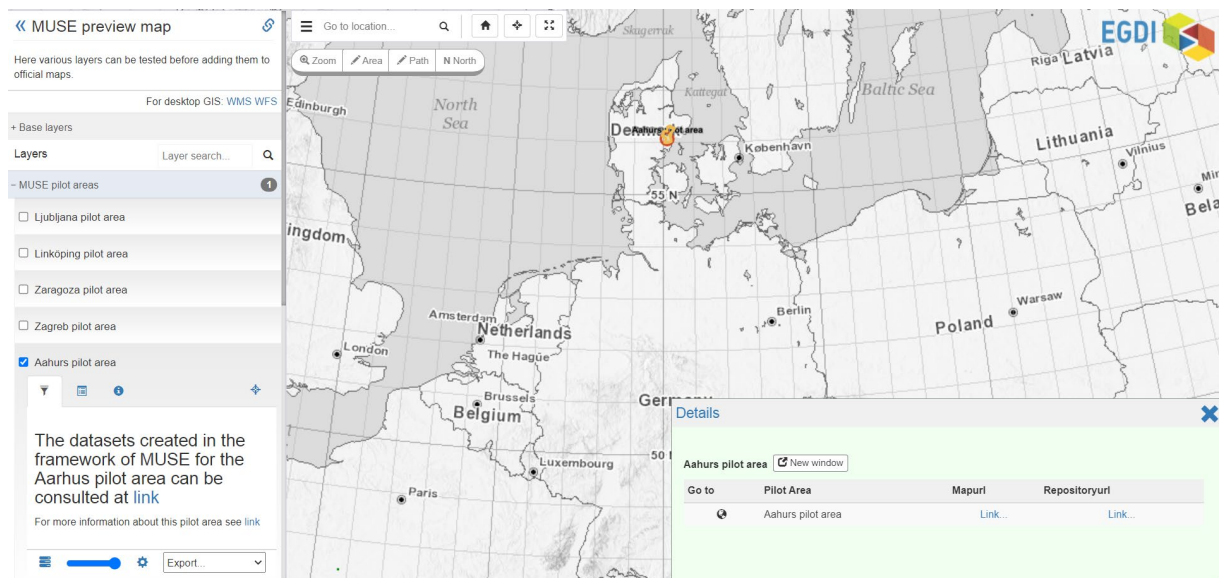


Figure 4. Preliminary EGD map showing The Aarhus pilot area. In the layer panel access to the pilot areas with welcome text are seen (see also Figure 5).



MapViewers for specific pilot areas can be accessed in two ways (Figure 4): 1) through a link added to the welcome text that appears when the layer representing a given urban pilot area is activated in the pan-European MapViewer, and 2) through a link (mapurl) written in the table that pops up when users click on the polygons defining the extension of the pilot areas in the MapViewer (Figure 4). Note that **links to factsheet** providing information **about each pilot area** are available from the welcome text that appears when layers are activated.

In all MapViewers it is possible to change the basemap using the panel entry “Base layers”. The following maps are available:

- Natural Earth (default)
- EDMODnet Bathymetry Basemap
- ESRI world Imagery
- ESRI world Topography

Note also that all MUSE data exposed in MapViewers are available through WMS and/or WFS by clicking on the links associated with the acronym WMS and WFS located in the upper left on top of the layer panel.

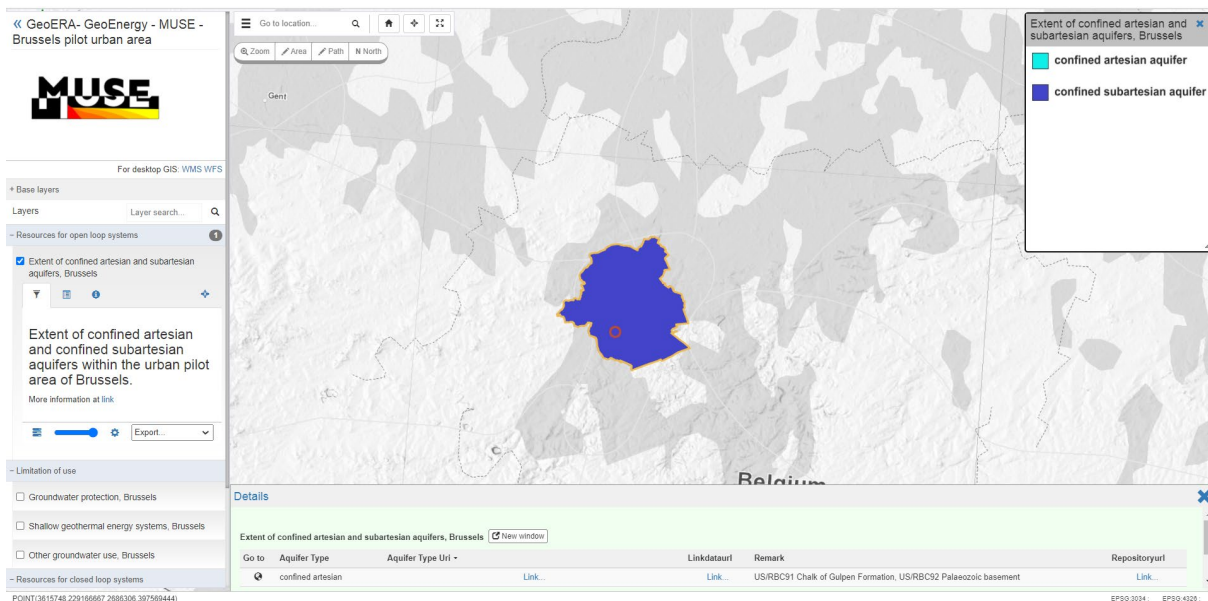







Figure 5. MapViewer created in EGDI for the Brussels pilot area. Note that a red circle appears when users click on a point of the layer, showing the attributes associated with that point in a table that appears at the lowest part of the map. The legend and explanatory welcome text (links to explanatory documents, etc.) of layers appear when users activate them.



3.2 Presentation of individual datasets

A series of functionalities in EGDl configure how the data are visualized and shared with the public. In MUSE, the data and webservice are configured as follows:

1. A welcome text for each layer is shown in maps when it is activated (see Figure 6). In the window that appears when a layer is activated, users can also access the legends and metadata associated with that particular layer by clicking the bottom  and , respectively. Users can also automatically zoom in to the extent of the layer by clicking the button .
2. Layers are thematized by adding different colours to the attributes contained in vector data and to the pixels' values of raster graphics. Discrete colours and colour ranges are explained in the legends that are attached to each layer (see Figure 5).
3. The visual impression of the selected layers can be adjusted both by moving the present layer to the top of the map clicking the bottom  and by changing the transparency / opacity of the present layer pulling the shooter .

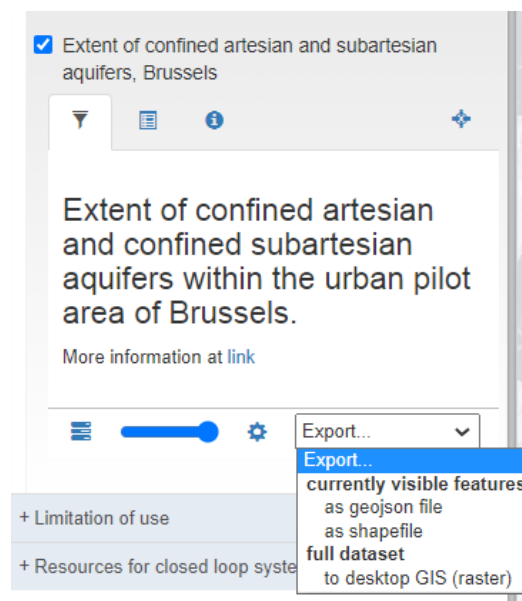


Figure 6. Box that opens when users activate a layer. It contains a welcome text with a short explanation about the data, links to documents and websites associated with the layer, and access to legends and metadata. Users can change the transparency of layers and put them in front of others using this dialogue box. Layers can also be exported.

Apart from MUSE data and base maps the user can also add his or her own data use the panel entry "Add your own data (WMS)"



– Add your own data (WMS)

| | | |
|---------|-------------|-----|
| http:// | Service URL | ... |
|---------|-------------|-----|

! Your WMS must support version 1.3.0. Also, it should support rather huge image dimensions - especially if the layer is not in the same projection as this map. If not, try reducing your browser window before loading the layer.

Figure 7. The panel entry “Add you own data (WMS)” allow the user to add own data using WMS

3.3 Individual maps for project areas

The MapViewer created for a given pilot area contains only the datasets located in that urban area, which are classified/grouped according to the category to which they belong (Figure 5).

The maps created for each MUSE pilot area are found at the following URLs:

Aarhus:

https://data.geus.dk/egdi/?mapname=muse_pilot_area_aarhus#baslay=baseMapGEUS&extent=3963150,3229100,4050190,3270750

Bratislava:

https://data.geus.dk/egdi/?mapname=muse_pilot_area_bratislava#baslay=baseMapGEUS&extent=4469240,2391580,4546600,2428600

Brussels:

https://data.geus.dk/egdi/?mapname=muse_pilot_area_brussels#baslay=baseMapGEUS&extent=3576620,2671460,3653970,2708480

Cardiff :

https://data.geus.dk/egdi/?mapname=muse_pilot_area_cardiff#baslay=baseMapGEUS&extent=3078830,2807660,3156180,2844680

https://data.geus.dk/egdi/?mapname=muse_pilot_area_cork#baslay=baseMapGEUS&extent=2760250,2930100,2798930,2948620

Girona:

https://data.geus.dk/egdi/?mapname=muse_pilot_area_girona#baslay=baseMapGEUS&extent=3395380,1740370,3434050,1758870



Glasgow:

https://data.geus.dk/egdi/?mapname=muse_pilot_area_glasgow#baslay=baseMapGEUS&extent=3114010,3285800,3165580,3310470

Linköping:

https://data.geus.dk/egdi/?mapname=muse_pilot_area_linkoping#baslay=baseMapGEUS&extent=4164910,3446030,4474370,3594120

Ljubljana:

https://data.geus.dk/egdi/?mapname=muse_pilot_area_ljubljana#baslay=baseMapGEUS&extent=4313160,2162220,4364730,2186900

Prague:

https://data.geus.dk/egdi/?mapname=muse_pilot_area_prague#baslay=baseMapGEUS&extent=4213780,2562920,4387850,2646210

Vienna:

https://data.geus.dk/egdi/?mapname=muse_pilot_area_vienna#baslay=baseMapGEUS&extent=4400830,2388660,4510350,2441060

Warsaw:

https://data.geus.dk/egdi/?mapname=muse_pilot_area_warsaw#baslay=baseMapGEUS&extent=4606070,2839890,4801900,2933600

Zagreb:

https://data.geus.dk/egdi/?mapname=muse_pilot_area_zagreb#baslay=baseMapGEUS&extent=4359490,2110550,4533570,2193850

Zaragoza:

https://data.geus.dk/egdi/?mapname=muse_pilot_area_zaragoza#baslay=baseMapGEUS&extent=3084070,1739760,3144420,1768650



3.4 Searching the EDGI metadata catalogue

The EDGI Metadata Catalogue (MIcKA) is the central access point to metadata concerning structured data on geo-energy, groundwater and raw materials themes provided by the geoscientific GeoERA projects. It provides tools for compilation of those metadata in a standardized format. In order to make the data discoverable in the most efficient way, the catalogue is fully compliant with international standards and supports the distributed system of metadata administration. In order to display a metadata record for which an on-line map service is available, the Metadata Catalogue is integrated into the EDGI Portal <http://www.europe-geology.eu/>. The catalogue enables systematic discovery, viewing and use of available geological data across Europe. The working version of the EDGI metadata catalogue is operational at <https://egdi.geology.cz/>.

The EDGI metadata provides very important information on:

- Documentation of the dataset itself (abstract, custodian contact, data origin, keywords, timespace description, update frequency, formats, etc.)
- Documentation of the data access options (availability of data resources, possible formats and ways of distribution, links to web services or user-oriented applications etc.)

In the left side panel of the WebGIS platform, the “Search EDGI metadata catalogue” field Figure 8 offers the possibility to type keywords for searching datasets.

- Search EDGI metadata catalogue

 ...

Figure 8: Search EDGI metadata catalogue.

To realise a search, the user needs to type keywords (for ex. Muse, Figure 9) in the free text box and the system will show the corresponding web-services. Clicking on the desired service will selected it and clicking on the “+ button” will add the data to the map.

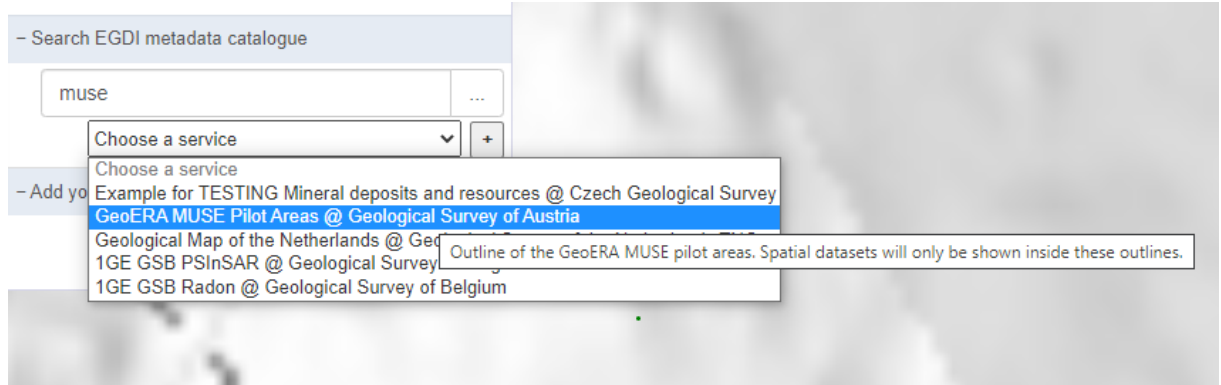


Figure 9: Search EGD metadata catalogue, example.