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):	
L QGIS Standalone Installer Version 3.18 (64 bit)	ø
sha256	ď
L QGIS Standalone Installer Version 3.18 (32 bit)	ø
sha256	ď

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/)



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

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/

	Open	
G	Share with Skype	
PC	Edit with PyCharm Community Edition	
	Open with WinRAR	
	Extract files	
	Extract Here	
	Extract to Archaeo-Astro Insight\	
	Move to OneDrive	
2	Edit with Notepad++	
4	Scan selected items for viruses	
Ē	Share	
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0	PowerISO	>
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	Create shortcut	
	Delete	
	Rename	
	Properties	_

- 4. Open **QGIS** and open the script
 - a. Open the QGIS Python Console



b. Click the **Show Editor** button

bythen Consule.	0
1 Python-Console	
2 Use iface to access QGIS API interface or Type help (iface) for more info	
3 Security warning: typing commands from an untrusted source can harm your computer	
4	

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:

```
♣
    🖹 Archaeo-Astro Insight.py 🗶
  2
  3
    4 #.Configuration.parameters.....#
    5
  6 QGIS CRS = "EPSG:3857" #canvas coordinates
    TARGET CRS = "EPSG: 4326" + #coordinates of your map
  7
  8
  9
    #path to the folder in which you want to savwe the generated c:
 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 he
    SCRIPT SLEEP = 10 + #wait before running R script in order for he
 19
 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}" #H_{3}
 28
```

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



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:

🖳 🎕 Vi 🔏 🖏 Vi I I / I I Vi k · 🕱 🖥 🛠 👌 🖹 5 8 8 1 🛥 🍕 1 🧠 🤫 🧠 🤫 🖓 🖓 🛃 🛃 🖉 🧷 🤈 ·	Start Tool Go to Coords
--	-------------------------

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.

; X				
Enter New Coordinates as 'x.xxx,y.yyy'				
lat,long				
Cancel				

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)

≡ stor	ehenge			Q X
Back to resu	lts			
•				
51°10'43 51.178634,-1		9'35.1"	W	
Directions	(D) Save	() Nearby	Send to you	r Share

4. Copy these coordinates and paste them into the Enter Coordinates window in QGIS



5. You're at Stonehenge now!



return taper (ShellSonthla, exer, Jrunson a summing Her (L) (SSGeroWei Appars) Prifron 37 (b) (code. py*, line 74, in runsource self.runcode(code) Her (L) (SSGeroWei Appars) Prifron 37 (b) (code. py*, line 90, in runcode exec(code, pelf (code) File **, line 1, in

IPython console 2Use iface to access (OIIS AFT interface or T ype help(iface) for more info 3 Security warning : typing commands from an u ntrusted source can harm your computer 4 >>> -exec (open ('D:/College/Licenta/Archaeo-A stro Insight/Archaeo-Aktro Insight.py'.enco de('Ust_6')).read()) 5

Configuration parameters
GG15_CR8---"EPSG:3857" fcanvas-coordinates
TARGET_CR8---"EPSG:4326" fcoordinates of your map

6
9 #path to the folder in which you want to save the generated of
0 RESULTS_FATH == "D:\\College\Licenta\Archaeo-Astro Insight\\rr
11 SCRIPT_FATH == "D:\\College\Licenta\Archaeo-Astro Insight" = ff(
12 R_FATH == "C:\\Program Files\\R\\R-4.0.5\\bin\\x64\\Reoript"
13

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.

Q Export to csv		×
Please enter the name fo	o the file (witho	ut the extension):
filename		
	ОК	Cancel

Pythor	Console	
۱ 🌜	 I 💫 I 🔌 II. 	
183	Google-image-is-already-loaded!	*
184	(-107.9217, 44.8261)	
185	(-107.9216, 44.8262)	
186	Azimuth is: 53.29714497048879	
187	Horizon profile code is N469XDLG	
188		
189	Altitude is 0.31	
190	Declination in degrees is 25.321788800305	
	555	-
191		
		Ŧ
>>>		

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.