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pyR2 workshop

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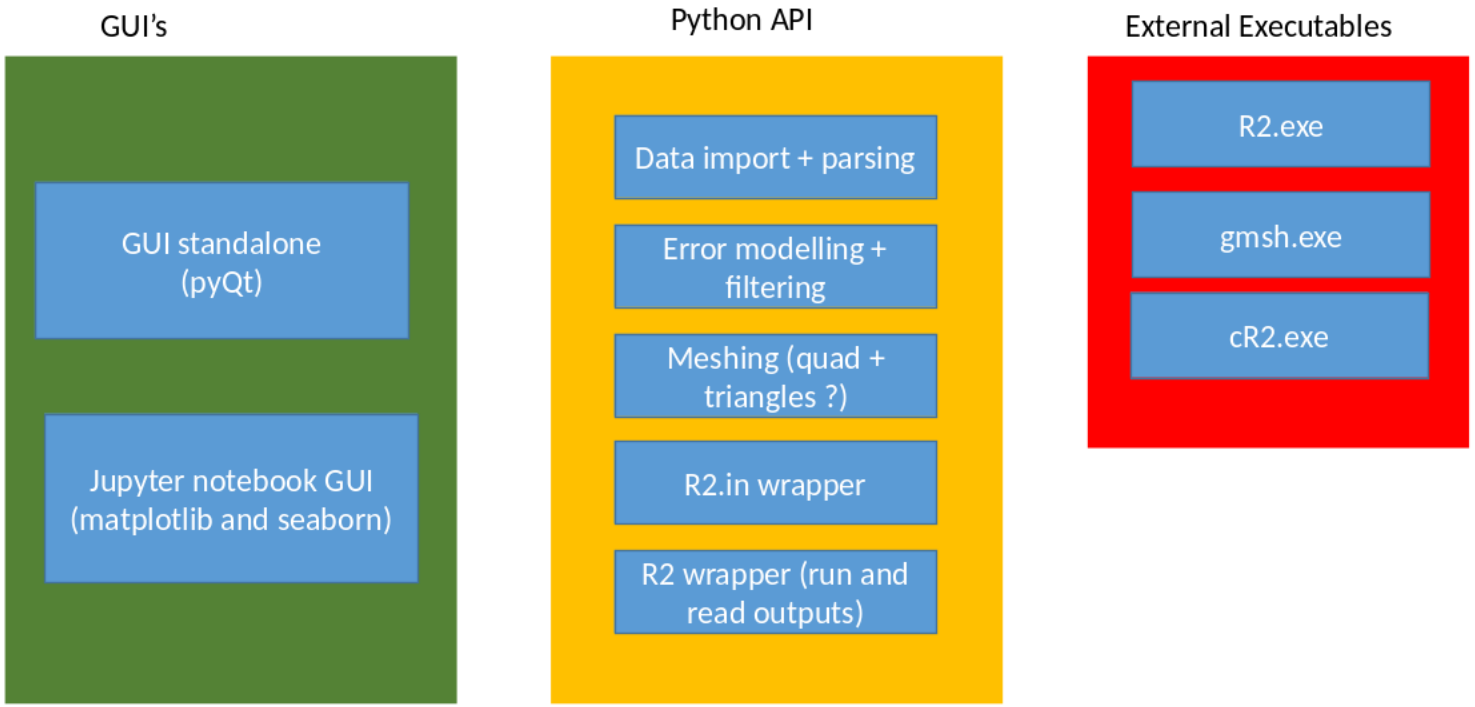
Download the code

Repository of binaries and examples:
https://lancaster.box.com/s/x7ke3i6ogmdkfobmbur6vttmxawjwjnh

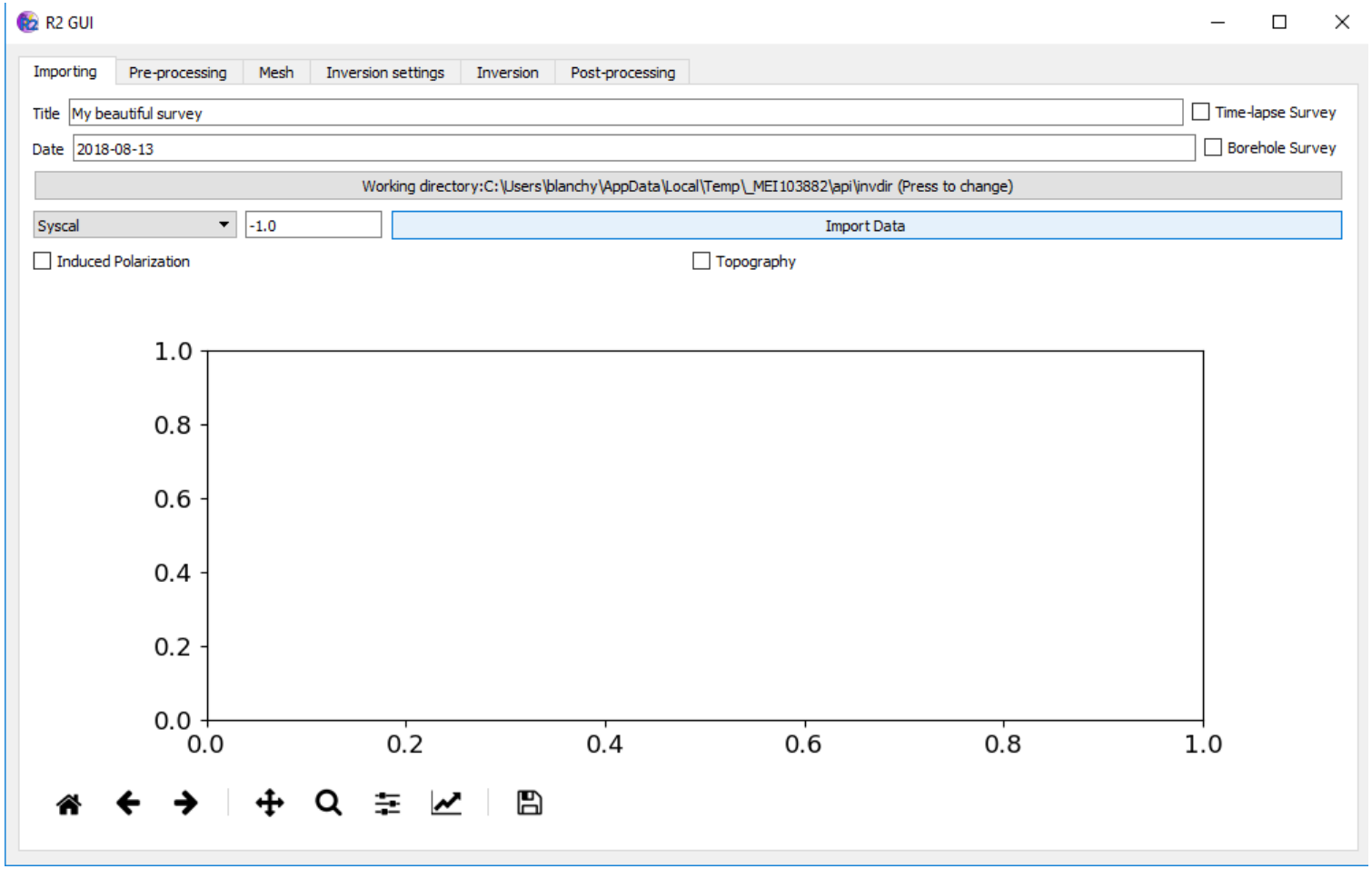
-> Download the « workshop180817 » folder

Code repository (for develpment and issue tracking):
https://gitlab.com/sagitta1618/r2gui

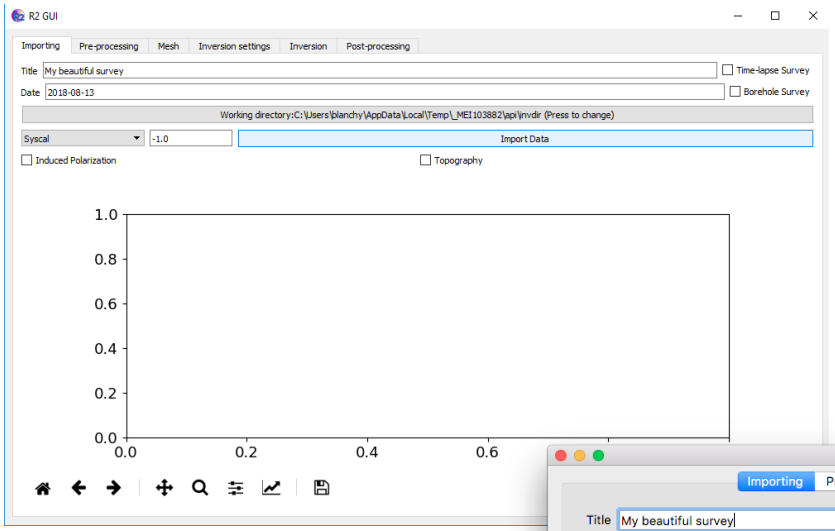
Project structure



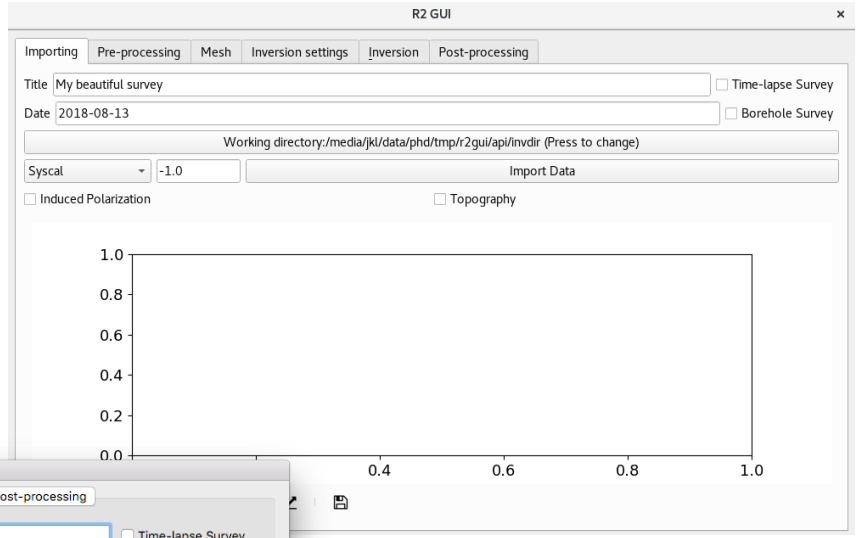
General view



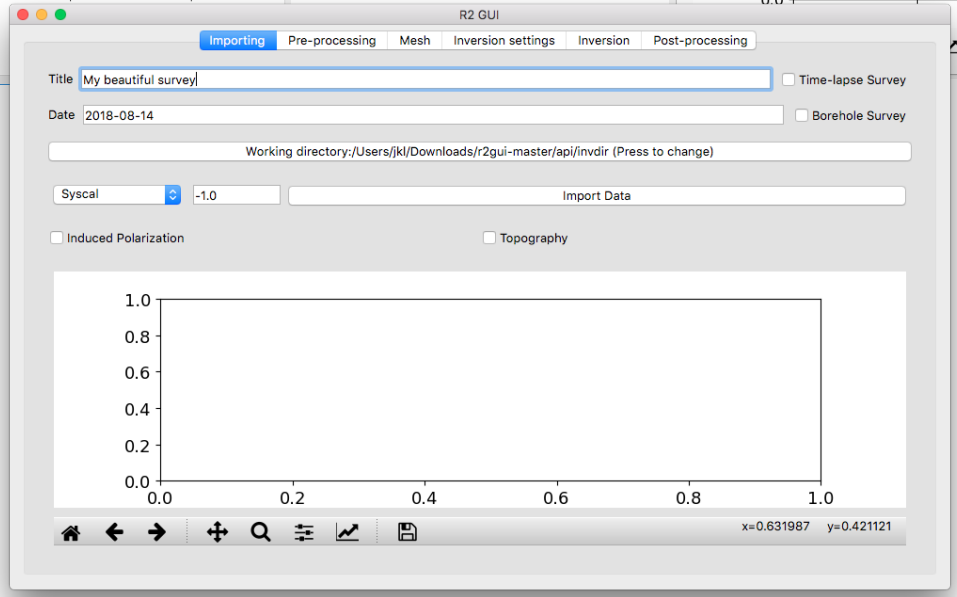
Multiplatform



Windows



Linux (using wine)



Mac (using wine)

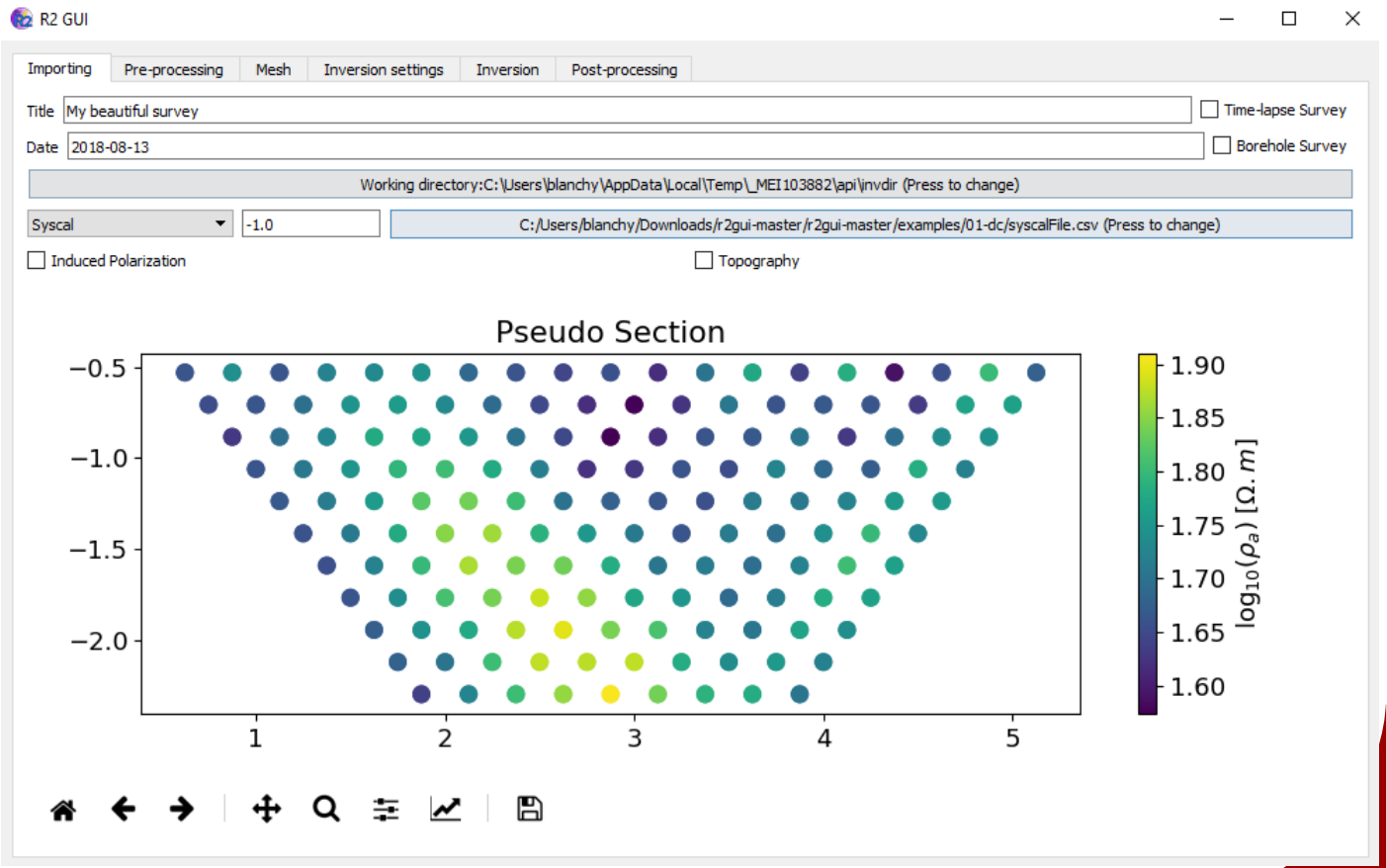
Example 1: DC inversion (step by step)

Folder: 01-dc

Example 1: DC inversion

Importing data

1. Give a name and a date to the survey
2. Choose a working directory (the 01-dc folder). That's were all inversion file will be stored.
3. Choose the file containing the data. Here it's called *syscalFile.csv*. That the file directly outputed by the Syscal instrument.

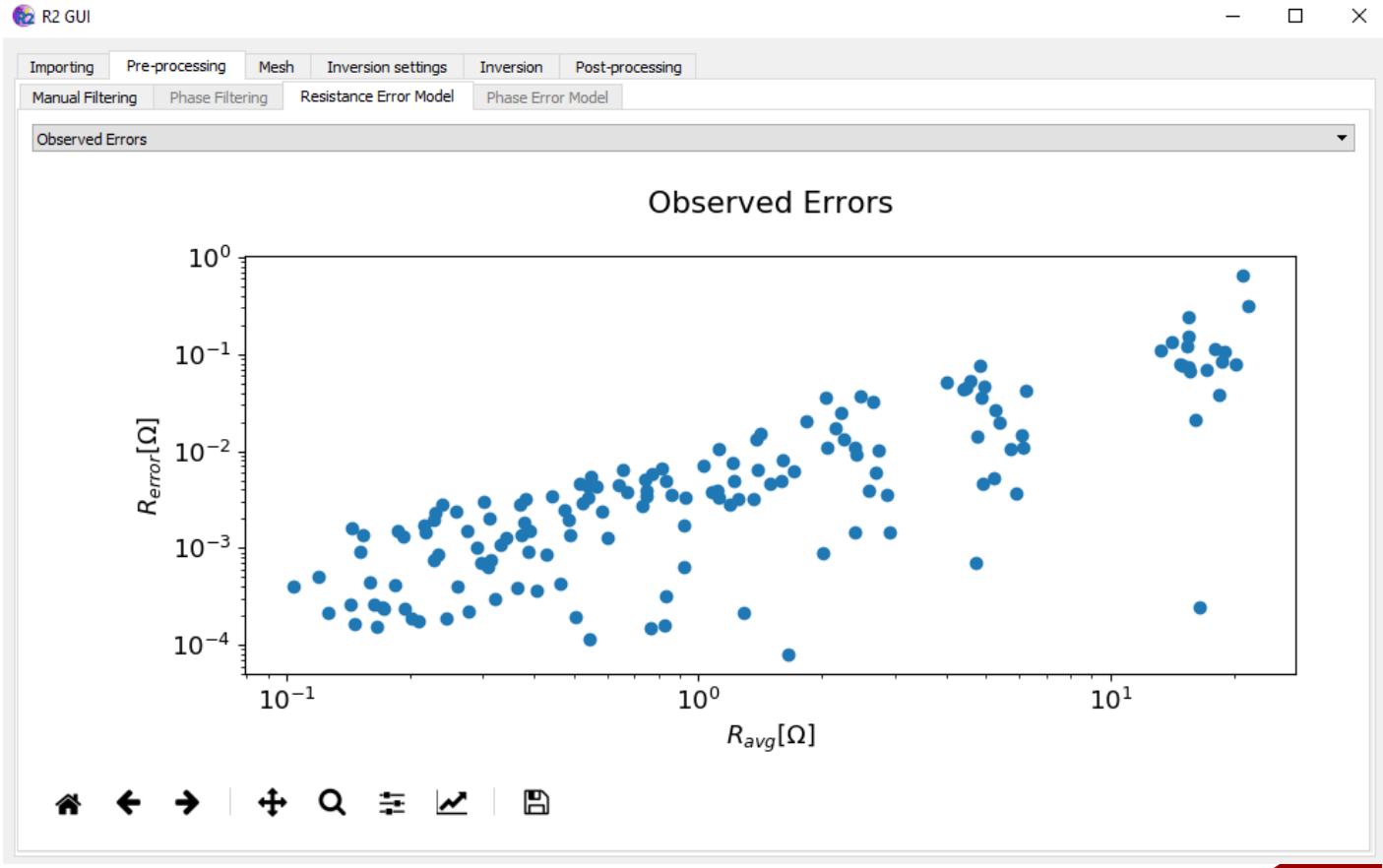


Example 1: DC inversion

Pre-processing – Resistance Error Model

In this tab you can see the reciprocal errors (R_{error}) associated with the mean of the transfer resistance (R_{avg}). Note that the higher the R_{avg}, the higher is the error.

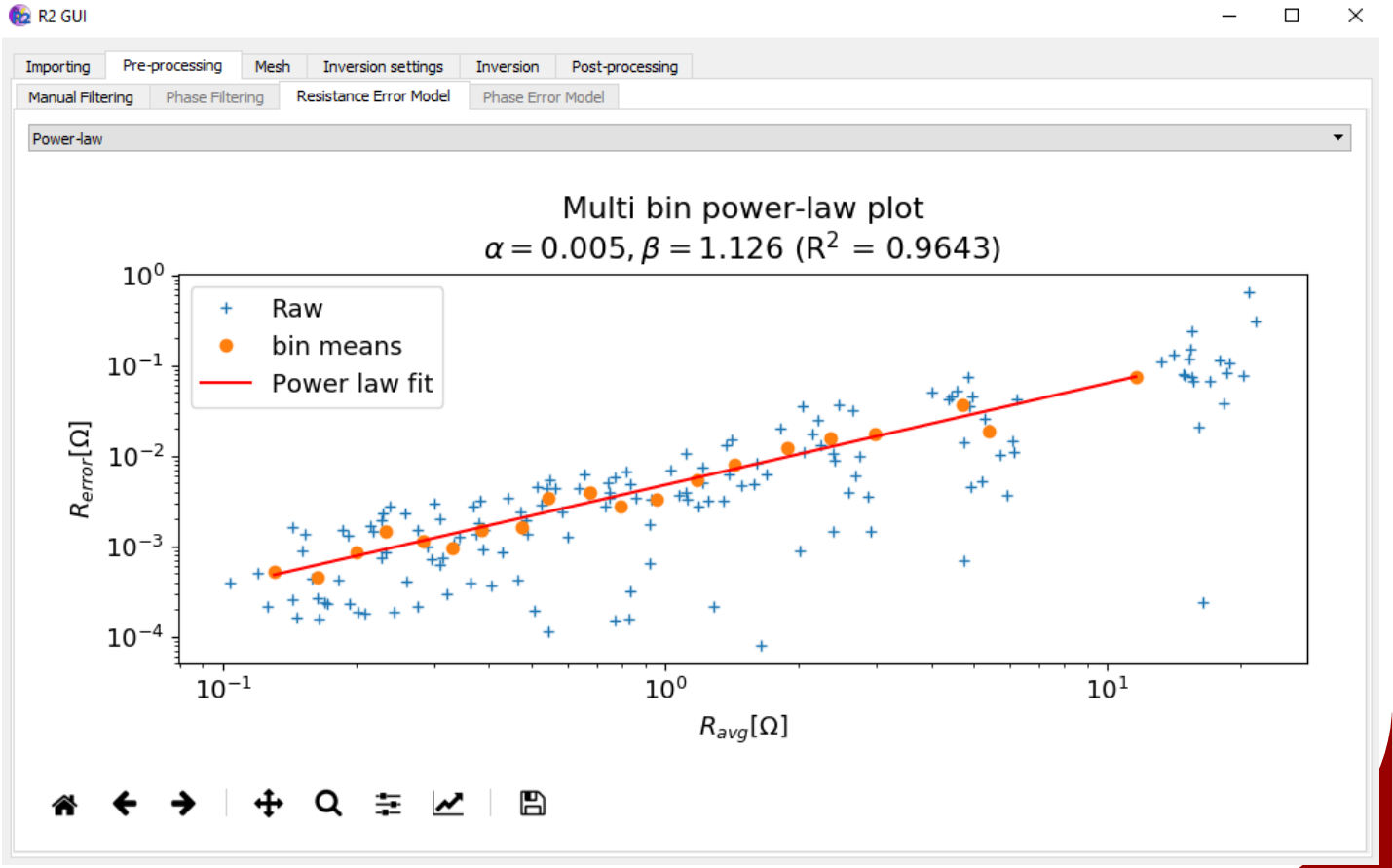
1. Use the drop down menu to fit a model to the errors. For instance you can choose a *power law*.



Example 1: DC inversion

Pre-processing – Resistance Error Model

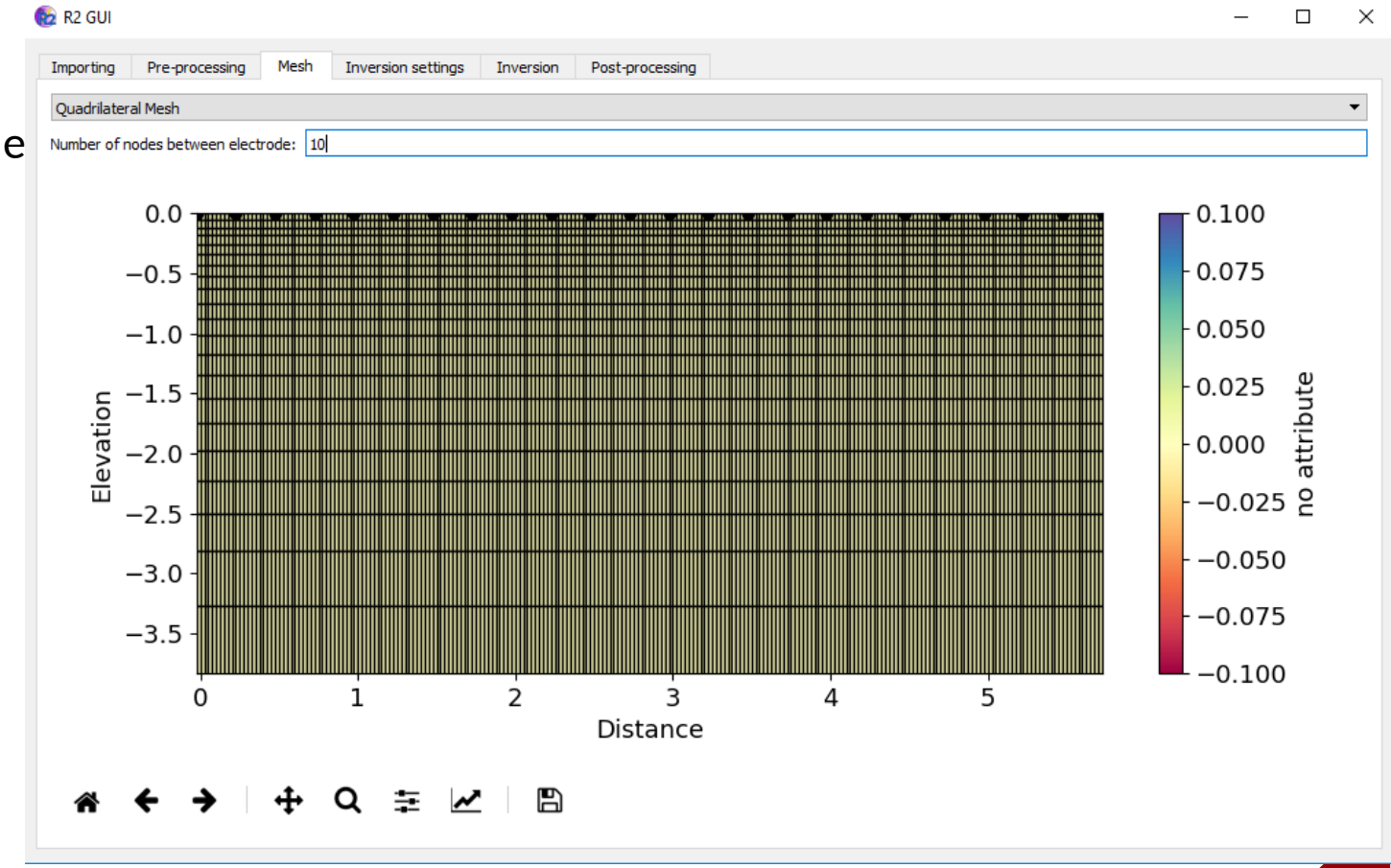
Here is the model fitted.



Example 1: DC inversion

Mesh

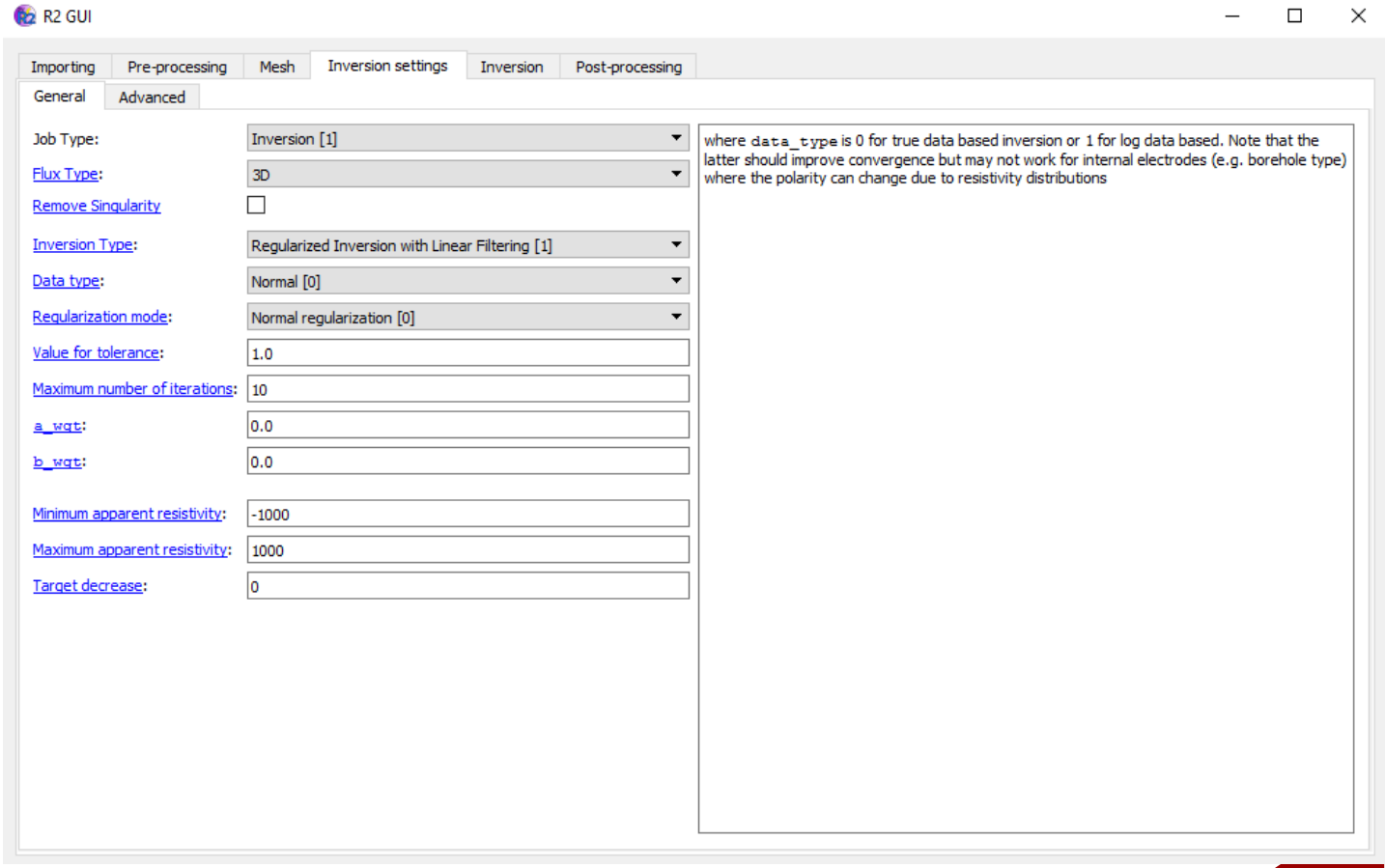
1. Using the drop down menu, create a *quadrilateral mesh* for the survey. Each electrode position is shown as a point on the transect.
2. You can adjust the mesh refinement by changing the *number of nodes between electrodes*. Set it up to 10 for instance.



Example 1: DC inversion

Inversion settings

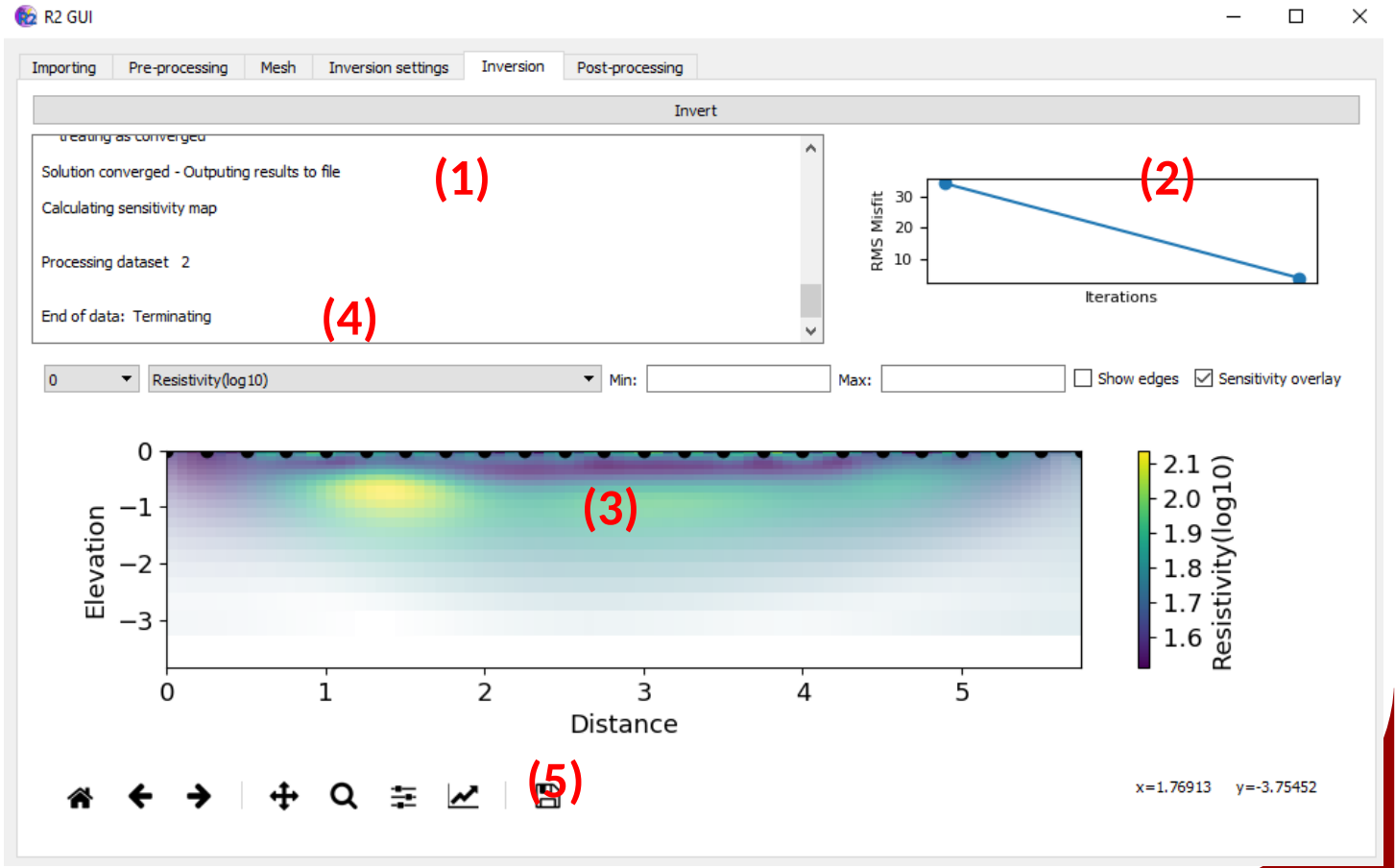
This tab contains all settings to be written into an R2.in file. Click on the labels (underlined in blue) to display the help in the right textbox.
Note that because we fit an error model to our observation, *a_wgt* and *b_wgt* are automatically set to 0.



Example 1: DC inversion

Inversion

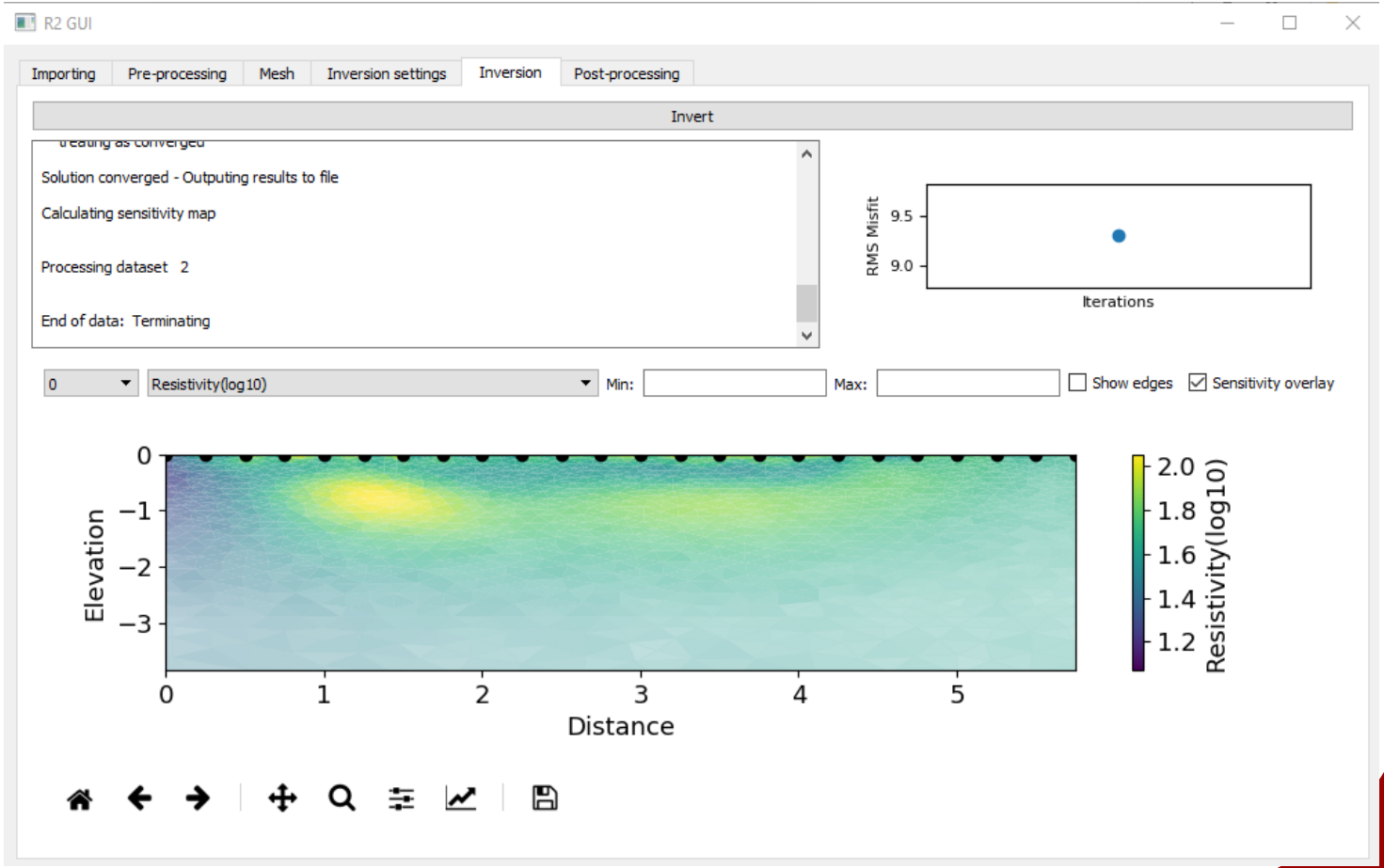
This tab will perform the inversion. Just hit *Invert* to start the inversion. During inversion the GUI is frozen and may be shown as «Not responding ». Be patient, inversion can take some time. Inversion log is visible on the left (1) You can follow the RMS on the top right graph (2). When the inversion is finished, the inverted section will be displayed (3). You can then view the different attribute (4) or save the graph as png (5).



Example 1: DC inversion

Same but with triangular mesh

Try to perform the same inversion but this time with a triangular mesh.



Example 2: DC time-lapse inversion

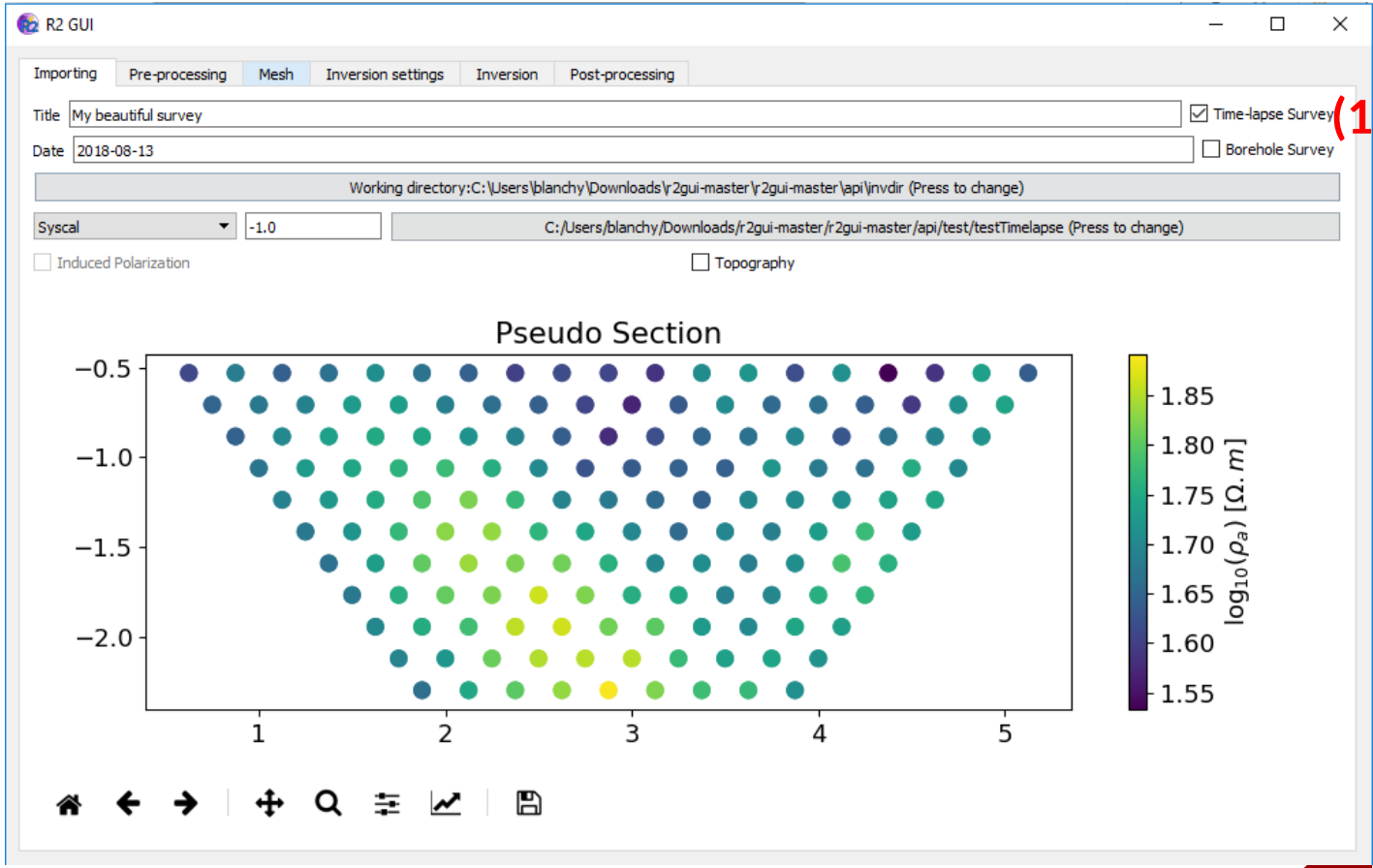
Use folder: 02-dc-time-lapse

Example 2: DC time-lapse inversion

Importing data

1. Check the time-lapse checkbox on the left.
2. Choose the folder that contains the different survey file (here *02-dc-timelapse-inversion/data*). Note that pyR2 will import the file according to the alphabetical order.

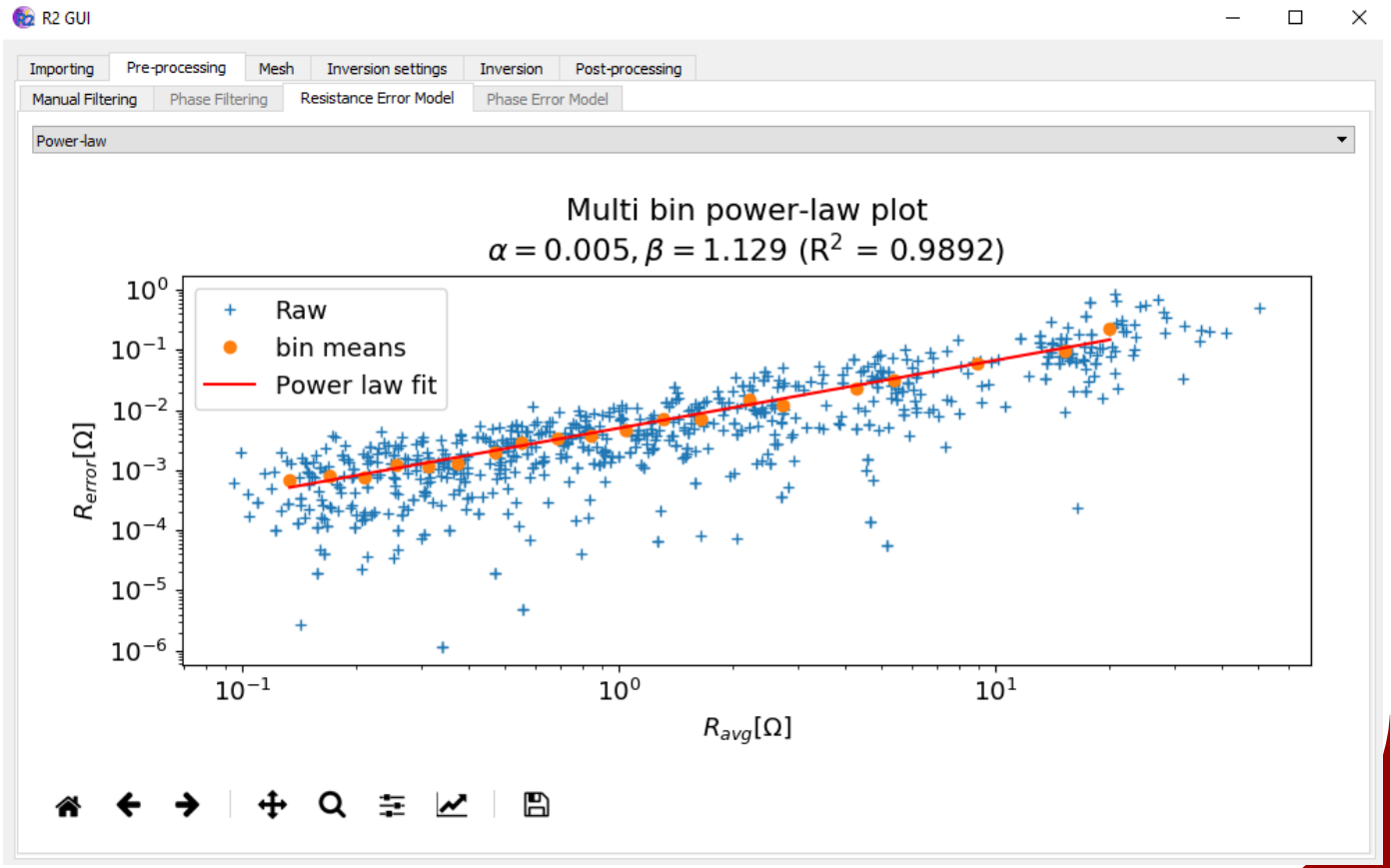
The pseudo section of the first survey will then be plotted.



Example 2: DC time-lapse inversion

Pre-processing – Resistance Error Model

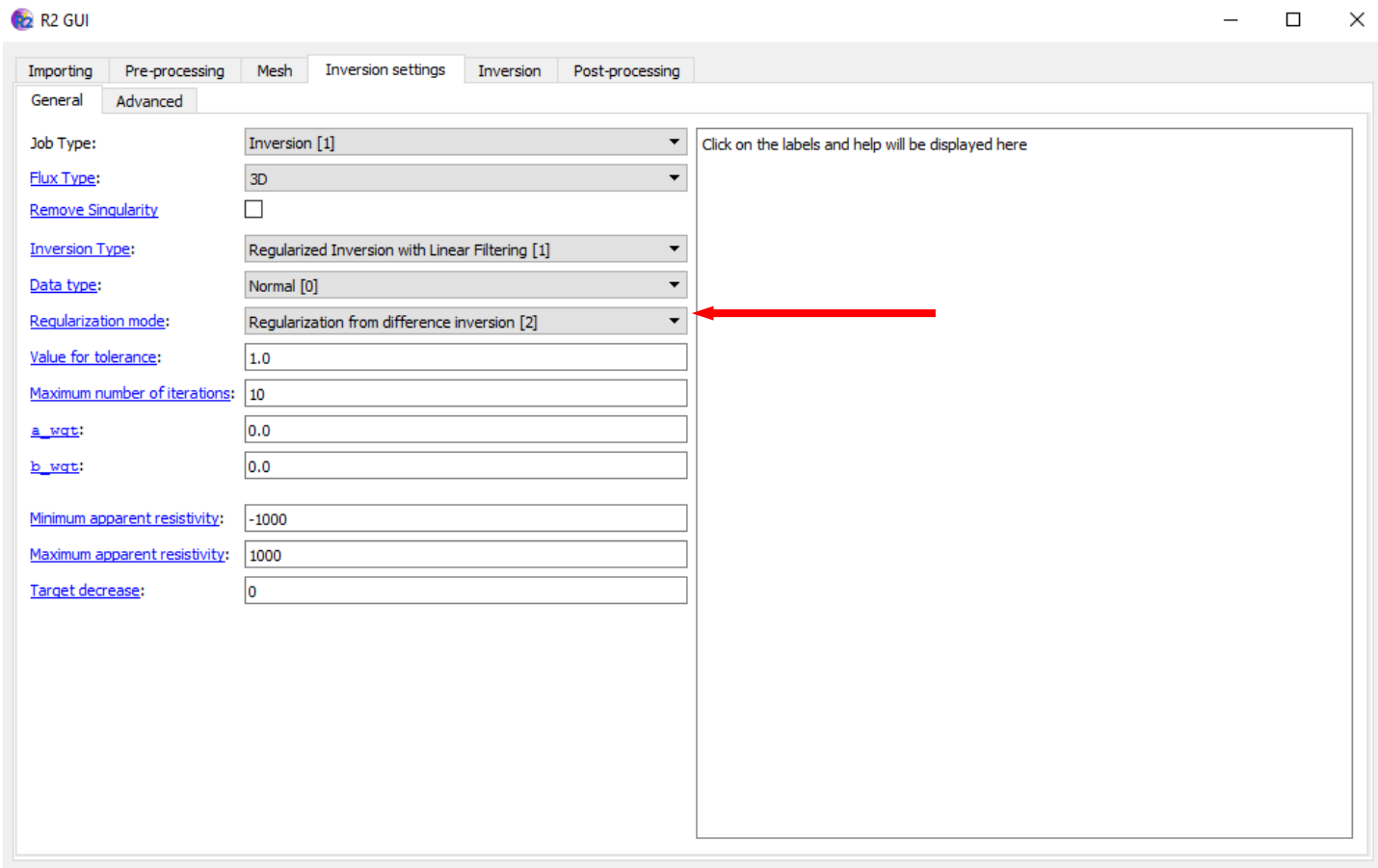
It is still possible to fit an error model to the data. Note that this time, the data displayed is a combination of the quadrupoles from all the surveys.



Example 2: DC time-lapse inversion

Inversion settings

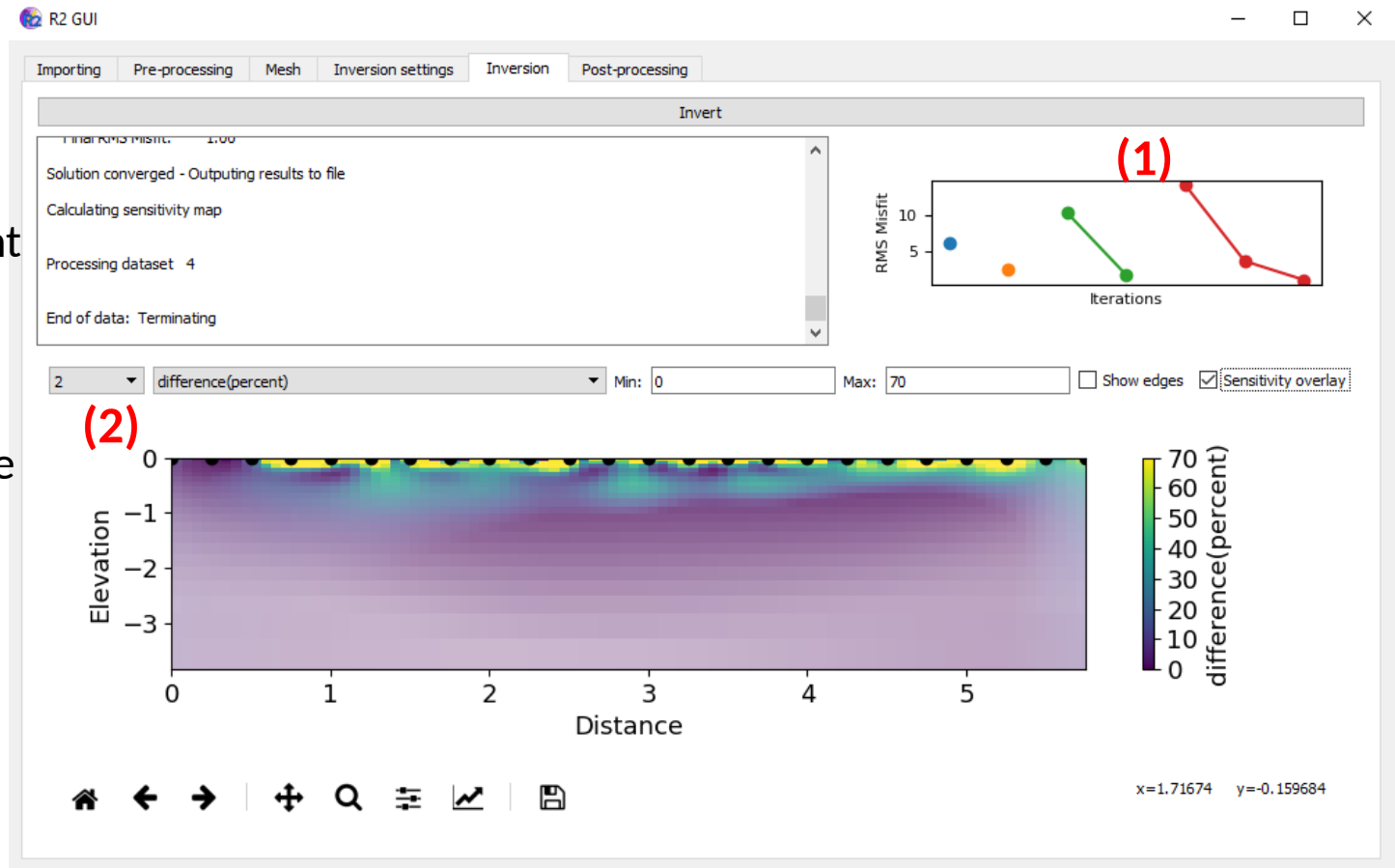
Note that the *regularization mode* is automatically set up to *Regularization from difference inversion [2]*.



Example 2: DC time-lapse inversion

Inversion

The inversion will take longer but you can follow the RMS misfit decrease for each survey (different color) on the left (1). Once the inversion is finished, you can change the survey using the section drop down menu (2). Note that all surveys (except the first one) will contain an additional *difference(percent)* attribute, showing the change in percent compared to the first survey.



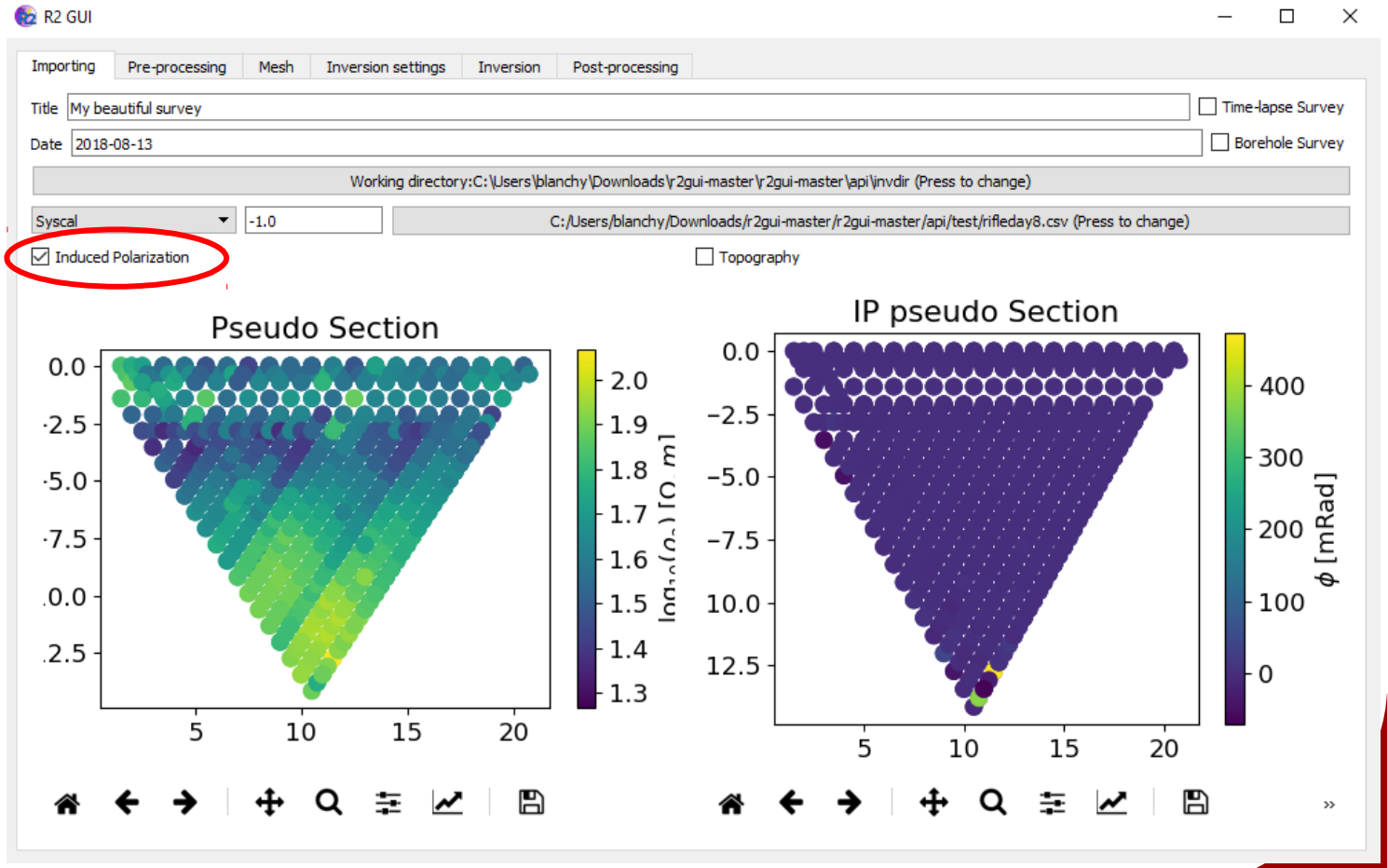
Example 3: IP inversion

Use file: rifleday8.csv

Example 3: IP inversion

Importing data

Import the data as usual, it will display a pseudo section. Then check the *Induced Polarization* checkbox. You will then see another pseudo section for the phase appears.



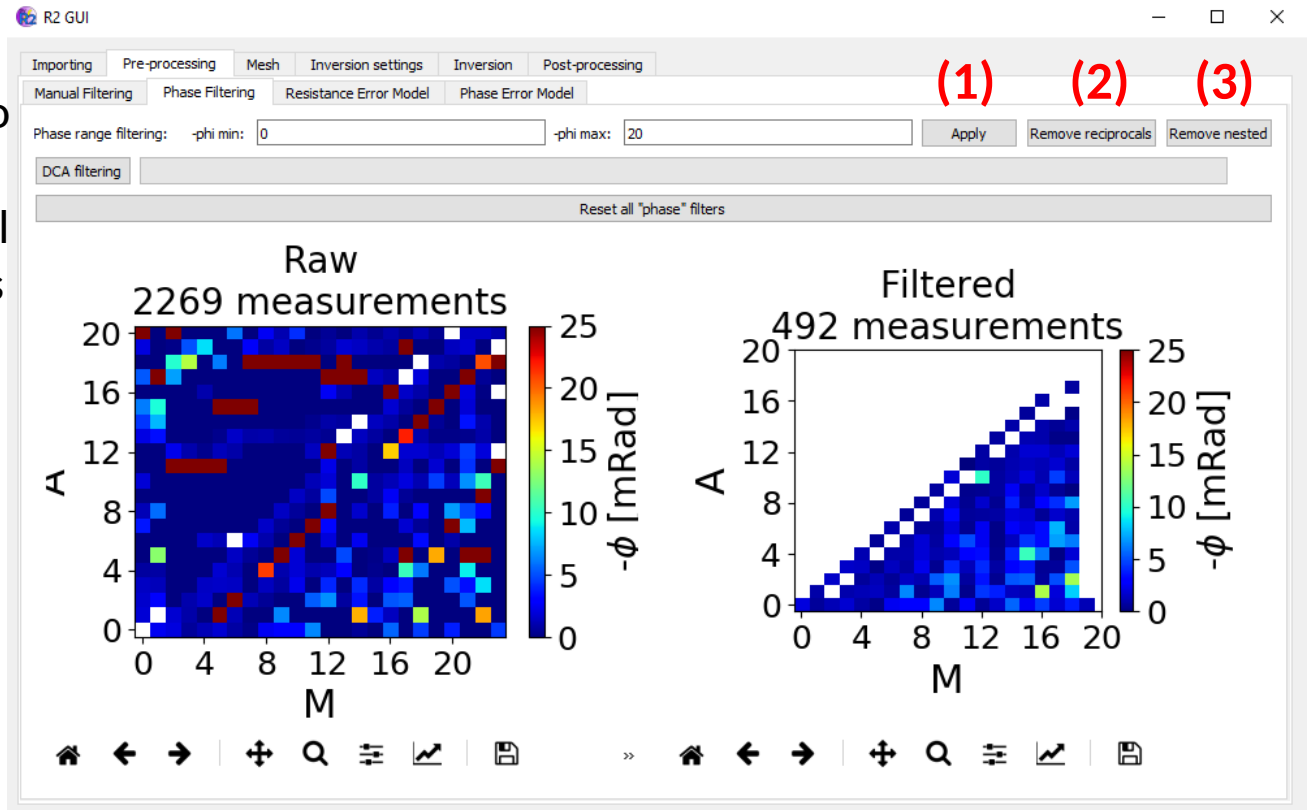
Example 3: IP inversion

Pre-processing - Phase Filtering (1/2)

Phase filtering tab is now activated.

1. Operate *range filtering* on the data to delete outsider
2. Opereate *Remove reciprocal*. This will remove reciprocal measurements within dataset.
3. Operate *Remove nested*. This will remove the quadrupoles whose potential electrodes are between the current electrodes.
4.

TBC



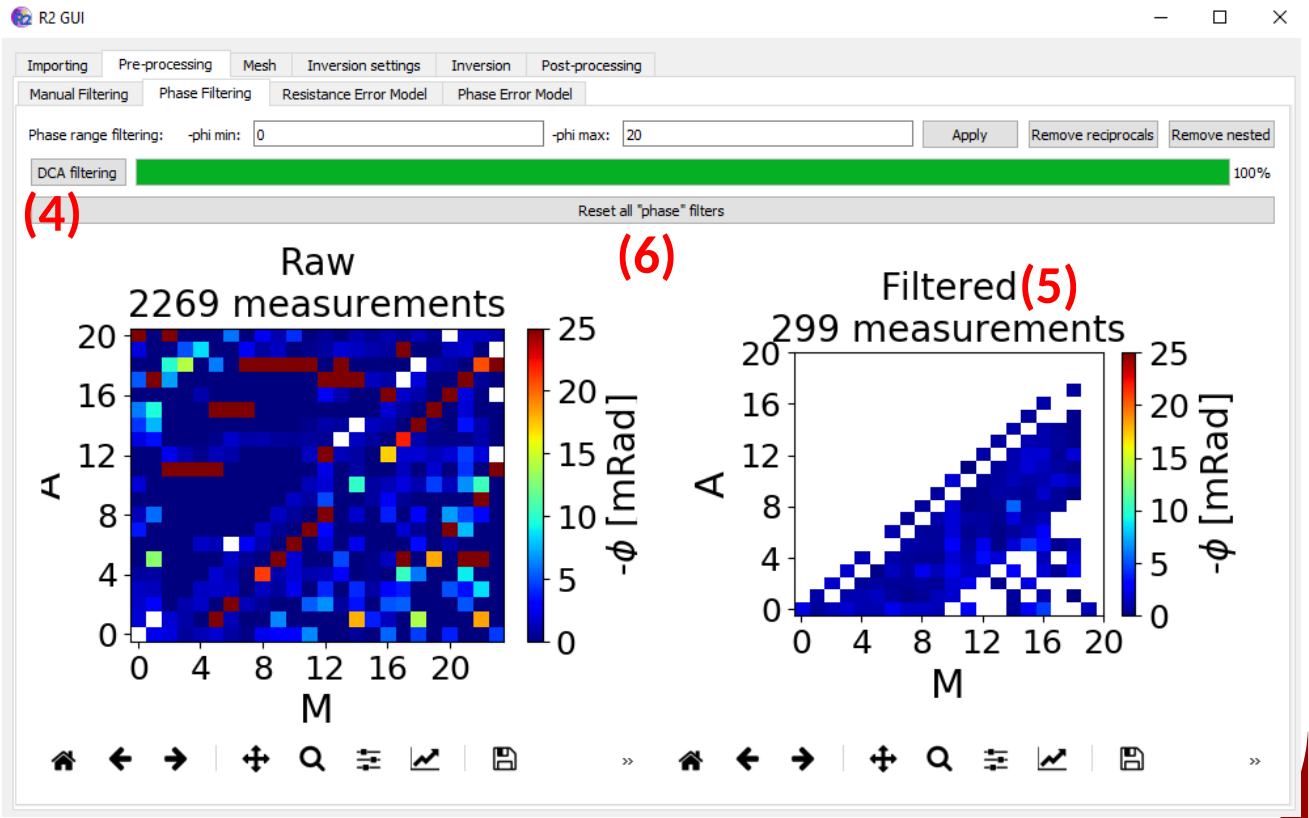
Example 3: IP inversion

Pre-processing - Phase Filtering (2/2)

4. Operate a DCA filtering. This complex procedure will get rid of the measurements whose decay curve is too far from the averaged decay curve.

5. Results of the filtering can be seen on the right graph.

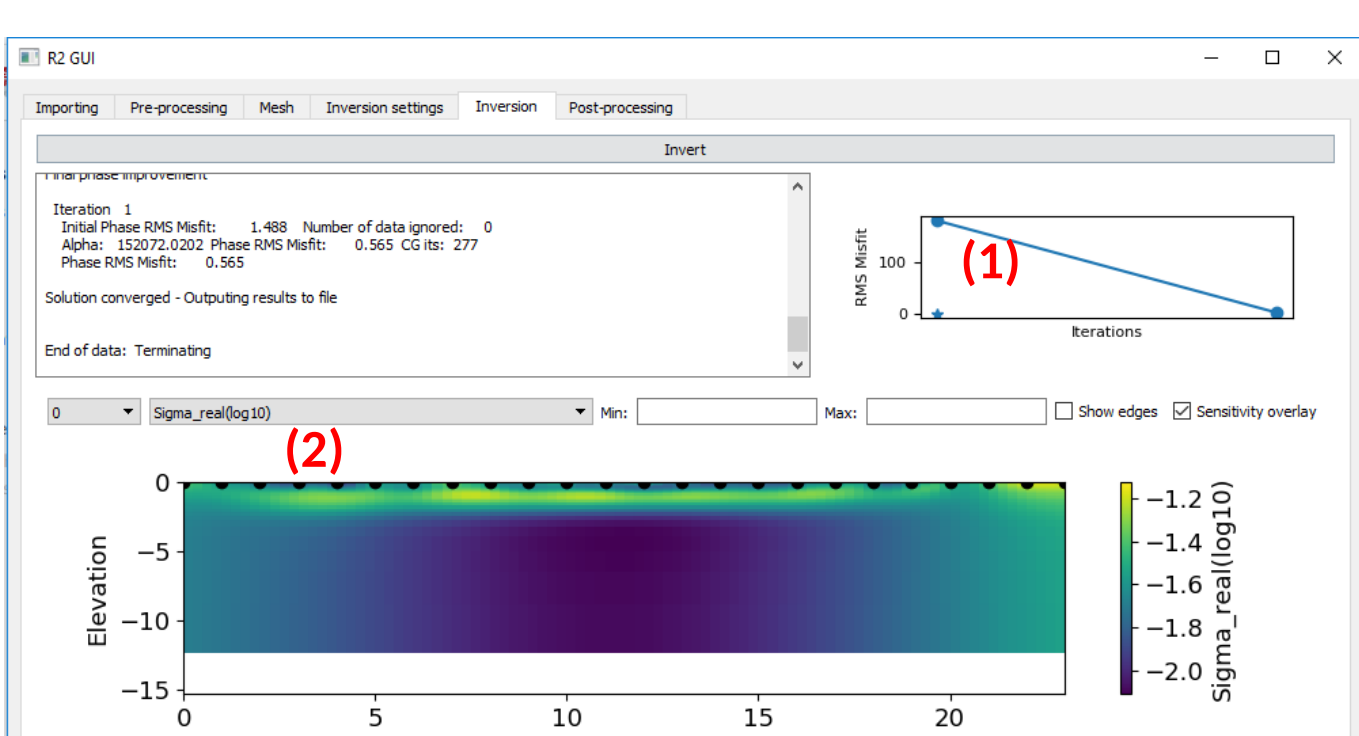
6. If you are not happy with the filtering, you can still *Reset all 'phase' filters* to have a new try.



Example 3: IP inversion

Inversion

Inversion is the same as for DC but it uses the cR2 code to invert the phase as well. RMS misfit for magnitude is display with dot and RMS misfit for phase with stars on (1).
Additional attributes are available on the inverted section (2).



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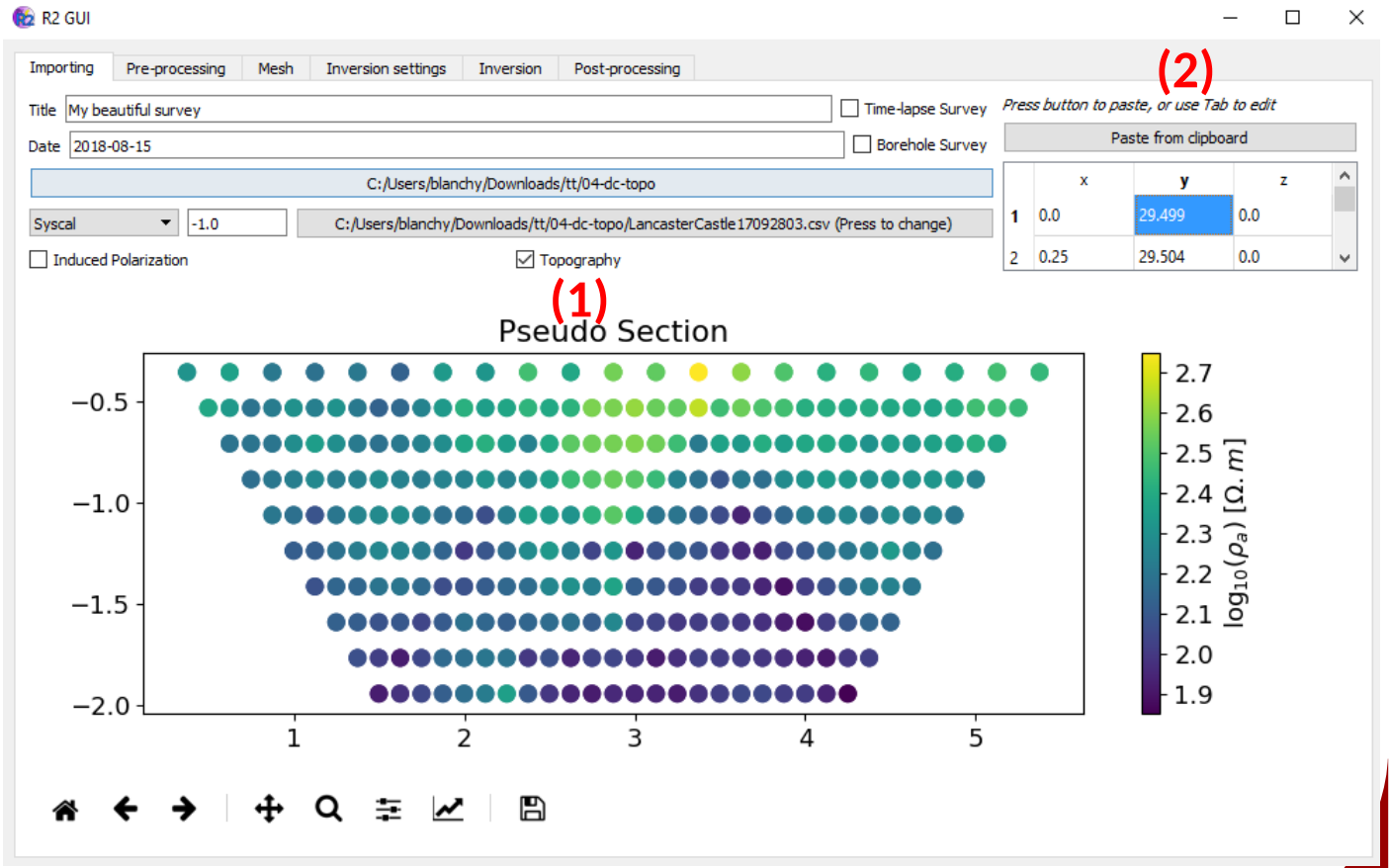
Example 4: DC with topography

Use folder: 04-dc-topo

Example 4: DC with topography

Importing data

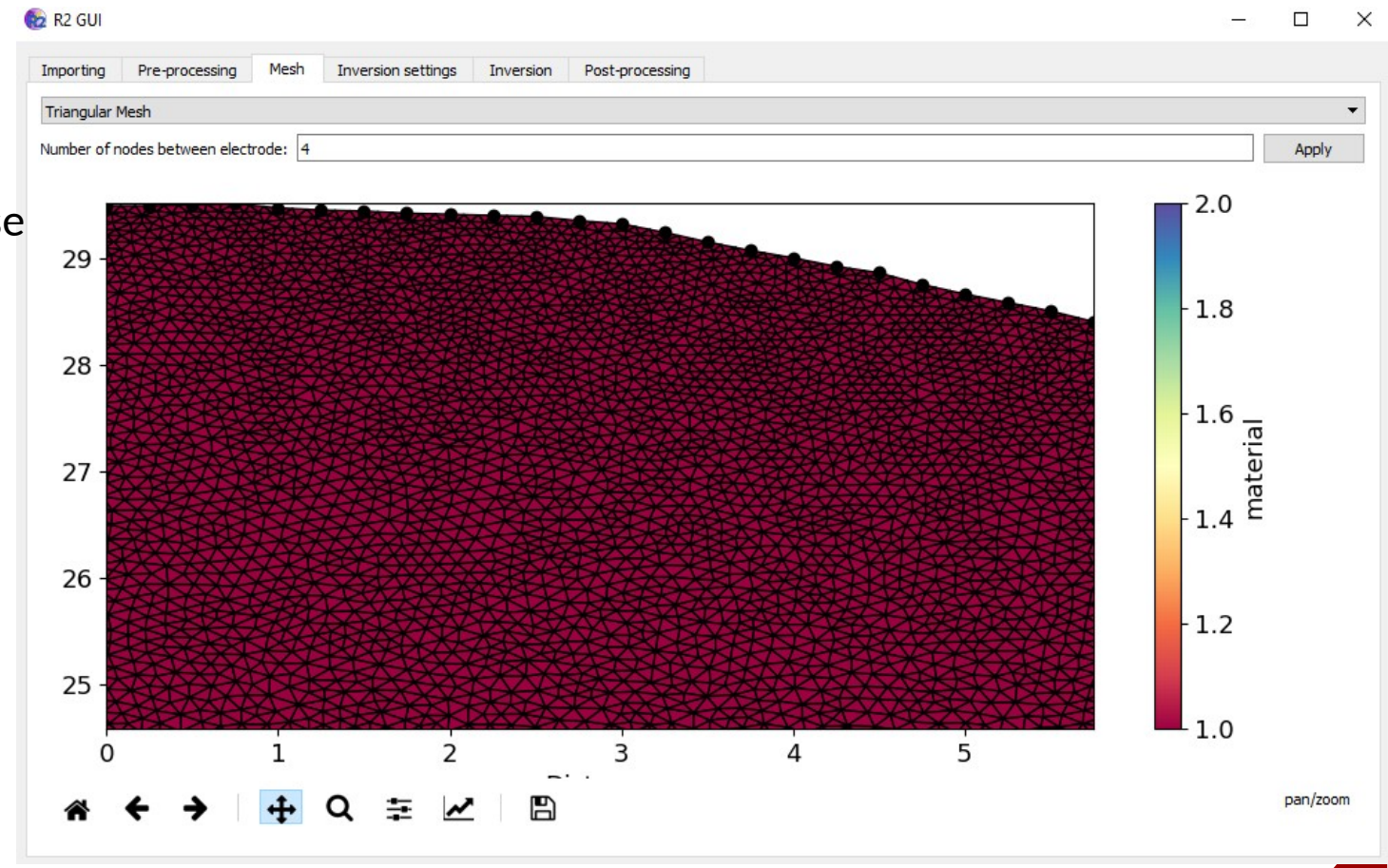
Import data as usual. Then tick the topography checkbox (1).
Open the electrodePosition.xlsx file and copy the « Elevation » columns. Then in pyR2, paste it (Ctrl+v) in the **y** columns (2).



Example 4: DC with topography

Create the mesh

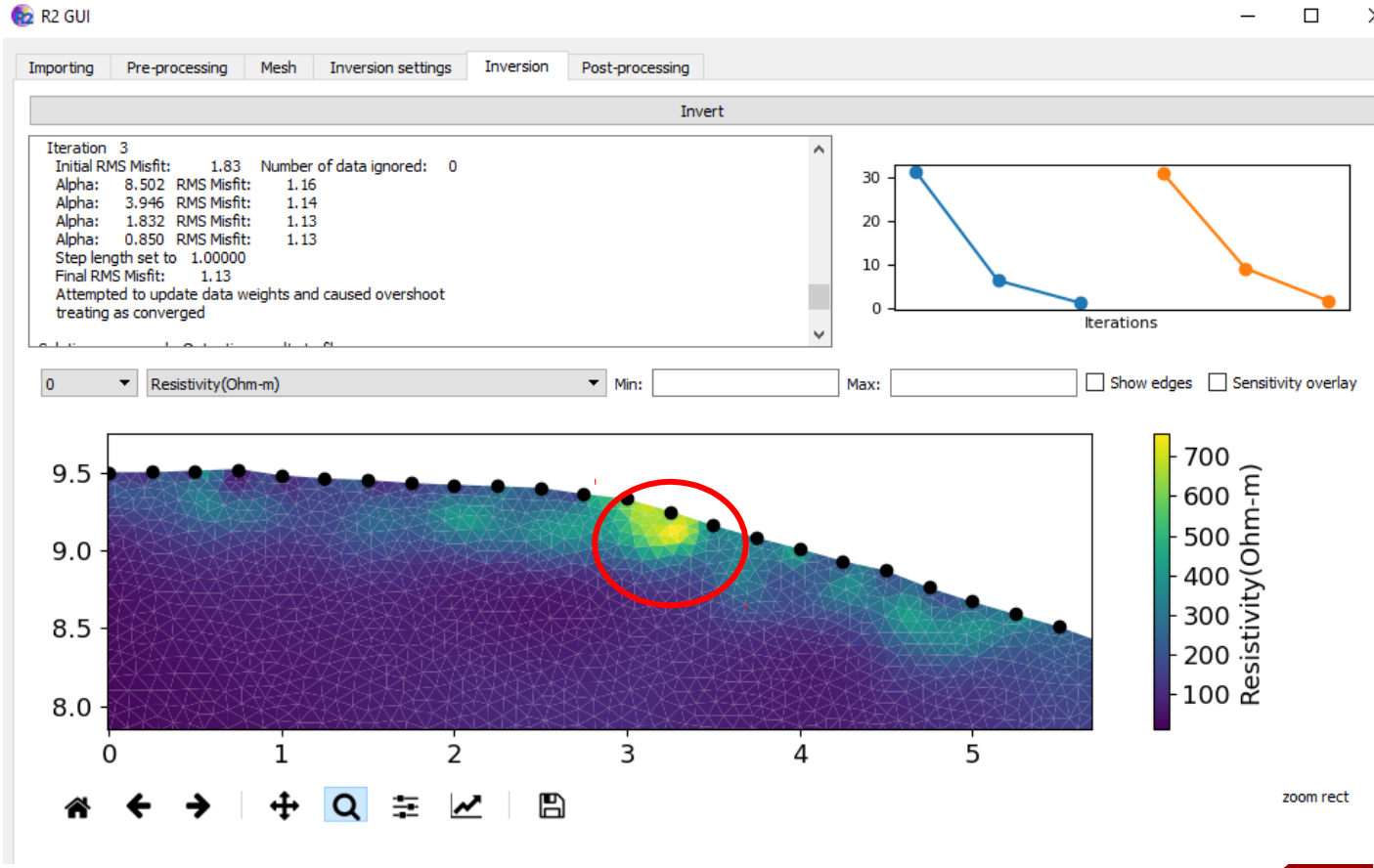
The topography is automatically taken into account when generating the mesh. Here we use a triangular mesh.



Example 4: DC with topography

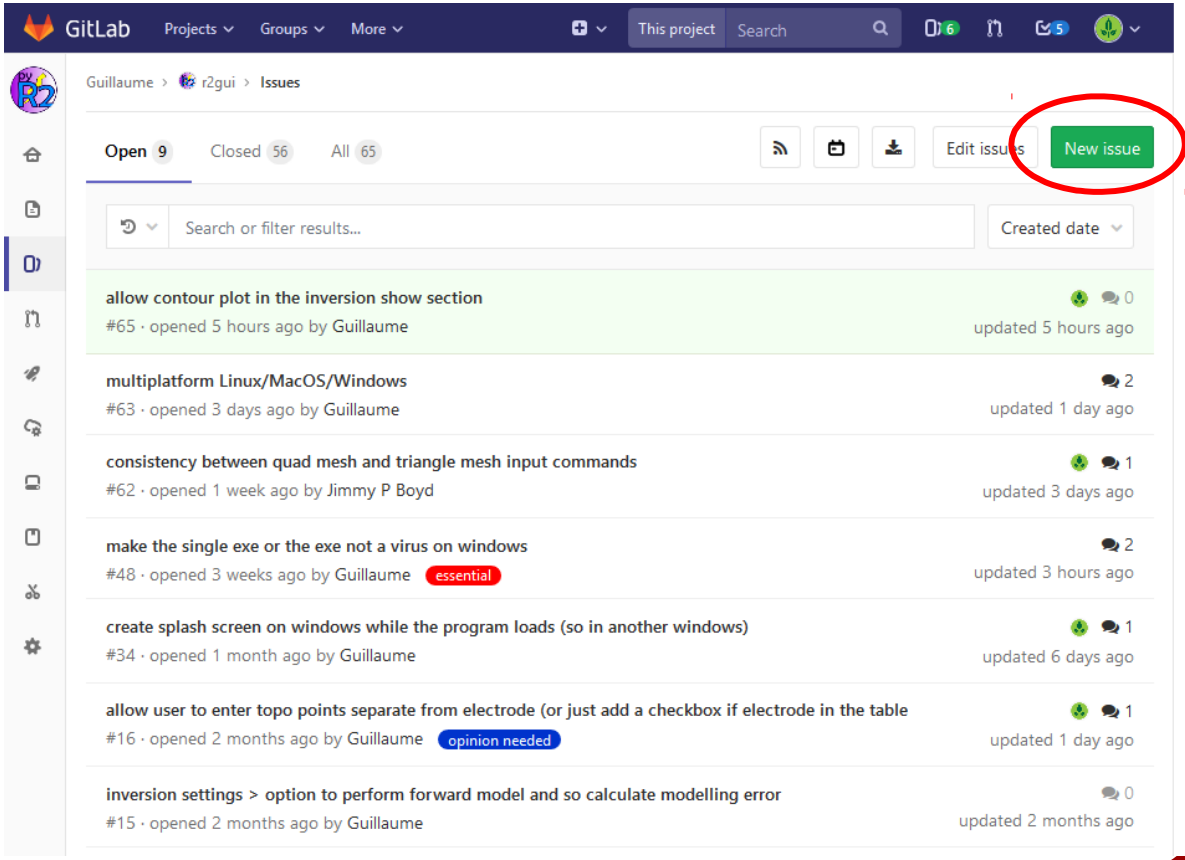
Inversion

Invert as usual and should should see the resulting inverted section. Choose «*Resistivity(Ohmm)* » as attribute and you should be able to see a resistivity anomaly at the top of the slope. This one is actually associated with the remains of a wall from a roman fort from which the data came from.



How to contribute ?

- Gitlab: https://gitlab.com/sagitta1618/r2gui/issues
-
- Raising issue or request a feature



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Thank you !