Installation Steps:

1. Install **QGIS** (Script tested for version 3.18) https://qgis.org/en/site/forusers/download.html
   a. There are two options to installing QGIS: **standalone** or through the **OSGeo4W** package
   b. Pick **Standalone** if you only wish to install QGIS

Latest release (richest on features):

⬇ **Q**	QGIS Standalone Installer Version 3.18 (64 bit)	⬈
sha256		⬈
⬇ **Q**	QGIS Standalone Installer Version 3.18 (32 bit)	⬈
sha256		⬈

   c. Pick the **OSGeo4W** if you want to install a whole package of GIS applications (check their website for more info https://www.osgeo.org/projects/osgeo4w/)

QGIS in OSGeo4W:

⬇	OSGeo4W Network Installer (64 bit)	⬈
⬇	OSGeo4W Network Installer (32 bit)	⬈

2. Install **R** (any version) https://cran.r-project.org/bin/windows/base/

Download R 4.1.0 for Windows (86 megabytes, 32/64 bit)

Installation and other instructions
New features in this version

3. Extract the files from **Archaeo-Astro Insight.rar**, right-click on the file and click **Extract to Archaeo-Astro Insight/**
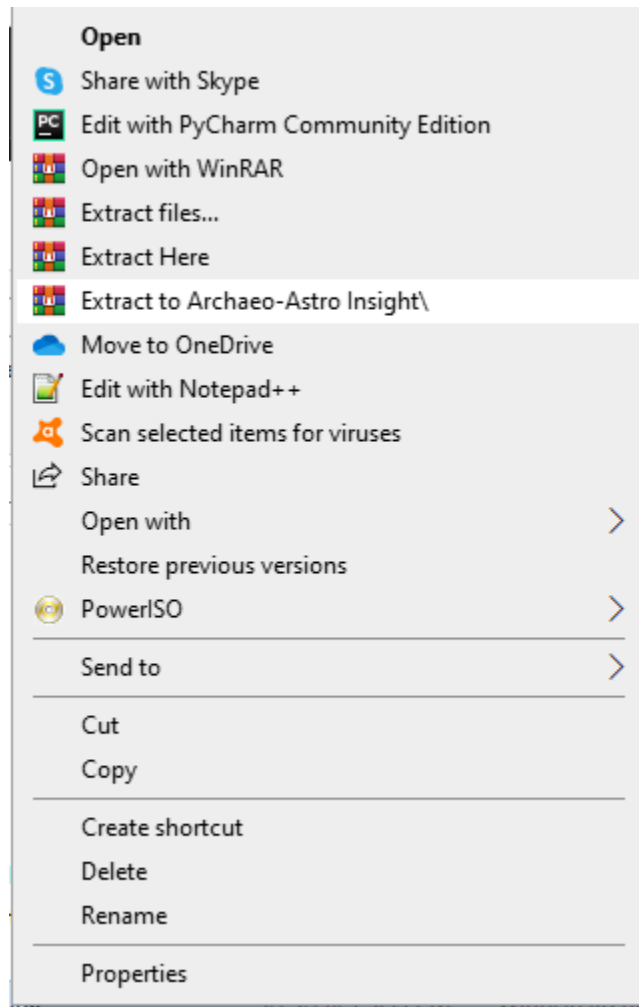
4. Open **QGIS** and open the script
   a. Open the **QGIS Python Console**

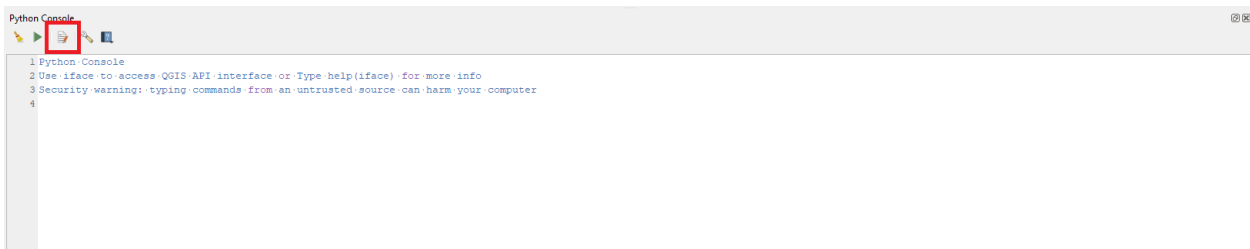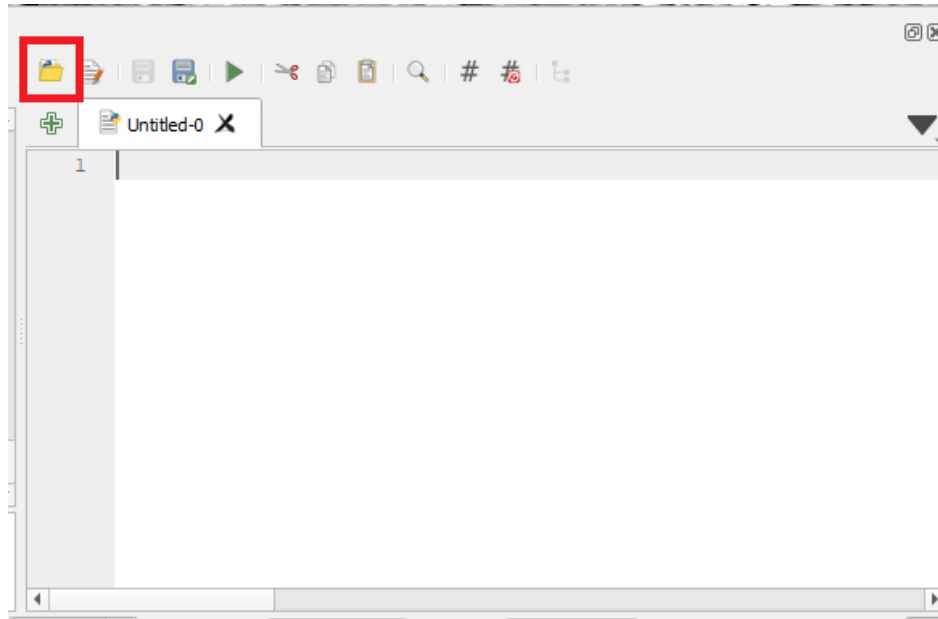

   b. Click the **Show Editor** button
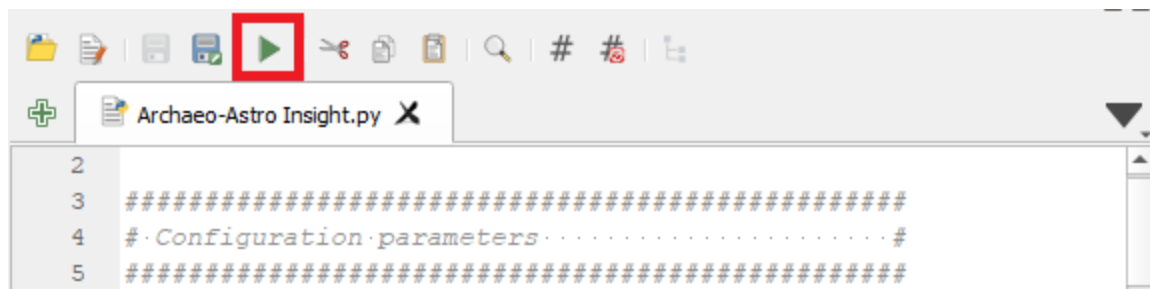

   c. Click the **Open Script...** button

d. Go to the folder where you saved the script and select **Archaeo-Astro Insight.py**

5. Now that the script is opened in the console, we must configure some parameters (**Very important to set the paths with \\ instead of \, the script will fail otherwise**)

    a. **R_PATH** – this is the path needed in order to run the R script from the python script. The path set in the script is the default installation path, yours might differ**. bin\\x64\\Rscript** part is the same regardless of your location. You need to go all the way to where Rscript is located

    Example: "C:\\Program Files\\R\\R-4.0.5\\bin\\x64\\Rscript"

    C:\\Program Files\\R - Might differ based on where you installed R

    R-4.0.5\\bin\\x64\\Rscript – Generally stays the same, R version might change from 4.0.5 to some other number in the future, folders should stay the same

    b. **SCRIPT_PATH** – this is the path to the folder where you have put the script files. Set it to your own path

    c. **RESULTS_PATH** – this is the path where the generated .csv result files are saved. You can change this to whatever path you want

    d. You will find these parameters and a few more at the beginning of the script:

```
 2
 3    ###############################################
 4    # Configuration parameters ...............#
 5    ###############################################
 6    QGIS_CRS = "EPSG:3857" #canvas coordinates
 7    TARGET_CRS = "EPSG:4326" #coordinates of your map
 8
 9    #path to the folder in which you want to savwe the generated cs
10    RESULTS_PATH = "D:\\College\\Licenta\\Archaeo-Astro Insight\\re
11    SCRIPT_PATH = "D:\\College\\Licenta\\Archaeo-Astro Insight" #fc
12    R_PATH = "C:\\Program Files\\R\\R-4.0.5\\bin\\x64\\Rscript"
13
14    #width of the line you draw on the map
15    LINE_WIDTH = 0.7
16
17    #Sometimes the script may fail if these values are too small
18    REQUEST_SLEEP = 5 #wait for the result of the request to get hc
19    SCRIPT_SLEEP = 10 #wait before running R script in order for hc
20
21    DOWNLOAD_MAP = True #set to False if you don't want a new googl
22
23    #Map types
24    ROADMAP = "mt1.google.com/vt/lyrs=m&hl=en&x={x}&y={y}&z={z}"
25    TERRAIN = "mt1.google.com/vt/lyrs=p&hl=en&x={x}&y={y}&z={z}"
26    SATELLITE = "mt1.google.com/vt/lyrs=s&hl=en&x={x}&y={y}&z={z}"
27    HYBRID = "mt1.google.com/vt/lyrs=y&hl=en&x={x}&y={y}&z={z}" #Hy
28
29    ###############################################
```

6. Now you can run the script pressing the **Run Script** button

```
 2
 3    ###############################################
 4    # Configuration parameters ...............#
 5    ###############################################
```

User Guide:

There are two functionalities to this script: going to specific coordinates on the map and computing declination.

When you run the script, these two buttons should appear on your toolbar:


If you click **Go to Coords** a window will open where you can enter the coordinates for a point on the map. The order of the coordinates is **latitude,longitude**, without any spaces. Coordinates are also taken with 4 decimal points.
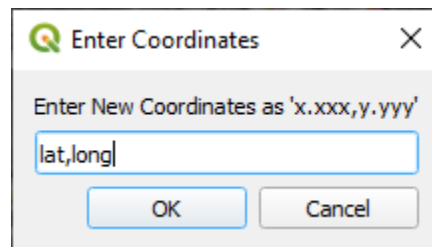
Example: Coordinates for Stonehnge

1. The simplest way to obtain coordinates is from Google Maps (https://www.google.com/maps)
2. Enter the name of the location, in our case Stonehenge and then click on a point on the map close to the desired location
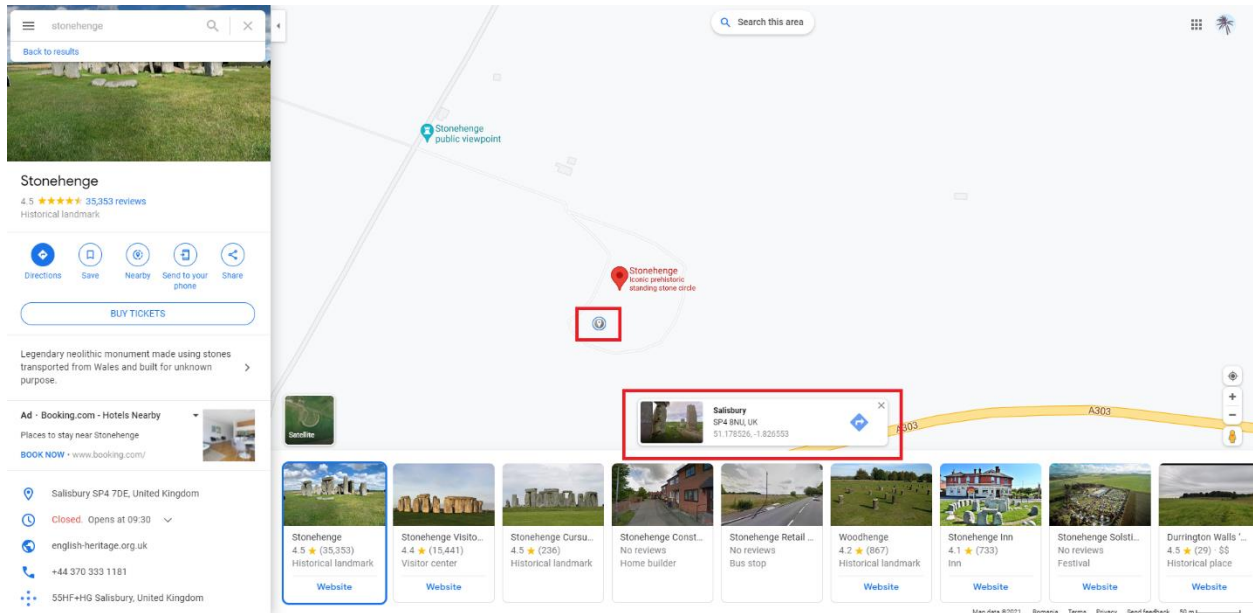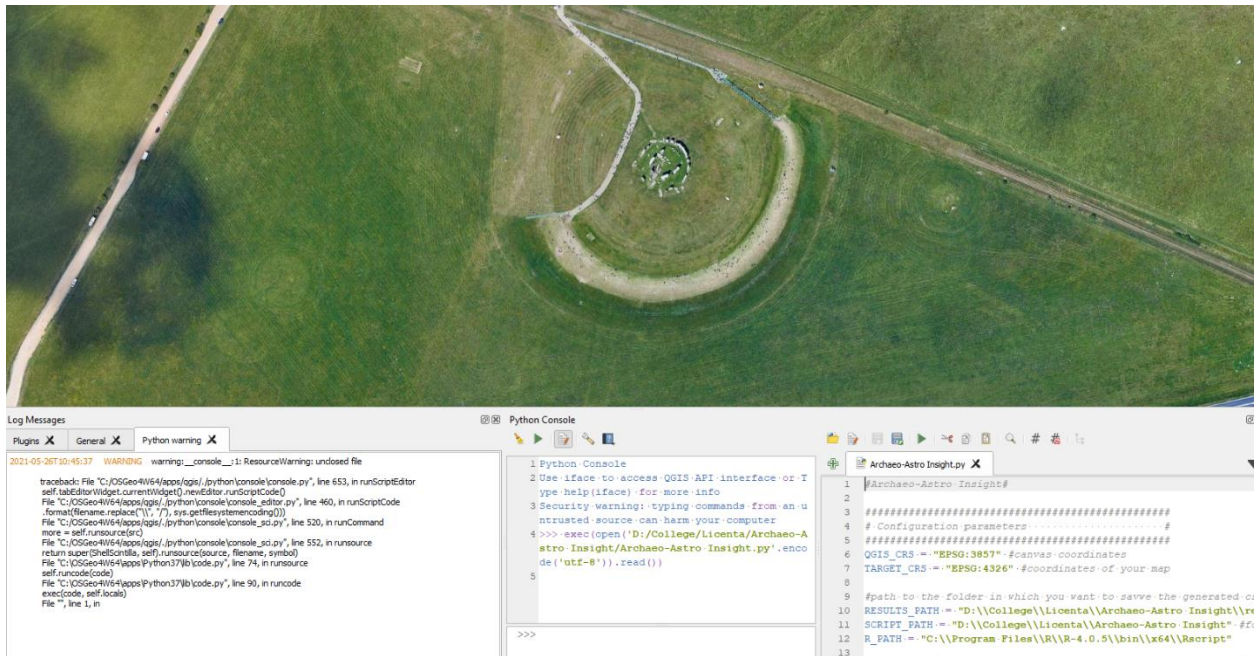

3. Click the coordinates in the rectangle at the bottom of the screen (see previous picture) and then copy the coordinates from the left side of the screen (decimal ones, not the ones in degrees, minutes, seconds)
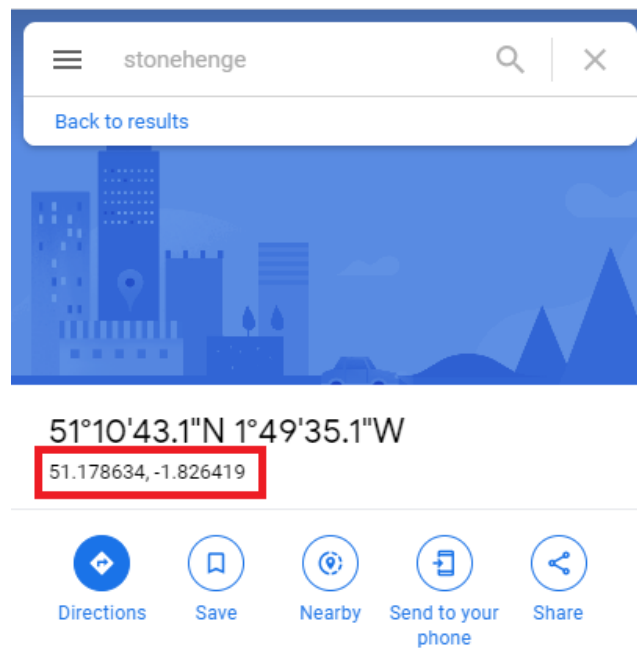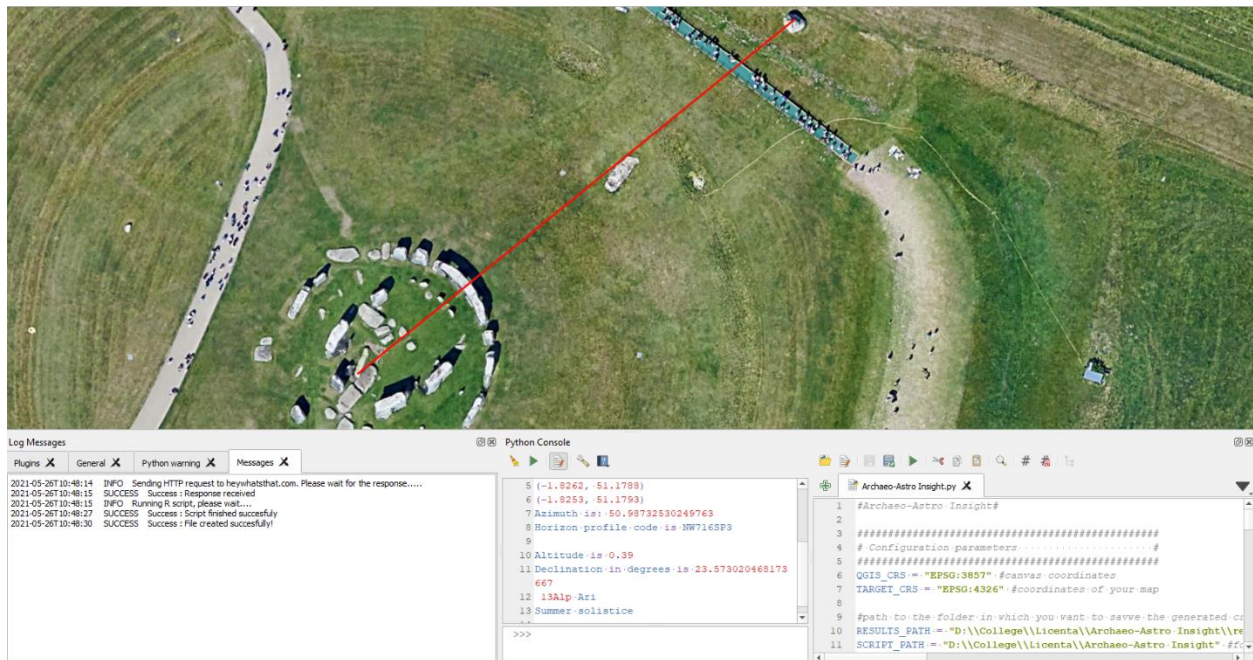
4. Copy these coordinates and paste them into the Enter Coordinates window in QGIS
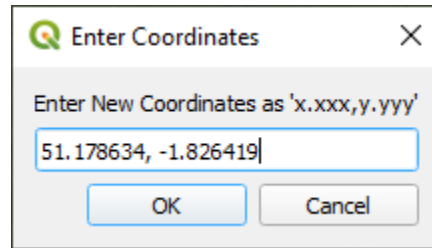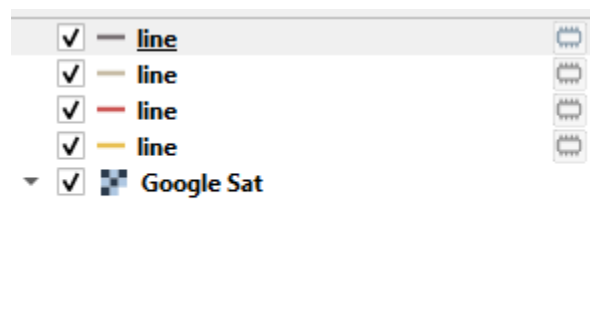

5. You're at Stonehenge now!

If you click **Start Tool**, the current tool will change to the one implemented by the script which will allow you to compute the declination of a line. Simply click on two points on the map and wait for the values to be computed.

Lines drawn on the map are saved as separate layers:

If you hover over a line for a few seconds, you can see the coordinates of the points. You can also delete any line without affecting the other lines.
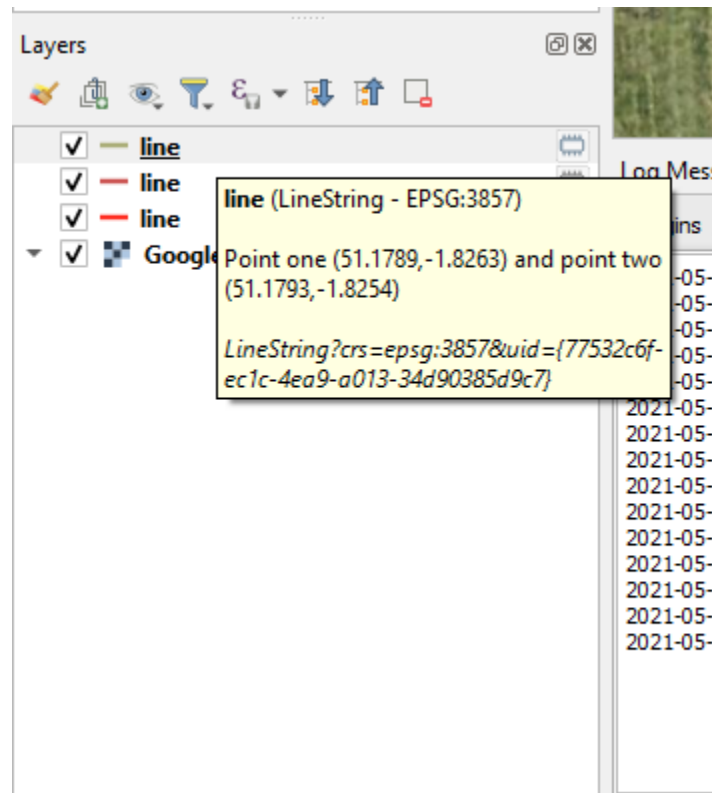
If you want to change the line width, change the value of the **LINE_WIDTH** parameter in the script.

At the end, you will be given the option to save the results as a .csv file. The results are also visible in the console as they are generated.
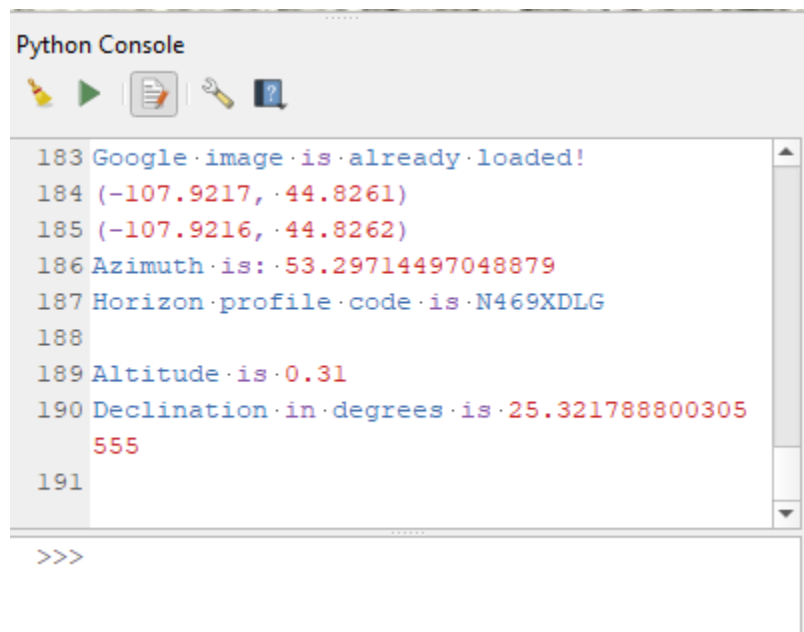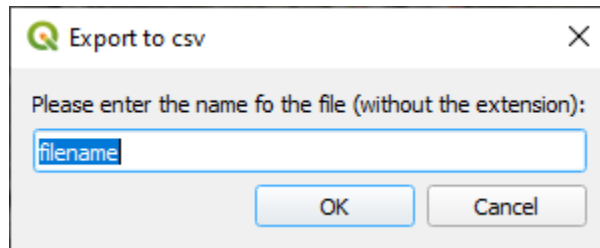
Possible Errors:

When generating the altitude of the point, the script gets the information from HeyWhatsThat.com automatically. Unfortunately, sometimes the data is not ready in time and the script cannot compute the value. This will cause the script to fail. In this case, you can try and increase the **SCRIPT_SLEEP** value and **RE-RUN the script** (as described in the installation steps). This will give more time for the data to be generated.