



PROGRAMME OF
THE EUROPEAN UNION



Guidelines for EGMS product analysis



Date: 15 January 2024

Doc. Version 1.1

Kongens Nytorv 6
1050 Copenhagen K
Denmark
Tel.: +45 336 7100
Fax: +45 3336 7199
eea.europa.eu



Document Control Information

Document Title	Guidelines for EGMS product analysis
Project Title	EGMS Advisory Board
Document Author	M. Crosetto and M. Cuevas
Project Owner	J. Balasis-Levinsen
Project Manager	J. Balasis-Levinsen
Document Version	1.1
Distribution	Public
Date	15/01/2024

Document Approver(s) and Reviewer(s):

Name	Role	Action	Date
J. Balasis-Levinsen	Project Officer (EEA)	Approved	21/09/2023

Document history

Revision	Date	Created by	Short description of changes
Draft	20/06/2023	M. Crosetto and M. Cuevas	First draft
Final	21/09/2023	M. Crosetto and M. Cuevas	Final version
1.1	15/01/2024	M. Cuevas	Correction of a script



1 Summary

This document contains comprehensive guidelines for conducting data analyses by exploiting the European Ground Motion Service (EGMS) products. The document is intended for supporting the non-expert user in getting started with the EGMS (downloading, importing, visualising products, etc.). The next section provides a detailed overview of the key EGMS documents and the wide range of resources accessible online.

To facilitate data exploration, the EGMS Explorer ([URL](#)) can be used for visualizing the EGMS products. Alternatively, data can be downloaded for analysis purposes by employing various Geographic Information System (GIS) tools. This document elaborates on the download process for the EGMS products, and on importing these products into the free and open-source GIS software, QGIS.

2 Introduction

An effective visualization of EGMS products is crucial for maximizing the potential with the Service, i.e., with the Basic (Level 2a), Calibrated (L2b), and Ortho (L3) products. To facilitate these tasks, a range of documents and resources have been made available.

These are the most important ones:

- EGMS Main Page ([URL](#)). This page offers a range of valuable links, including EGMS service documentation such as the theoretical framework behind EGMS, the product description document, and more.
- EGMS Explorer ([URL](#)). The EGMS Explorer is a powerful tool for disseminating EGMS products.
It boasts two key functionalities:
 - Interactive WebGIS. Users can leverage this feature to visualize data and perform basic data analysis operations. No user registration is required to access the WebGIS.
 - Product search and download interface. This interface facilitates searching and downloading EGMS products, and users must register via EU-Login.
- End User Interface Manual ([URL](#)). This serves as a comprehensive guide for understanding and using the EGMS Explorer. Readers can learn how to effectively visualize, inspect, and perform basic analysis operations using this manual.
- Product User Manual ([URL](#)). This manual offers detailed descriptions of the EGMS products. It provides valuable insights and guidance to help users understand and correctly use these products.

This document addresses the following key aspects:

1. Downloading EGMS products. Section 3 provides detailed instructions on how to download the products. The section is complementary to the End User Interface Manual.
2. Importing and visualizing EGMS products in QGIS. Section 4 guides users on importing EGMS products into QGIS, a free and open-source desktop GIS. Additionally, it explains how to effectively visualize the EGMS products within the QGIS environment.



3 Downloading EGMS products

Follow this step-by-step procedure to download the products efficiently.

- 1) Create an “EU Login” account if you do not have one already. You can register using the European Commission’s “EU Login” service ([URL](#)). The process will take a few minutes.
- 2) Open the EGMS Explorer: <https://egms.land.copernicus.eu>.
- 3) Locate the second button from the right on the toolbar and click on it (see Figure A.1Figure A.1).
- 4) Login to the EGMS Explorer using your “EU Login”.
- 5) Click on the third button from the right of the toolbar (see Figure A.2).
- 6) Navigate to your area of interest, and if required, zoom in for a closer view. You can zoom in with the scroll button on your mouse or with the up and down arrows on your keyboard.
- 7) To define a search area, click to create a polygon shape. Double-click to close the polygon. The Product Archive window will appear beneath the toolbar (see Figure A.3).
Note: The maximum size of the search area is 3° lat by 3° lon (~333 by 333 kilometres).
- 8) Within the Product Archive window, select the type of product (Basic, Calibrated, or Ortho) you wish to download. The window will display the number of results or an error indicator (represented by a triangle).

*Note: the results include all the EGMS products,
which in any way cover the above search area.*

- 9) In the Product Archive window, click the “View results” button on the right. A new window will open, listing all the search results. See Figure A.4 for an example with Ortho data, or Figure A.5 for an example with Calibrated data.
- 10) In the “View results” window, the active light-blue link on the right can be used to download individual products.

Note: this procedure allows for downloading the products one by one.

To download multiple products, please refer to step 12.

- 11) Each downloaded product corresponds to a Zip file containing two files: an XML file providing basic information on the product, and a CSV file containing the main EGMS information, i.e. a set of Measurement Points (MPs) with all their attributes.

Note: refer to Section 4 for guidance on using the CSV information.

For advanced use:

- 12) To download multiple products resulting from a search query (as described in step 7 above), click the active blue link labelled “Download links” in the Product Archive window (see Figure A.3). This action generates a text ASCII file containing hyperlinks to the multiple products (see Figure A.6).

*Note: The hyperlinks can be used to download the products
individually using a web browser.*

The hyperlinks expire after one hour unless a download is in progress.

- 13) Follow these steps to download products using hyperlinks to multiple products in a Microsoft Windows environment:
 - a) Locate the file “egms-archive-links.txt” in the Windows Download directory.
 - b) Open the Command Prompt application.



- c) Install the “wget” software:
 - i. Type the command: `echo %PATH%`
 - ii. A list of paths will appear in your screen, the last of them containing **your username** (instead of “**cttc**” in this example):
`C:\Windows\System32\WindowsPowerShell\v1.0\C:\Windows\system32;C:\Windows;C:\Windows\System32\Wbem;C:\Windows\System32\OpenSSH;C:\ProgramFiles\dotnet\;C:\ProgramFiles\AutoFirma\AutoFirma;C:\ProgramFiles(x86)\GnuWin32\bin\; C:\Users\cttc\AppData\Local\Microsoft\WindowsApps;`
 - iii. Type the following command replacing the directory where you want to download the products: `winget install wget -l C:\Users\cttc\AppData\Local\Microsoft\WindowsApps`
- d) Copy the “*egms-archive-links.txt*” file to this directory where you want to download the EGMS products.
- e) Download the products using the following command:
`wget -nc --no-check-certificate --http-user="user" --http-password="password" -i egms-archive-links.txt`

Make sure to replace “user” with your “EU Login” account username and “password” with your corresponding password.

The result of this operation will be a set of products (Zip files).

If you are using a Linux environment, you can download the products using the same command as described in step 13e above.

4 Importing & visualizing EGMS products in QGIS

Follow this step-by-step procedure to import and visualize EGMS products in QGIS.

Before proceeding, it is important to understand some basic notions about the structure and size of EGMS CSV files:

- CSV file structure. A CSV (Comma-Separated Values) file is a text file with a specific format, which allows data to be saved in a table structured format. The EGMS CSV files consist of:
 - A header with attribute names separated by a comma.
 - N records, one per each MP, containing the same number of attributes.
- CSV file size. CSV file sizes vary depending on the number of MPs in a given product. The size can vary from a few tens of Mb, up to more than 3 Gb. The bigger files usually correspond to urban areas, where the MP density is the highest. If your CSV is rather small (e.g., less than 100 Mb, please skip to step 3). Visualizing large CSV files using standard tools like Notepad or Excel can be challenging or even impossible. However, there are alternative options for visualization. Notepad++ (<https://notepad-plus-plus.org>) is a suitable tool that can handle large CSV files efficiently. Moreover, it is important to note that visualizing large CSV files directly in QGIS can be slow due to the file size. To address this, we will describe two procedures to reduce the size of the CSV files.

For advanced use (otherwise please skip to step 3):

- 1) Procedure 1. Reducing the size of the CSV file by retaining specific attributes (East, North, and deformation velocity attributes) exploiting the software “gawk”.
 - a) Visit the website: gnuwin32.sourceforge.net/packages/gawk.htm
 - b) Navigate to the “Download” section and click on “Zip” in correspondence to “Binary”. Confirm the download by clicking OK. This will save a Zip file to your computer; when writing this document, the Zip file was named gawk-3.1.6-1-bin.zip.
 - c) Unzip the downloaded ZIP file to a location on your computer.
 - d) Go to the “Bin” directory, copy the “gawk.exe” file and paste it into the directory `C:\Users\cttc\AppData\Local\Microsoft\WindowsApps` (replace “your_username”, **cttc** in this example, with your actual username). This is the same directory used for the “wget”.
 - e) Navigate to the directory where you have the downloaded EGMS products. Let’s assume the product of interest is `EGMS_L2b_001_0242_IW1_VV.csv`.



- f) To create a reduced CSV file, open a command prompt or terminal in that directory and run the following command:

```
gawk -F, "{print $5, $6, $19}" EGMS_L2b_001_0242_IW1_VV.csv > EGMS_L2b_001_0242_IW1_VV_env.csv
```

where *EGMS_L2b_001_0242_IW1_VV.csv* is the input file, and *EGMS_L2b_001_0242_IW1_VV_env.csv* is the reduced file that will be created. Proceed to step 4) after executing this command.

- 2) Procedure 2. Reducing the size by extracting a sub-area defined by $East_{min}$, $East_{max}$, $North_{min}$, and $North_{max}$.

- Follow the steps a) to d) from Procedure 1 to download and set up the “gawk” utility.
- Navigate to the directory where you have download the EGMS products, assuming the product of interest is *EGMS_L2b_001_0242_IW1_VV.csv*.
- To extract a sub-area, use the following command:

```
gawk -F, -v Emin=3070000.0 -v Emax=3090000.0 -v Nmin=2110000.0 -v Nmax=2115000.0 -f area_rect.awk EGMS_L2b_001_0242_IW1_VV.csv >EGMS_L2b_001_0242_IW1_VV_rect.csv
```

where:

- Replace the values for Emin, Emax, Nmin, and Nmax (in the ETRS89 Lambert Azimutal Equal Area cartographic system) with the desired boundaries of the sub-area rectangle.
- *EGMS_L2b_001_0242_IW1_VV.csv* is the input file and *EGMS_L2b_001_0242_IW1_VV_rect.csv* is the reduced file that will be created.
- Create a text file named *area_rect.awk* with this content:

```
{  
if (NR == 1) print $0;  
if ($5 > Emin && $5 < Emax && $6 > Nmin && $6 < Nmax)  
{print $0;}  
}
```

- 3) The header of the CSV file needs to be modified to use the PS Time Series Viewer of QGIS (see step 18) by adding a “D” to the dates of the deformation time series, e.g., from 20150202 to D20150202. This can be performed using this command:

```
gawk -F, -f add_D.awk EGMS_L2b_001_0242_IW1_VV_rect.csv > EGMS_L2b_001_0242_IW1_VV_rect2.csv
```

where:

- *EGMS_L2b_001_0242_IW1_VV_rect.csv* is the input file.
- *EGMS_L2b_001_0242_IW1_VV_rect2.csv* is the output file.
- Create a text file named *add_D.awk* with this content:

```
BEGIN {getline;  
  
for (i=1;i<NF;i++) {  
  
if(i<25) {printf "%s,", $i}  
else {printf "D%s,", $i}  
}  
  
{printf "D%s", $NF  
printf "\n"}  
}  
  
{  
  
print $0;
```

{}

- 4) QGIS installation. Download and install QGIS from the official website <https://qgis.org/es/site/forusers/download.html>. The recommended stable version as of June 15, 2023, is QGIS 28.
- 5) Launch QGIS.
- 6) Open the Data Source Manager (see Figure B.2) to import CSV EGSM data, and select “Delimited Text” (see Figure B.3):
 - Provide the name of the CSV file to be visualized.
 - Set the X field to Easting and the Y field to Northing.
 - Choose the cartographic projection: “ETRS89 Lambert Azimuthal Equal Area”.
 - Click the “Add” button (this may take some time).
- 7) The imported EGMS products will be displayed in the main window of QGIS (see Figure B.4).
- 8) Adjusting Symbology.
 - a) Right-click on the imported EGMS products in the “Layers” window of QGIS (see Figure B.5).
 - b) Choose “Properties” (see Figure B.6).
 - c) A new window will open. Select “Symbology” from the left column and fill the required fields (see Figure B.7:):
 - Choose “Graduated” in the first field.
 - Set “mean_velocity” in the “Value” field.
 - Select “Turbo” as the “Color ramp”.
 - Specify the number of classes for the colour scale, e.g., 7, 9, etc.
 - Define the classes of the colour scale by clicking on the Values (see the green circle).
 - Click “Apply”, and then “OK” to confirm the changes.
- 9) Export the EGMS products in a Shapefile:
 - a) Right-click on the EGMS products in the “Layers” window (see Figure B.8).
 - b) Choose “Export” and then “Save Feature As”.
 - c) Specify a name for the Shapefile and click “OK” to save (see Figure B.9).
- 10) Close the Shapefile by right-clicking (see Figure B.10) on the name in the “Layers” window and choosing “Remove Layer”.
- 11) Open the Shapefile in the Data Source Manager by selecting “Vector” (see Figure B.11) and providing the Shapefile name.
- 12) Copy the style to the Shapefile.
 - a) Right-click on the CSV data (see Figure B.12) and choose “Style” > “Copy Style” > “All categories”.
 - b) Right-click the Shapefile data (see Figure B.13) and choose “Style” > “Paste Style” > “All categories”.
- 13) Close the CSV file by right-clicking on the name in the “Layers” window and choosing “Remove Layer”.
- 14) Import a background image.
 - a) Right-click on “XYZ Tiles” of the “Browser” window and select “New connection” (see Figure B.14).

- b) In the window that opens (see Figure B.15), specify “Google Satellite” in the “Name” field, and then enter the URL [“<https://www.google.es/maps/vt?lyrs=s@189&gl=cn&x={x}&y={y}&z={z}>”](https://www.google.es/maps/vt?lyrs=s@189&gl=cn&x={x}&y={y}&z={z}).
- c) Click “OK” to save the connection.

Note: other connections might be added.

- 15) Click on “XYZ Tiles” > “Google Satellite” to display the background image (see Figure B.16).
- 16) Adjust the layer order in the “Layers” window by dragging the Google Satellite layer below the Shapefile layer (see Figure B.17).
- 17) You can now navigate the area using the zoom in/out capabilities of QGIS to, for example, identify areas of deformation or verify the stability of a specific area.
- 18) To visualize the time series:
 - a) Click on “Plugins” > “Manage and Install Plugins” (see Figure B.18).
 - b) In the window “Plugins” that opens, search for the “PS Time Series Viewer” (see Figure B.19) and click on “Install Plugin”.
 - c) Click on the icon representing the “PS Time Series Viewer” (see Figure B.20).
 - d) Click on a specific MP to view the corresponding time series (see Figure B.21).

The above step concludes the two main operations covered by this document: (i) Downloading EGMS products; and (ii) Importing and visualizing EGMS products in QGIS. With this, the user can start the analysis and interpretation of the EGMS products.

Annex A: Downloading EGMS products



Figure A.1: Click on the second button from the right on the toolbar. [Locate](#) the second button



Figure A.2: Click on the third button on the right on the toolbar. [Click](#).Click



Product Archive



Click the button to enter geographical search mode. Once in this mode, click in the map to draw a polygon representing your area of interest. Double-click to close the polygon and perform the product archive search. Once a search completes, an overview of results will appear here.

You are logged in as ncrosmch.

Archive search returned 8 results

BASIC (Level 2A) CALIBRATED (Level 2B) ORTHO (Level 3)

[Download links](#)

[Clear results](#)

[View results](#)

Figure A.3: The Product Archive window appears under the toolbar. Return. To define .Click

Figure A.4: View results window. Example showcasing Ortho products (also referred to as Level L3 product). The displayed result represents a horizontal East-West Ortho, spanning a tile of 100 by 100 km. The active blue link on the right side allows to download the product. [In the Product .Click](#)



The screenshot shows a search results page for the European Ground Motion Service. At the top, there are logos for the European Union, Copernicus (Europe's eyes on Earth), Land Monitoring, and the European Environment Agency. The main title is "European Ground Motion Service - Archive Search". On the right, there are "Help" and "Info" links.

CALIBRATED (Level 2B)

- EGMS_L2b_015_0287_IW2_VV.zip
- EGMS_L2b_015_0287_IW3_VV.zip
- EGMS_L2b_015_0288_IW2_VV.zip
- EGMS_L2b_015_0288_IW3_VV.zip
- EGMS_L2b_015_0289_IW1_VV.zip
- EGMS_L2b_015_0289_IW2_VV.zip
- EGMS_L2b_015_0289_IW3_VV.zip
- EGMS_L2b_015_0290_IW1_VV.zip
- EGMS_L2b_015_0290_IW2_VV.zip

EGMS_L2b_015_0287_IW2_VV.zip

Name: EGMS_L2b_015_0287_IW2_VV.zip
Size: 620.33 MB (650467017 bytes)
Type: CALIBRATED
Level: L2B
Direction: ascending
Burst ID: 015-0287-IW2-VV
Burst cycle: 0287
Polarization: VV
Relative orbit: 015
Swath: IW2

[Highlight in viewer](#) [Download dataset](#)

Figure A.5: View results window. Example showcasing Calibrated products (also referred to as Level L2B product). The active blue link on the right side allows to download the product. [In the Product .Click](#)

https://egms.land.copernicus.eu/insar-api/archive/download/EGMS_L3_E43N29_100km_U.zip?id=7faa23f29bb948c0a49ee95e72ac6ac2
https://egms.land.copernicus.eu/insar-api/archive/download/EGMS_L3_E43N30_100km_E.zip?id=7faa23f29bb948c0a49ee95e72ac6ac2
https://egms.land.copernicus.eu/insar-api/archive/download/EGMS_L3_E43N29_100km_E.zip?id=7faa23f29bb948c0a49ee95e72ac6ac2
https://egms.land.copernicus.eu/insar-api/archive/download/EGMS_L3_E42N29_100km_E.zip?id=7faa23f29bb948c0a49ee95e72ac6ac2
https://egms.land.copernicus.eu/insar-api/archive/download/EGMS_L3_E42N30_100km_U.zip?id=7faa23f29bb948c0a49ee95e72ac6ac2
https://egms.land.copernicus.eu/insar-api/archive/download/EGMS_L3_E44N29_100km_E.zip?id=7faa23f29bb948c0a49ee95e72ac6ac2
https://egms.land.copernicus.eu/insar-api/archive/download/EGMS_L3_E43N30_100km_U.zip?id=7faa23f29bb948c0a49ee95e72ac6ac2

Figure A.6: Example of hyperlinks to the products. These hyperlinks can be used either to download the data individually using a web browser or in an automated manner using a script. [To download](#) .

Annex B: Importing & visualizing EGMS products in QGIS

	pid	mp_type	latitude	longitude	easting	northing	height	height_line	pixel	rmse	tempora	amplitude	incidence	track_ang	los_east	los_north	los_up	mean_veli	mean_veli	accelerati	accelerati	seasonalit	seasonalit	20150205	20150
2	2C7PH0BZ	0	50.89613	11.84978	4451127	3088833	331.8	377.8	42	5578	4.2	0.63	0.43	37.33	349.65	-0.597	-0.109	0.795	0.5	0.1	-0.54	0.13	1.3	0.2	0.5
3	2C7PH0BZ	0	50.89684	11.856	4451563	3088923	338.3	384.2	42	5692	2.6	0.86	0.31	37.36	349.65	-0.597	-0.109	0.795	-0.2	0.1	-0.04	0.08	0.6	0.1	0.8
4	2C7PH0Ba	0	50.91985	12.05945	4465799	3091864	207	252.8	42	9561	2.1	0.88	0.22	38.23	349.76	-0.609	-0.11	0.786	0.1	0.1	-0.03	0.07	1.5	0.1	-1.9
5	2C7PH0Ba	0	50.92397	12.09621	4468370	3092395	311.4	357.1	42	10225	3.3	0.25	0.32	38.4	349.81	-0.611	-0.11	0.784	-0.7	0.1	1.81	0.11	6.7	0.2	1.6
6	2C7PH0Bb	0	50.94015	12.24178	4478545	3094998	287.1	332.7	42	13023	2.7	0.81	0.42	39.04	349.97	-0.62	-0.11	0.777	-0.8	0.1	-0.14	0.08	1.9	0.1	0.4
7	2C7PH0Bd	0	50.99039	12.70518	4510890	3101185	275.8	320.7	42	22140	3.8	0.53	0.38	40.95	350.32	-0.646	-0.11	0.755	1	0.1	-1.68	0.12	1.6	0.2	3.6
8	2C7PH0Be	0	50.99303	12.70518	4510890	3101185	275.8	320.7	42	22140	3.8	0.53	0.38	40.95	350.32	-0.646	-0.11	0.755	1	0.1	-1.68	0.12	1.6	0.2	3.6
9	2C7PH0BY	0	50.87153	11.63558	4436138	3085738	163.8	209.9	42	1696	2.8	0.83	0.39	36.37	349.45	-0.583	-0.109	0.805	-0.5	0.1	0.13	0.09	0.7	0.1	1.9
10	2C7PH0BY	0	50.87158	11.63622	4436167	3085744	167.9	214	42	1703	4.2	0.66	0.45	36.37	349.45	-0.583	-0.109	0.805	-0.7	0.1	0.3	0.13	0.4	0.2	-0.7
11	2C7PH0BY	0	50.87158	11.63622	4436168	3085744	165.2	211.3	42	1704	3	0.81	0.41	36.37	349.45	-0.583	-0.109	0.805	-0.8	0.1	-0.2	0.09	0.4	0.1	-1.3
12	2C7PH0BY	0	50.8724	11.64328	4436662	3085847	172.3	218.4	42	1830	2.1	0.8	0.3	36.4	349.45	-0.583	-0.109	0.805	-0.7	0.1	0.27	0.07	2.6	0.1	2.9
13	2C7PH0BY	0	50.8724	11.64328	4436664	3085847	170.8	216.8	42	1831	1.7	0.88	0.25	36.4	349.45	-0.583	-0.109	0.805	-0.4	0.1	0.18	0.05	2	0.1	-0.7
14	2C7PH0BY	0	50.87241	11.64336	4436664	3085848	170.7	216.8	42	1832	2	0.88	0.35	36.4	349.45	-0.583	-0.109	0.805	-0.4	0.1	-0.08	0.06	1.3	0.1	-2.4
15	2C7PH0BY	0	50.87243	11.64355	4436681	3085850	174.3	220.3	42	1834	3	0.68	0.38	36.4	349.45	-0.583	-0.109	0.805	-0.8	0.1	-0.06	0.1	3.3	0.2	-3

Figure B.1: First lines of a CSV file corresponding to a Calibrated product. Please note that the above example represents a simplified structure, and the actual CSV file may contain more attributes and corresponding values. Before proceeding, it is important to understand some basic notions about the structure and size of EGMS CSV files:

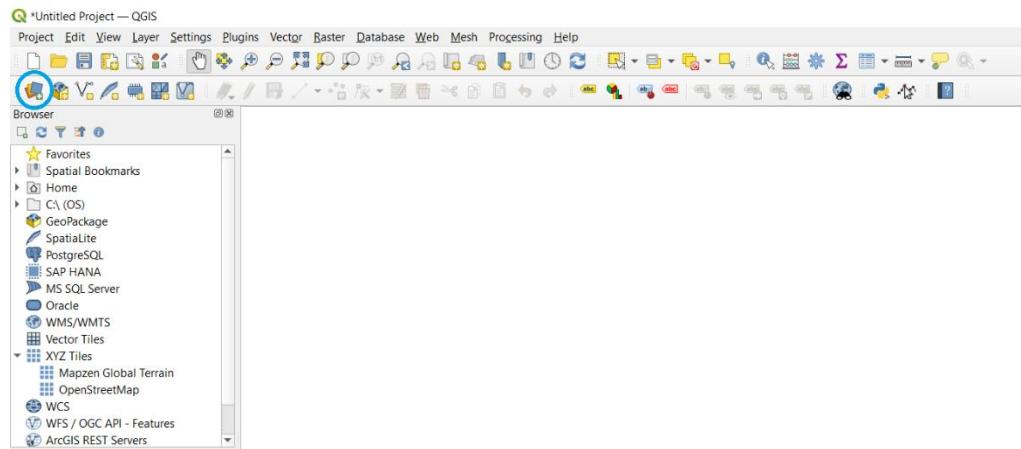


Figure B.2: Open the Data Source Manager, which is indicated by the blue circle in the image. Open.

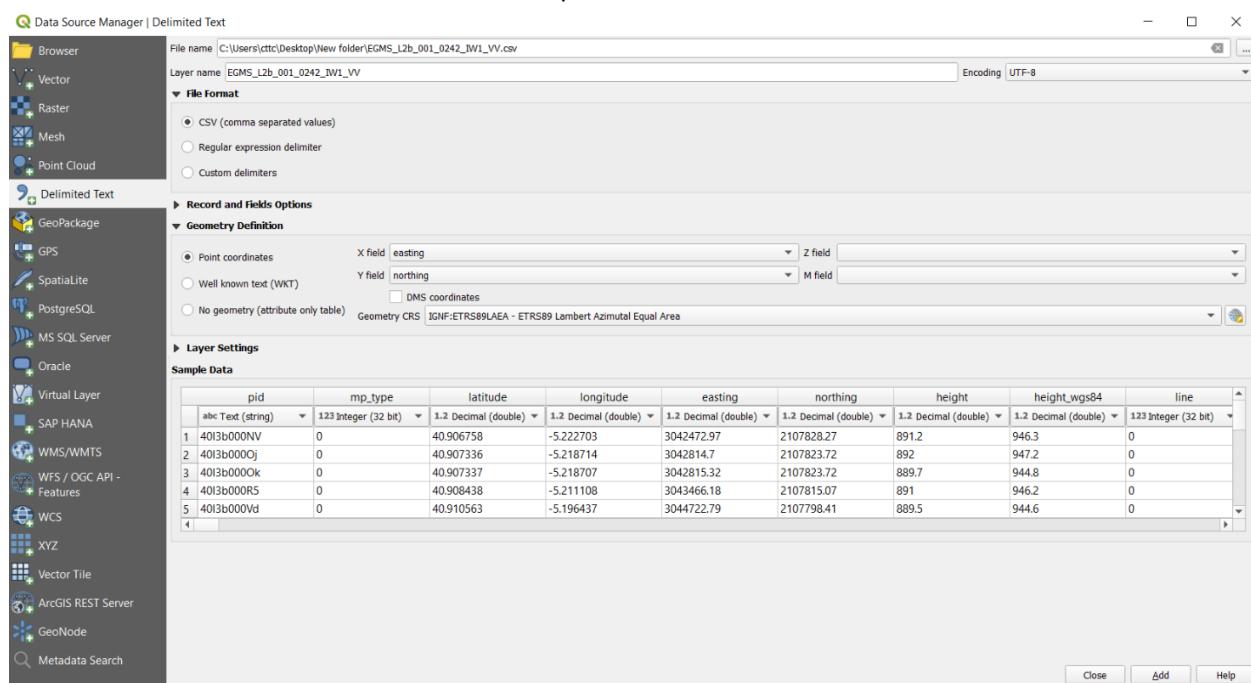


Figure B.3: “Delimited Text” options of the “Data Source Manager” window. Open.

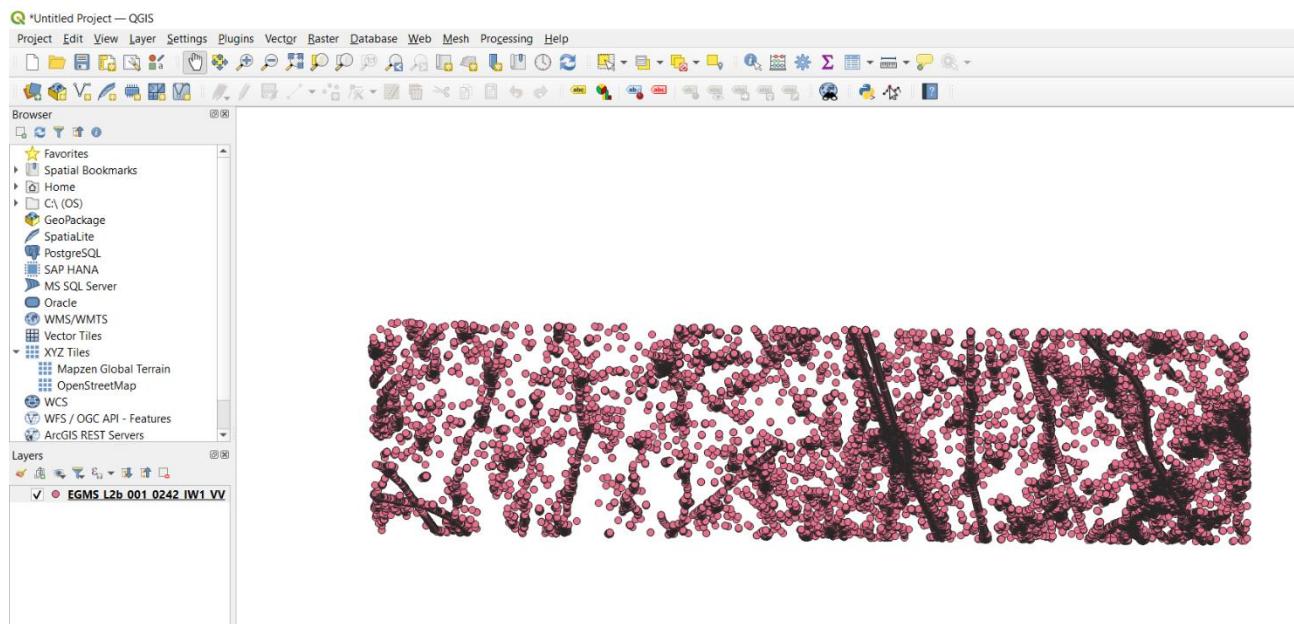


Figure B.4: The data are visualized in the main window of QGIS. [The imported EGMS products .](#)

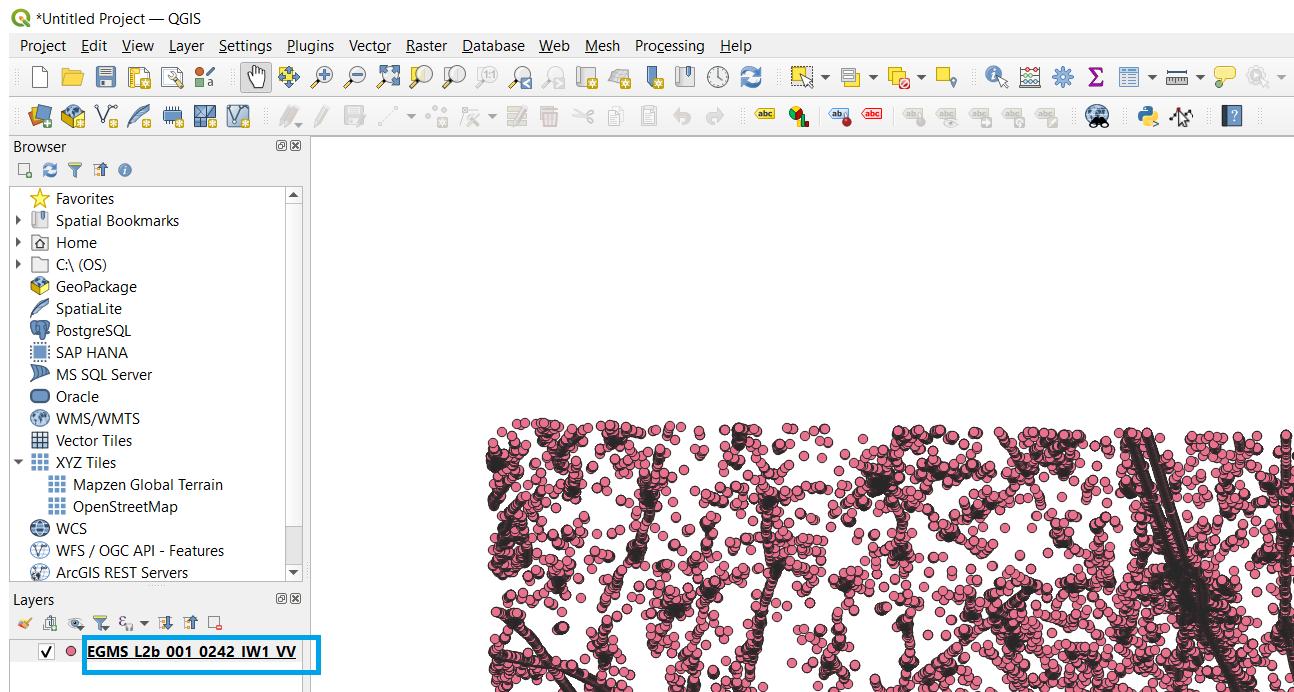


Figure B.5: Right-click on the name of the EGMS products highlighted by the blue rectangle.
[Adjusting Symbology.](#)

Right-click on the imported EGMS products in the “Layers” window of QGIS.

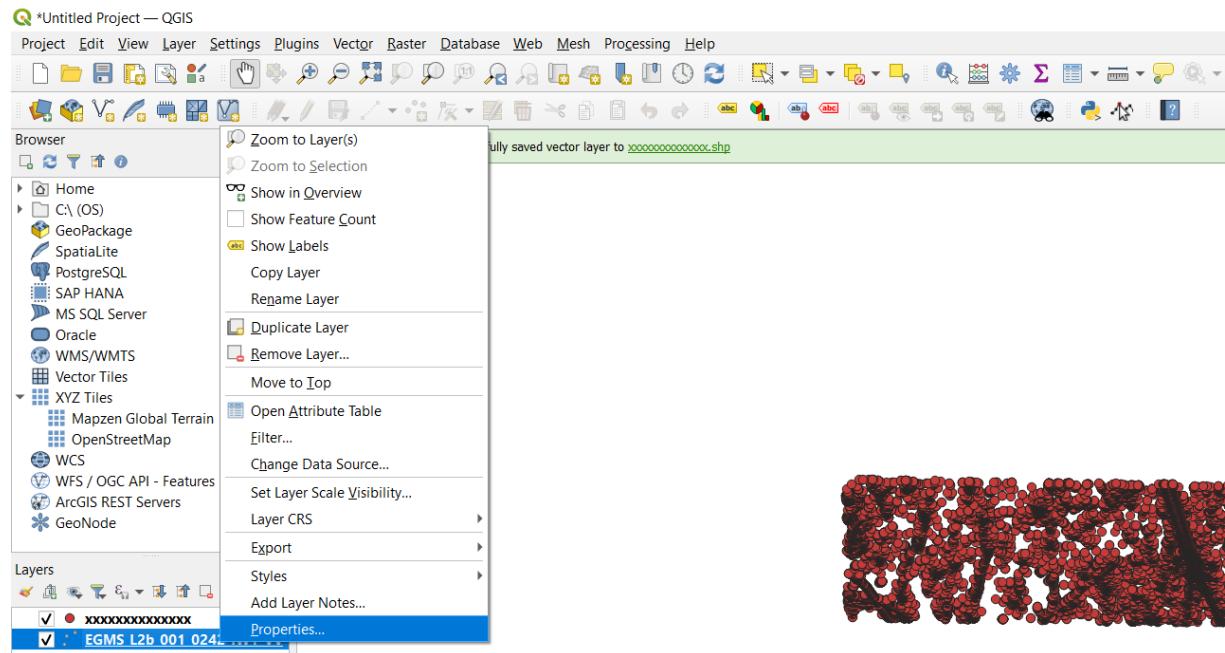


Figure B.6: Choose “Properties”.

Choose.

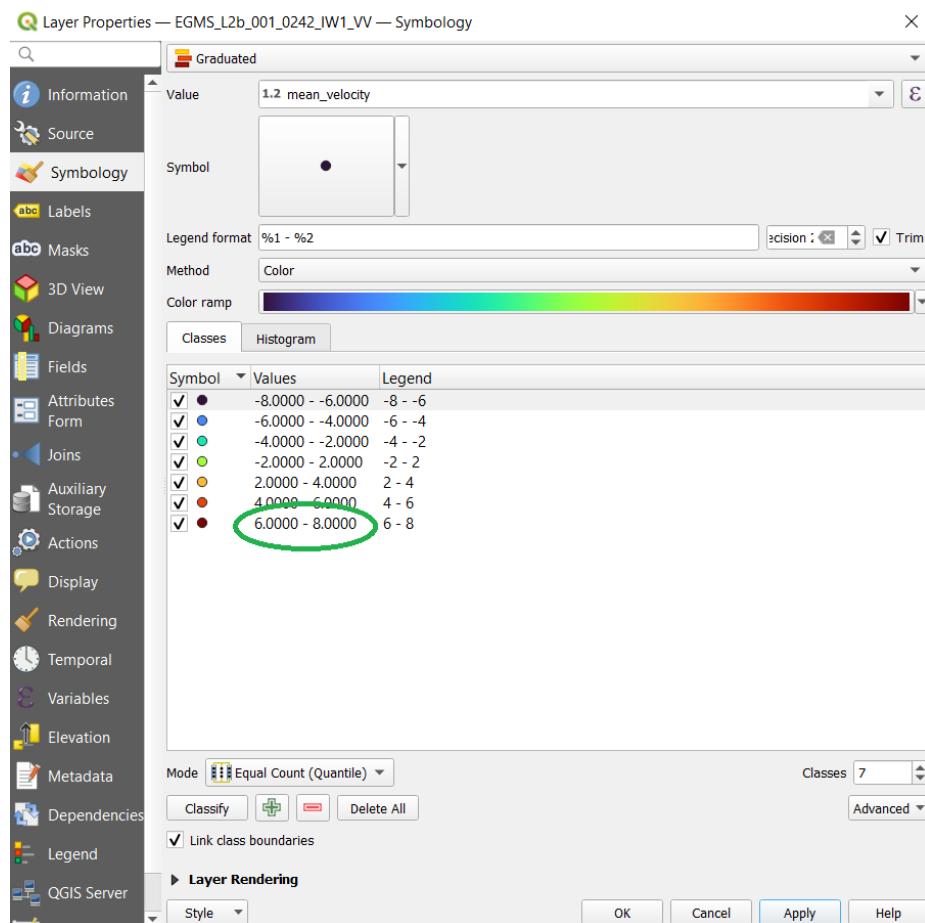


Figure B.7: A new window opens. Select “Symbology” from the left column and fill the fields. A new .

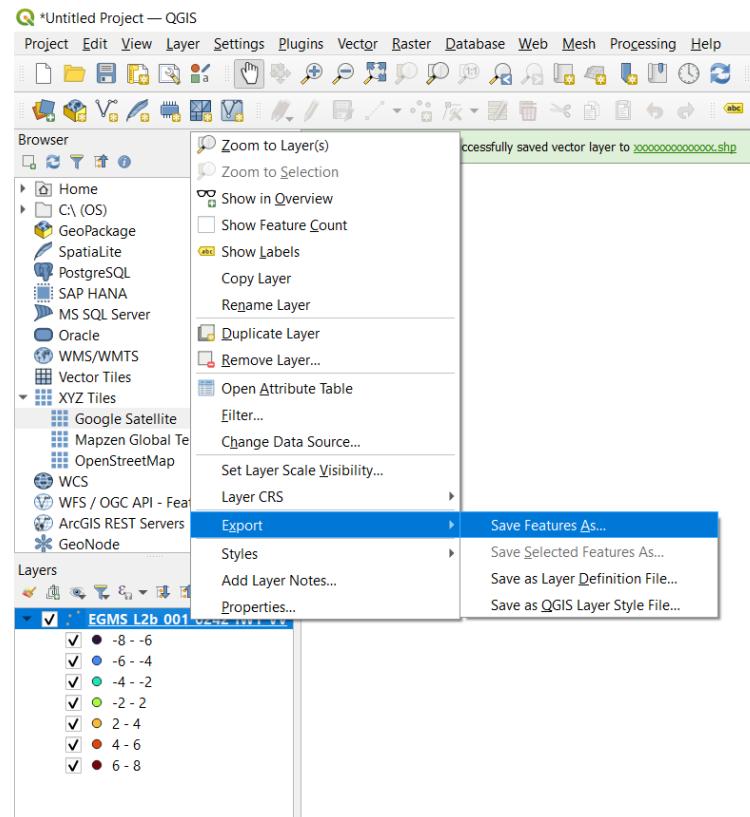


Figure B.8: Convert the data to Shapefile by right-clicking on the EGMS layer, choosing “Export” and then “Save Feature As”. **Error! Reference source not found..**

Figure B.9: Specify the name of the Shapefile and click “OK”. **Error! Reference source not found..**

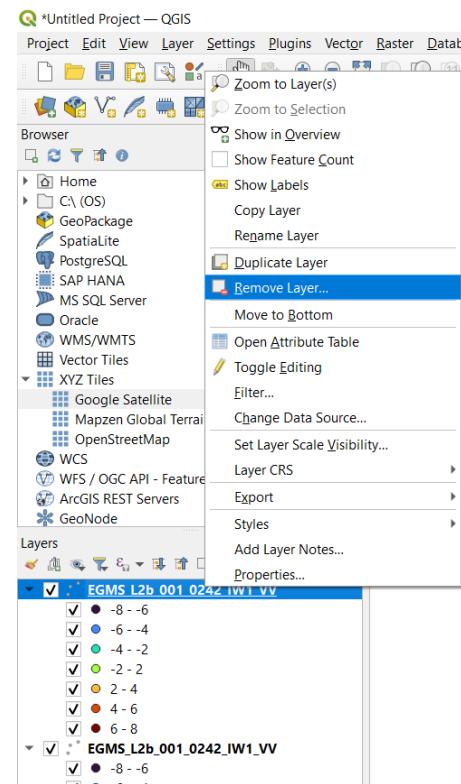


Figure B.10: Close the Shapefile by right-clicking on the EGMS layer and choosing “Remove Layer”. [Close](#).

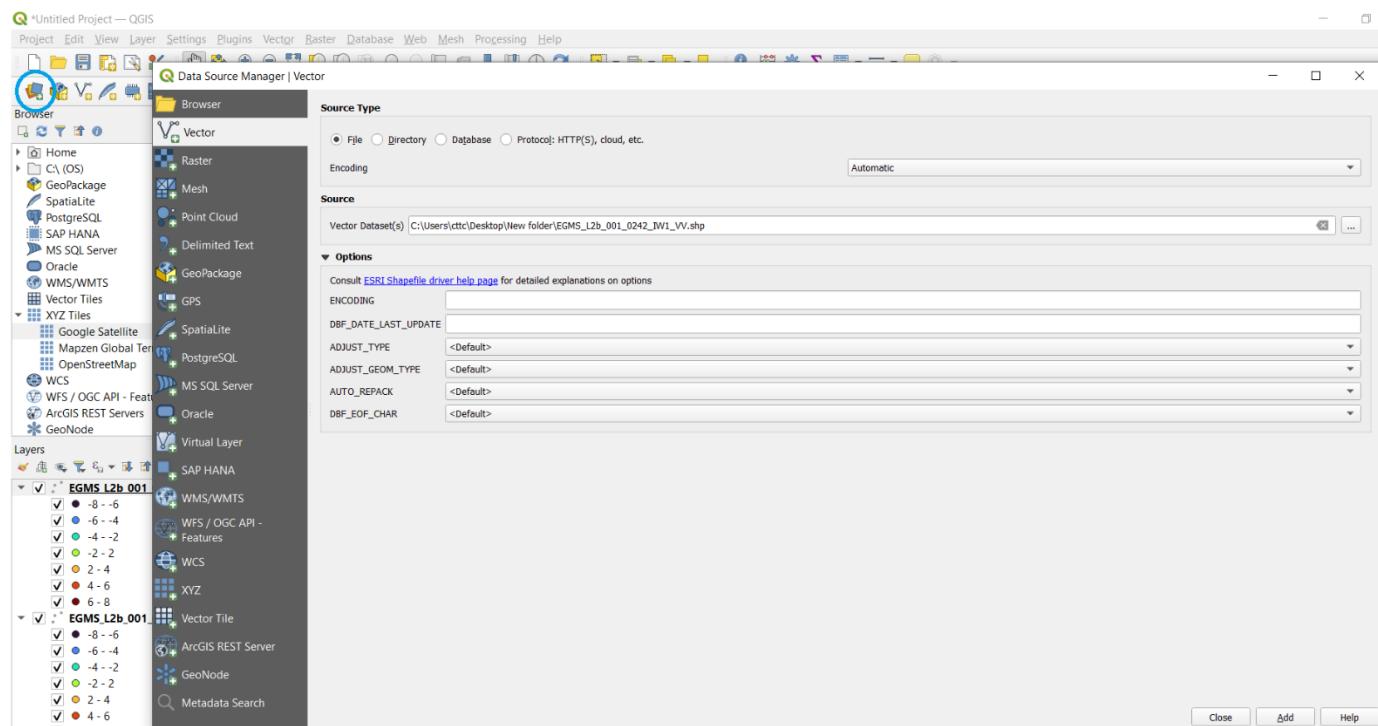


Figure B.11: Open de Data Source Manager by clicking on the blue circle highlighted in the image, choosing “Vector” and providing the name of the Shapefile. [Open](#).

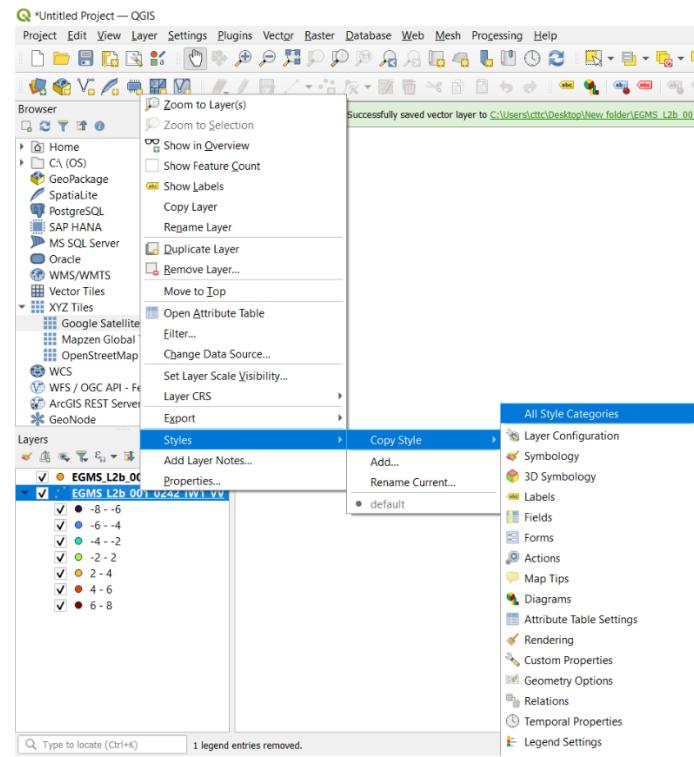
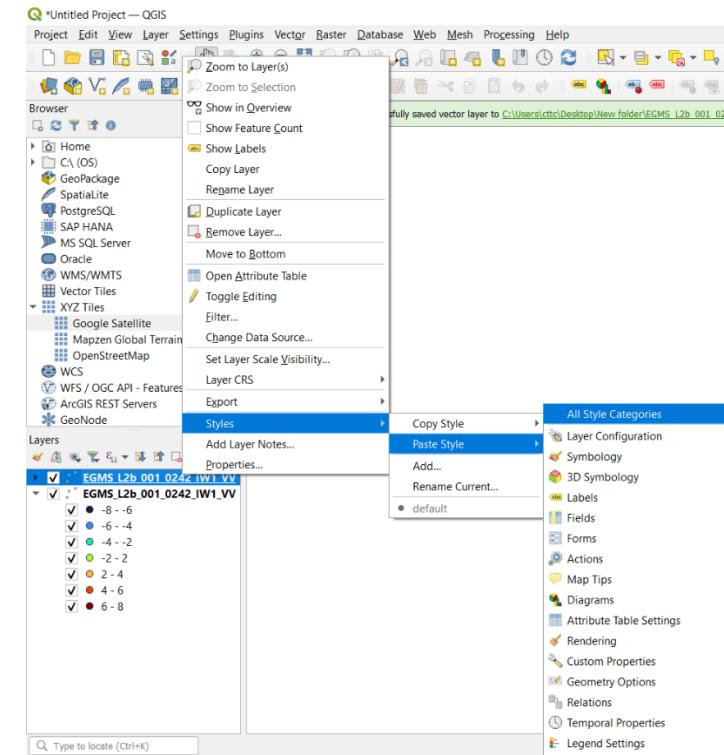
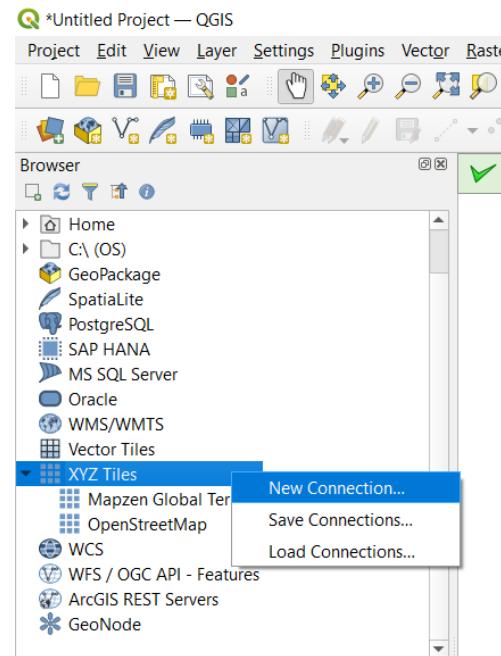


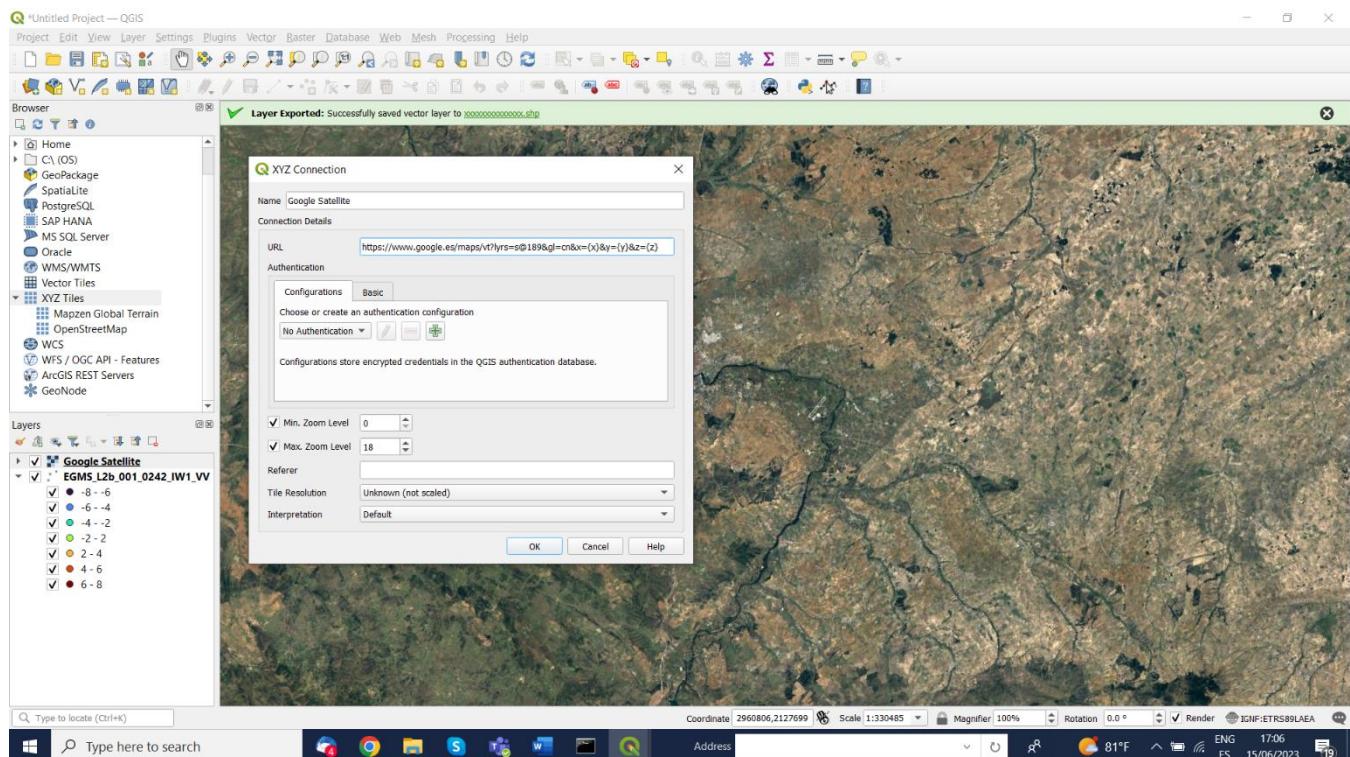
Figure B.12: Copy the style to the Shapefile by right-clicking the name of the CSV layer and choosing “Style” > “Copy Style” > “All categories”. [Copy](#).



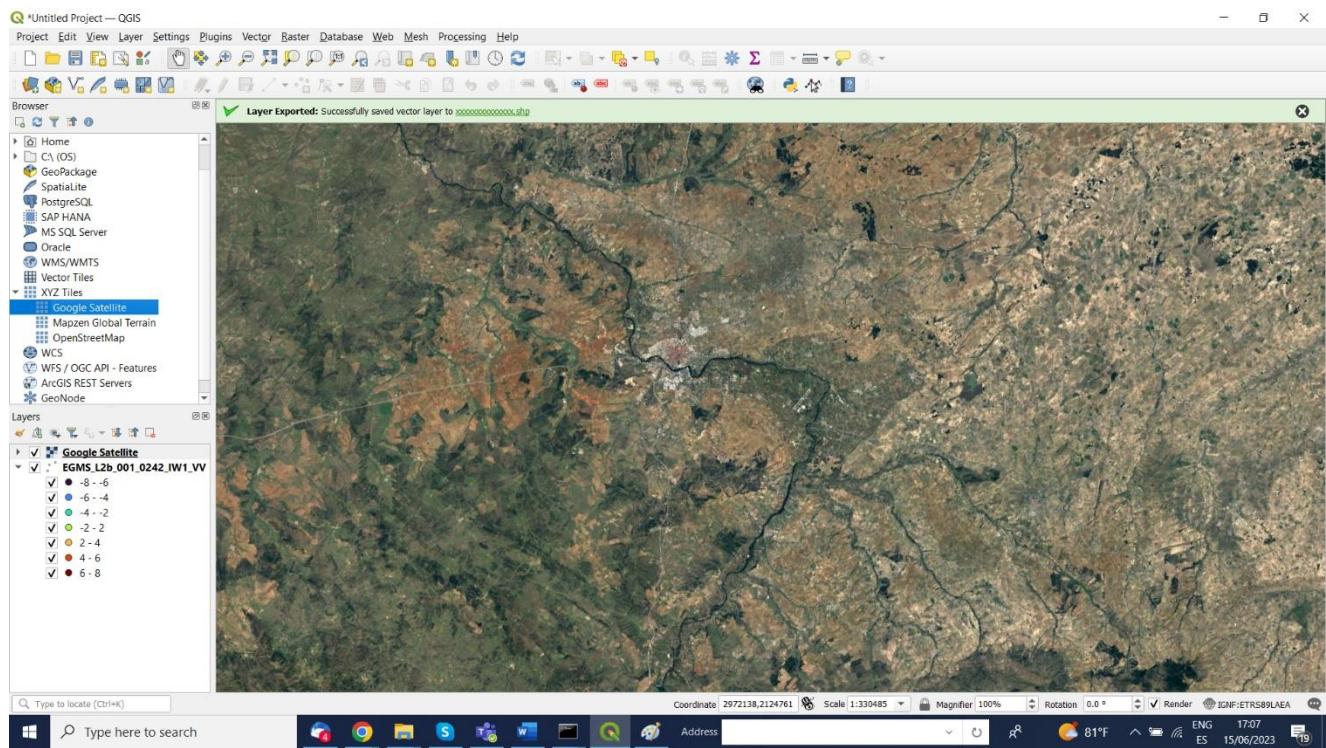
- Figure B.13: Paste the style by right-clicking on the Shapefile layer and choosing “Style” > “Paste Style” > “All categories”. [Right-click](#).



- Figure B.14: Import a background image by right-clicking “XYZ Tiles” of the “Brower” window, and then selecting “New connection”. **Import**.



- Figure B.15: Specify “Google Satellite” in the “Name” field, and then enter the URL [“<https://www.google.es/maps/vt?lyrs=s@189&gl=cn&x={x}&y={y}&z={z}>”](https://www.google.es/maps/vt?lyrs=s@189&gl=cn&x={x}&y={y}&z={z}). Click “OK” to save the connection. **In** the .



- Figure B.16: Click on “XYZ Tiles” > “Google Satellite” to display the background image.
[Click.](#)

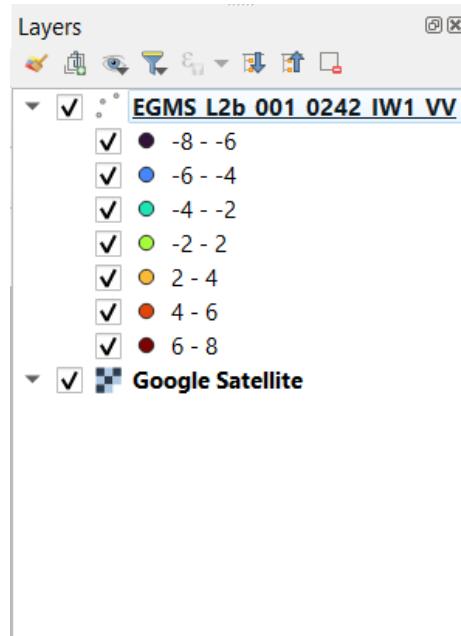


Figure B.17: Adjust the layer order in the “Layers” window by dragging the “Google Satellite” layer below the Shapefile layer. [Adjust](#) the layer order in the “Layers” window by dragging .

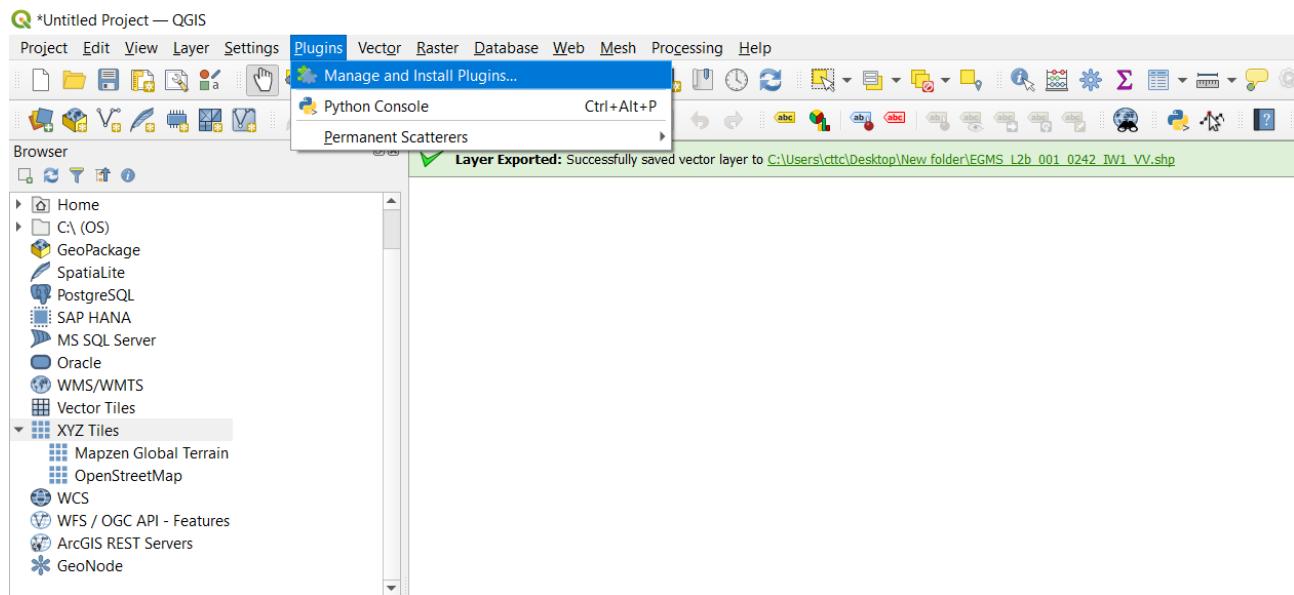


Figure B.18: Click on “Plugins” > “Manage and Install Plugins”. [To](#).

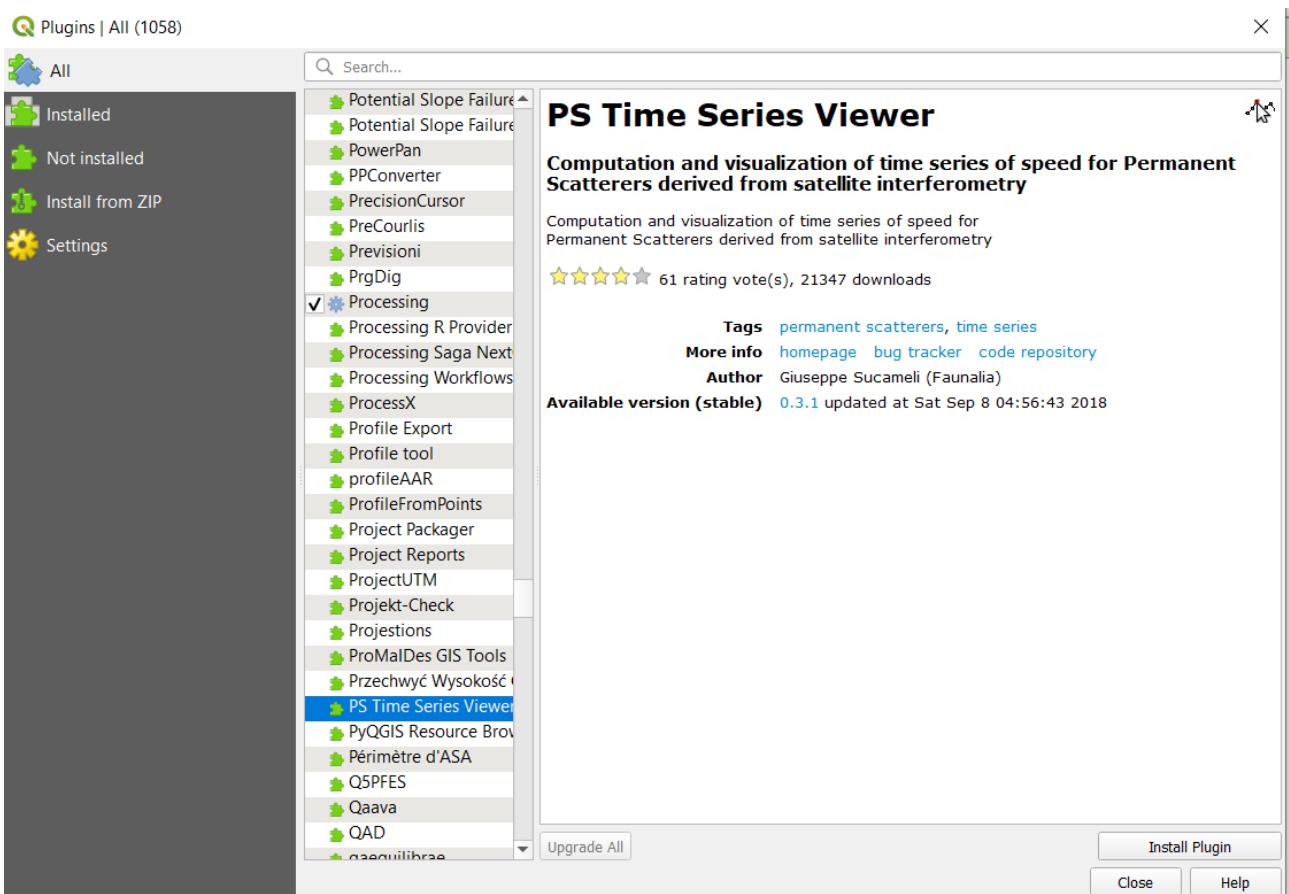


Figure B.19: In the window “Plugins”, select “PS Time Series Viewer” and click on “Install Plugin”. [To](#).

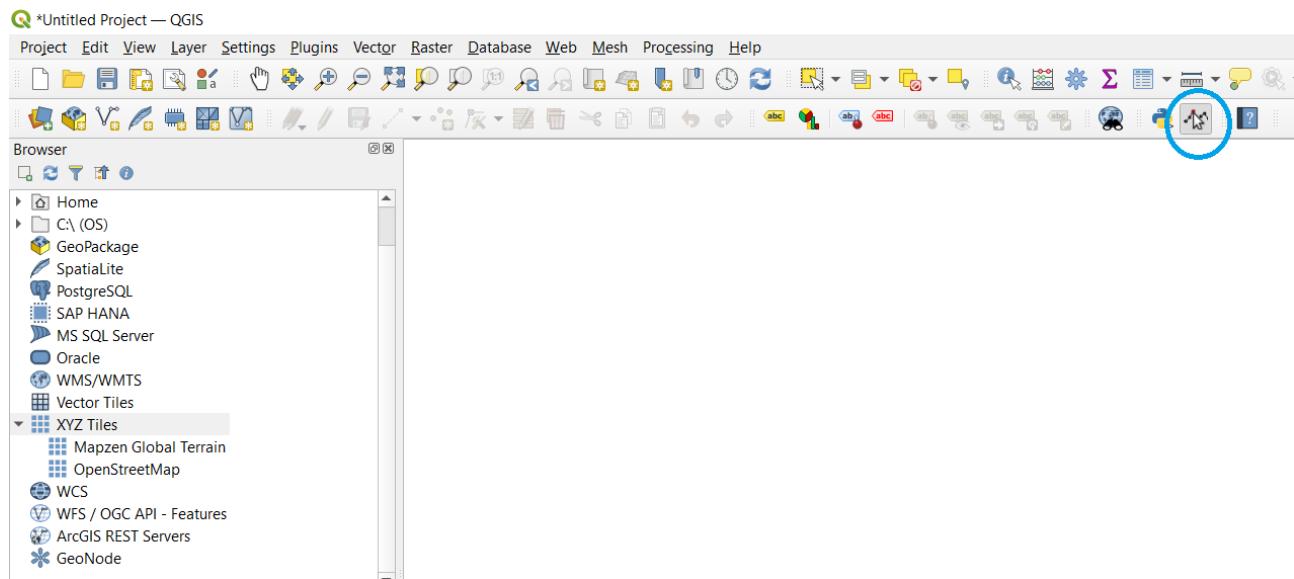


Figure B.20: To see the time series, Click on the icon representing the “PS Time Series Viewer” highlighted by a blue circle in the image, to visualize the time series. [To](#).

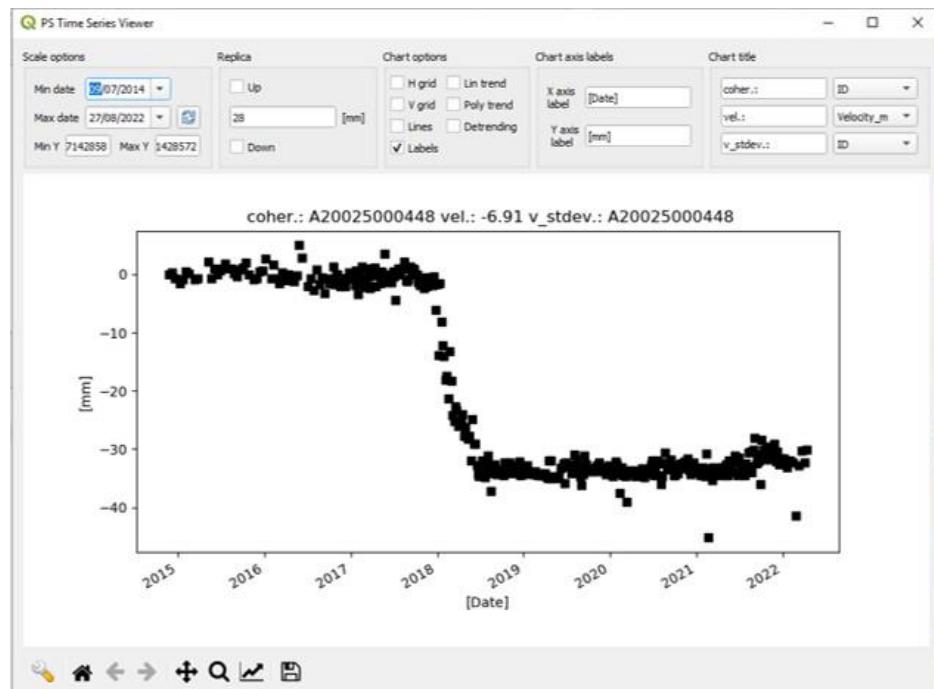


Figure B.21: Example the time series. [To](#).