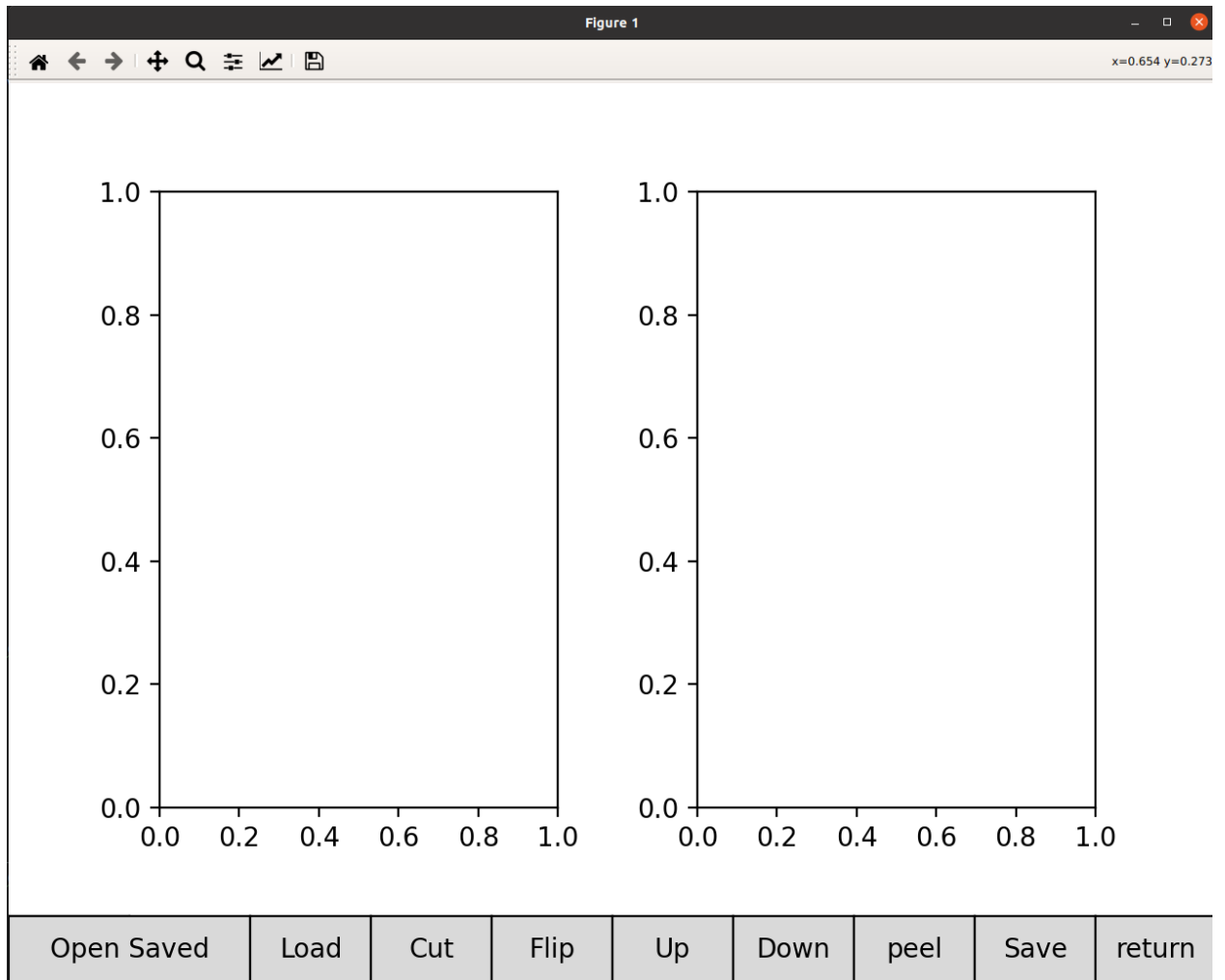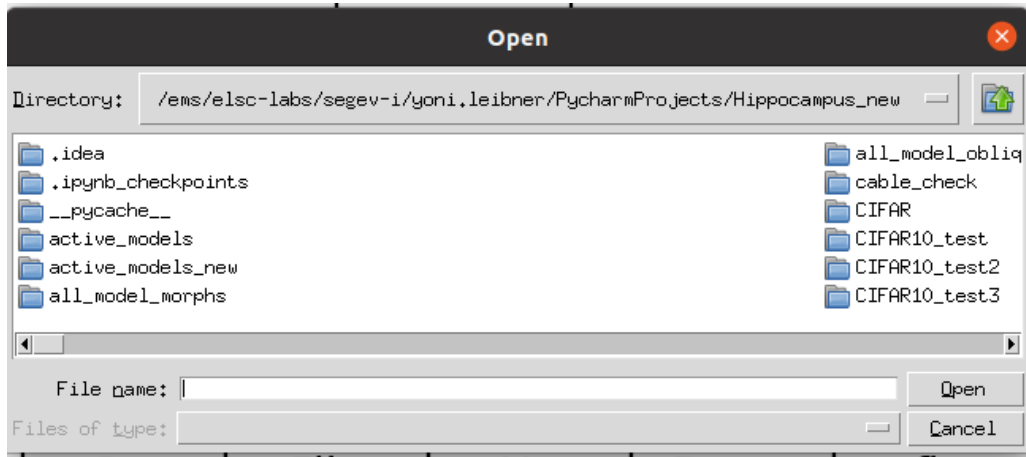# Peeler - GUI

Starting the program

- Open python console and import the peeler:
  from Neuron_analysis_tool import peeler
- This should open a matplotlib gui:

The left axis will show the voltage and the right axis will show the log voltage (for peeling).

Loading a trace:

● Click on Load. and a file manager will open:

● Choose your trace. The trace need to be in the following format: 3/2 columns numpy readable, the first column is time, the second is current (you dont have to have this column), and the last one is

voltage. Like this:

```
peel.txt
~/PycharmProjects/Neuron_analysis_tool/Neuron_analysis_to...

 1 0.000000000000000000e+00 4.260253906250000000e+00 -7.275238037109375000e+01
 2 2.000000000000000042e-02 4.150390625000000000e+00 -7.275273301025390625e+01
 3 4.000000000000000083e-02 4.248046875000000000e+00 -7.275352478027343750e+01
 4 5.999999999999999778e-02 4.199218750000000000e+00 -7.275377655029296875e+01
 5 8.000000000000000167e-02 4.223632812500000000e+00 -7.275695800781250000e+01
 6 1.000000000000000056e-01 4.211425781250000000e+00 -7.276039123535156250e+01
 7 1.199999999999999956e-01 4.199218750000000000e+00 -7.276052093505859375e+01
 8 1.400000000000000133e-01 4.174804687500000000e+00 -7.275848388671875000e+01
 9 1.600000000000000033e-01 4.113769531250000000e+00 -7.275644683837890625e+01
10 1.799999999999999933e-01 4.138183593750000000e+00 -7.275835418701171875e+01
11 2.000000000000000111e-01 4.125976562500000000e+00 -7.275937652587890625e+01
12 2.200000000000000011e-01 4.248046875000000000e+00 -7.275873565673828125e+01
13 2.399999999999999911e-01 4.125976562500000000e+00 -7.275949859619140625e+01
14 2.600000000000000089e-01 4.174804687500000000e+00 -7.275785064697265625e+01
15 2.800000000000000266e-01 4.211425781250000000e+00 -7.275924682617187500e+01
16 2.999999999999999889e-01 4.064941406250000000e+00 -7.275886535644531250e+01
17 3.200000000000000067e-01 4.174804687500000000e+00 -7.275632476806640625e+01
18 3.400000000000000244e-01 4.260253906250000000e+00 -7.275924682617187500e+01
19 3.599999999999999867e-01 4.211425781250000000e+00 -7.275759124755859375e+01
20 3.800000000000000044e-01 4.260253906250000000e+00 -7.275453948974609375e+01
21 4.000000000000000222e-01 4.223632812500000000e+00 -7.275530242919921875e+01
22 4.199999999999999845e-01 4.223632812500000000e+00 -7.275314331054687500e+01
23 4.400000000000000022e-01 4.162597656250000000e+00 -7.275314331054687500e+01
24 4.600000000000000200e-01 4.211425781250000000e+00 -7.275225067138671875e+01
25 4.799999999999999822e-01 4.260253906250000000e+00 -7.275530242919921875e+01
26 5.000000000000000000e-01 4.138183593750000000e+00 -7.275365447998046875e+01
27 5.200000000000000178e-01 4.223632812500000000e+00 -7.275518035888671875e+01
28 5.400000000000000355e-01 4.199218750000000000e+00 -7.275428771972656250e+01
29 5.600000000000000533e-01 4.248046875000000000e+00 -7.275047302246093750e+01
30 5.799999999999999600e-01 4.138183593750000000e+00 -7.275377655029296875e+01
31 5.999999999999999778e-01 4.077148437500000000e+00 -7.275632476806640625e+01
32 6.199999999999999956e-01 4.211425781250000000e+00 -7.275556182861328125e+01
33 6.400000000000000133e-01 4.162597656250000000e+00 -7.274971008300781250e+01
34 6.600000000000000311e-01 4.211425781250000000e+00 -7.274971008300781250e+01
35 6.800000000000000488e-01 4.211425781250000000e+00 -7.275085449218750000e+01
36 7.000000000000000666e-01 4.150390625000000000e+00 -7.275339508056640625e+01
37 7.199999999999999734e-01 4.211425781250000000e+00 -7.274945831298828125e+01
38 7.399999999999999911e-01 4.223632812500000000e+00 -7.275009155273437500e+01
39 7.600000000000000089e-01 4.296875000000000000e+00 -7.275415802001953125e+01
40 7.800000000000000266e-01 4.162597656250000000e+00 -7.275273301025390625e+01
41 8.000000000000000444e-01 4.162597656250000000e+00 -7.275009155273437500e+01
42 8.200000000000000622e-01 4.199218750000000000e+00 -7.275327301025390625e+01
43 8.399999999999999689e-01 4.174804687500000000e+00 -7.275848388671875000e+01
44 8.599999999999999867e-01 4.284667968750000000e+00 -7.275848388671875000e+01
45 8.800000000000000044e-01 4.187011718750000000e+00 -7.275657653808593750e+01
46 9.000000000000000222e-01 4.162597656250000000e+00 -7.276039123535156250e+01
47 9.200000000000000400e-01 4.260253906250000000e+00 -7.276026153564453125e+01
48 9.400000000000000577e-01 4.125976562500000000e+00 -7.275644683837890625e+01
49 9.599999999999999645e-01 4.150390625000000000e+00 -7.275746917724609375e+01
50 9.799999999999999822e-01 4.211425781250000000e+00 -7.275606536865234375e+01
51 1.000000000000000000e+00 4.235839843750000000e+00 -7.276026153564453125e+01
52 1.020000000000000018e+00 4.174804687500000000e+00 -7.275988006591796875e+01
53 1.040000000000000036e+00 4.260253906250000000e+00 -7.275733947753906250e+01
```

Plain Text ▾   Tab Width: 8 ▾   Ln 1, Col 76   ▾   INS

- Click Open and the trace will load into view:
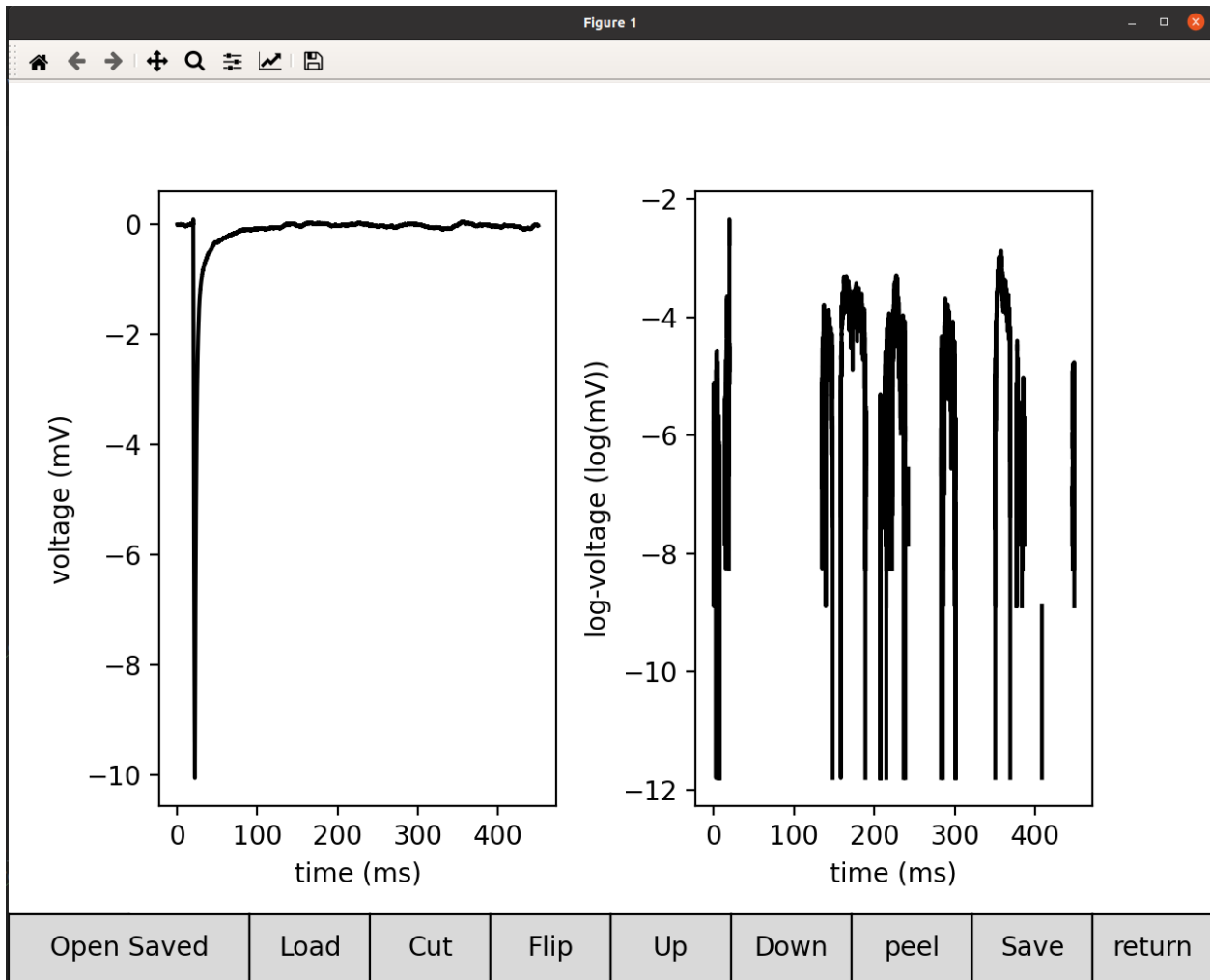
Pre peeling setting

- Before peeling exponents, you can use the following options:
  - Cut - cut your point of interest from the trace (After choosing cut you need to choose 2 points on the trace for start and end).
  - Flip - flip the y axis (peeling is only acceptable for positive values so if you used negative current injection you need to Flip so that the voltage response will be positive.
  - Down/Up - shift all the trace up or down by a constant factor (we set this to 0.05 mV) but you can change it in peeler.py script SHIFT_FACTOR.
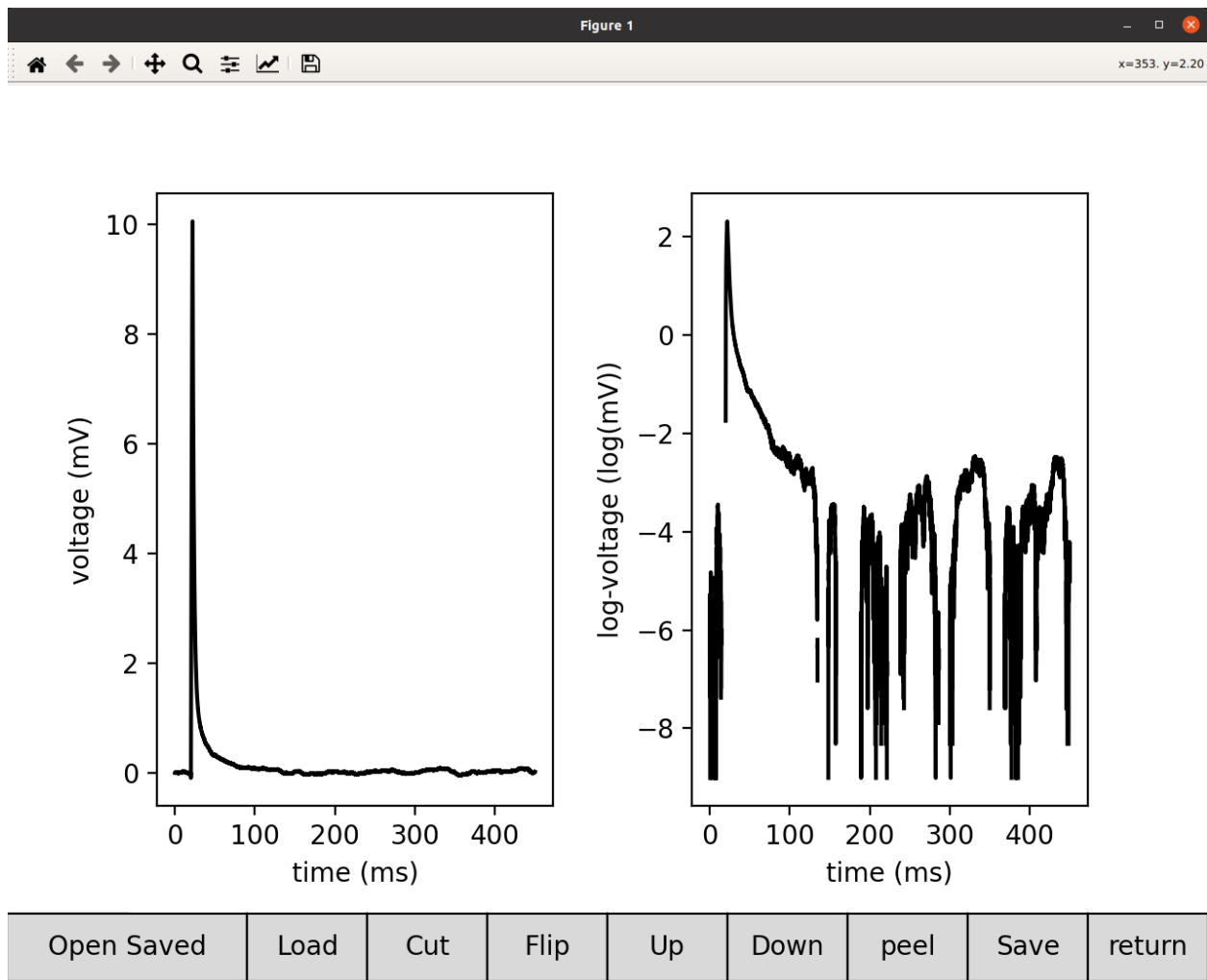
Notice that shifting the voltage can affect your results (see).
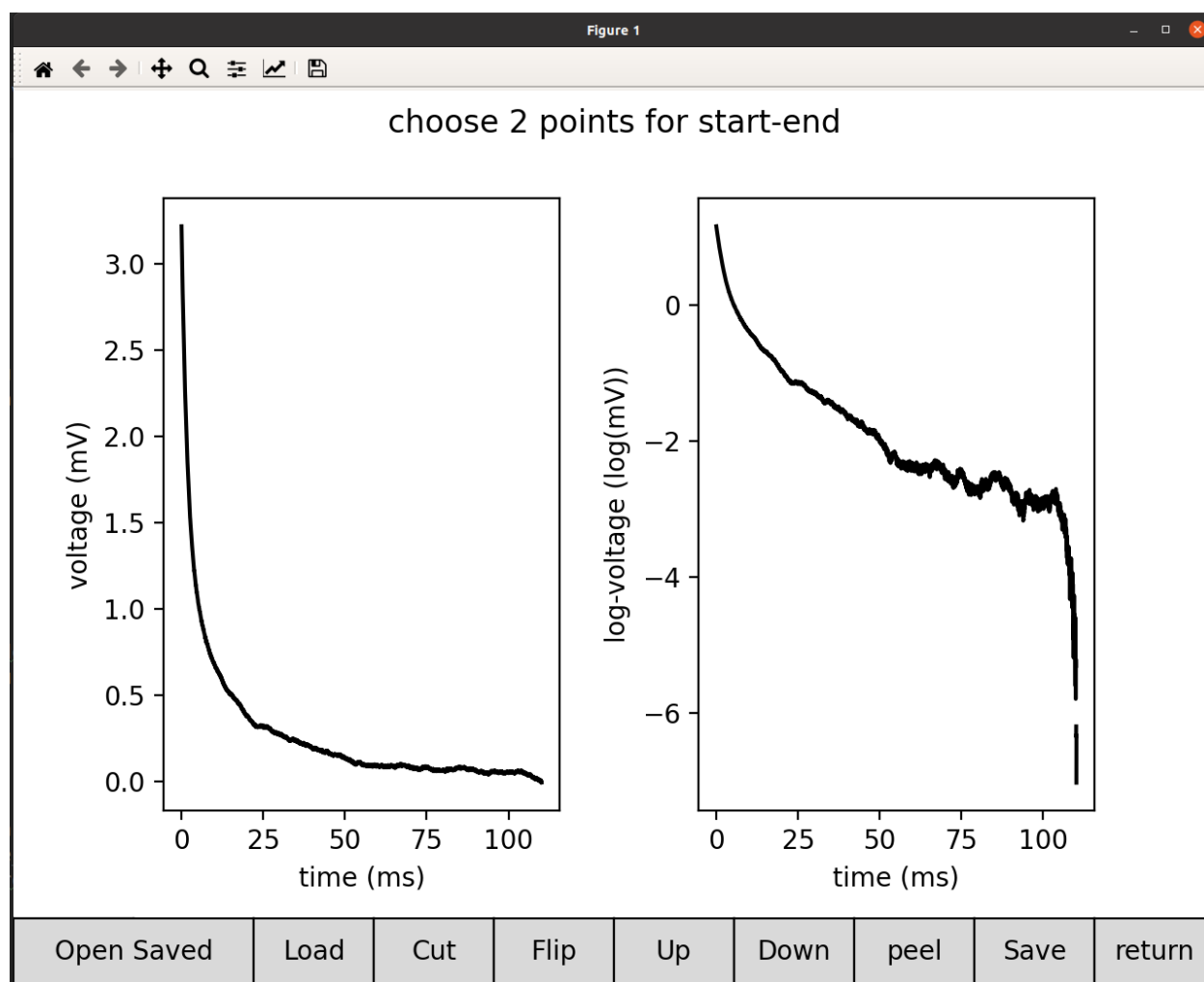
○ Return - go back to the previous step.

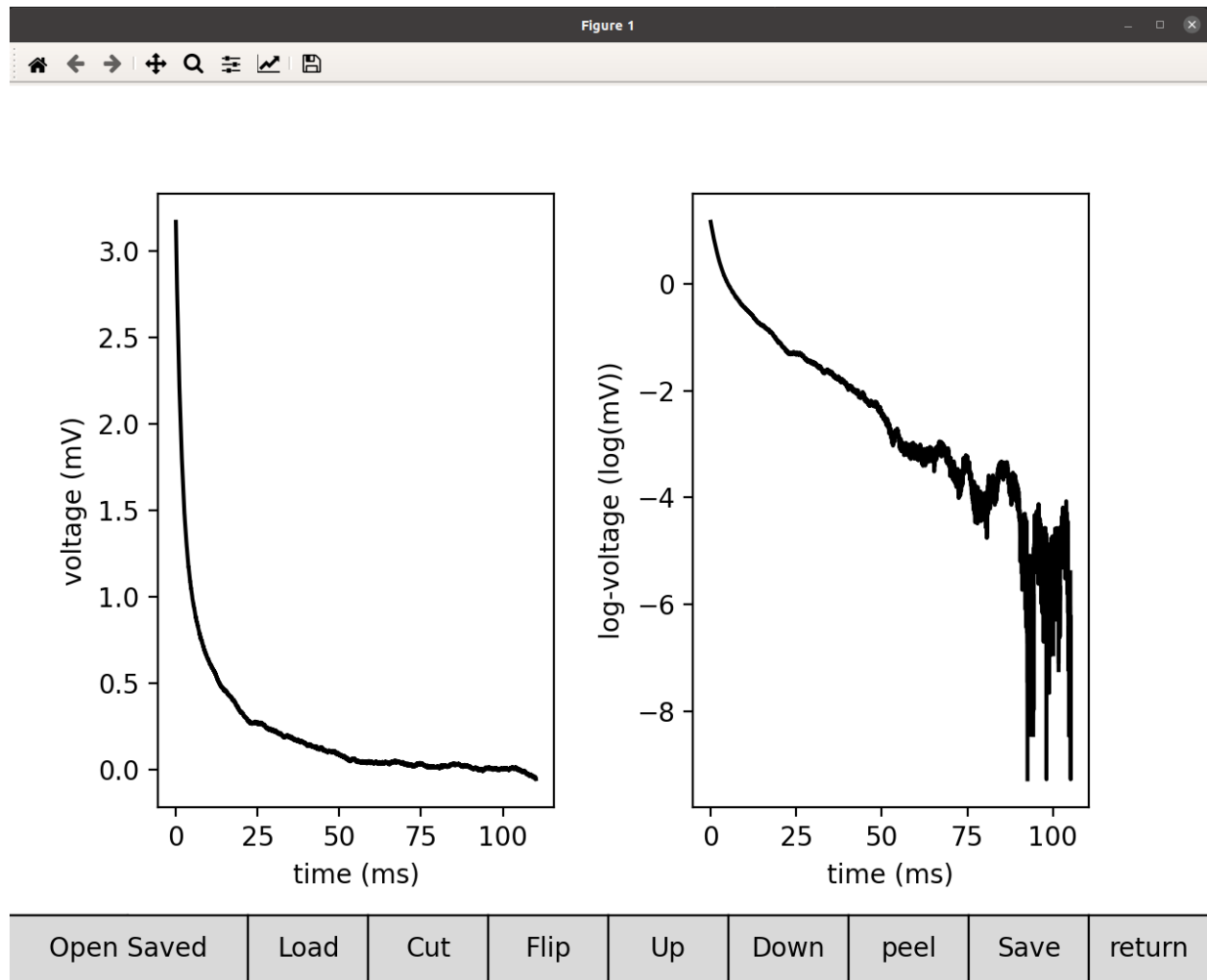Example:
For the top screenshot:

Flip:


Open Saved | Load | Cut | Flip | Up | Down | peel | Save | return

Cut:

choose 2 points for start-end

| Open Saved | Load | Cut | Flip | Up | Down | peel | Save | return |

Down:

| Open Saved | Load | Cut | Flip | Up | Down | peel | Save | return |

Peeling
- When you finished presenting the trace parameter you can star peeling.
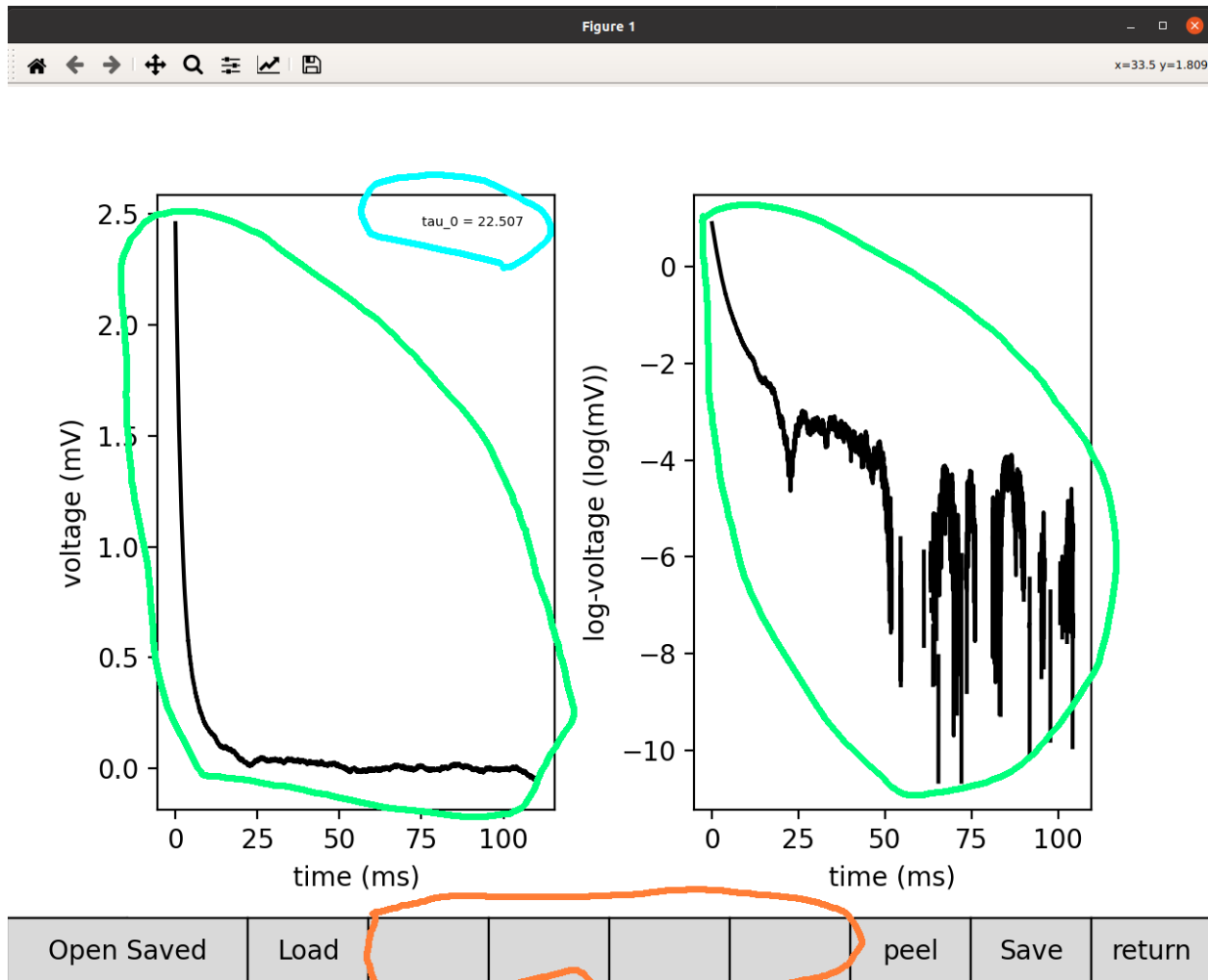- Choose the peel option and choose a linear part in the log-scale axis (the right plot).

- After choosing the 2 points you will get the following plot:
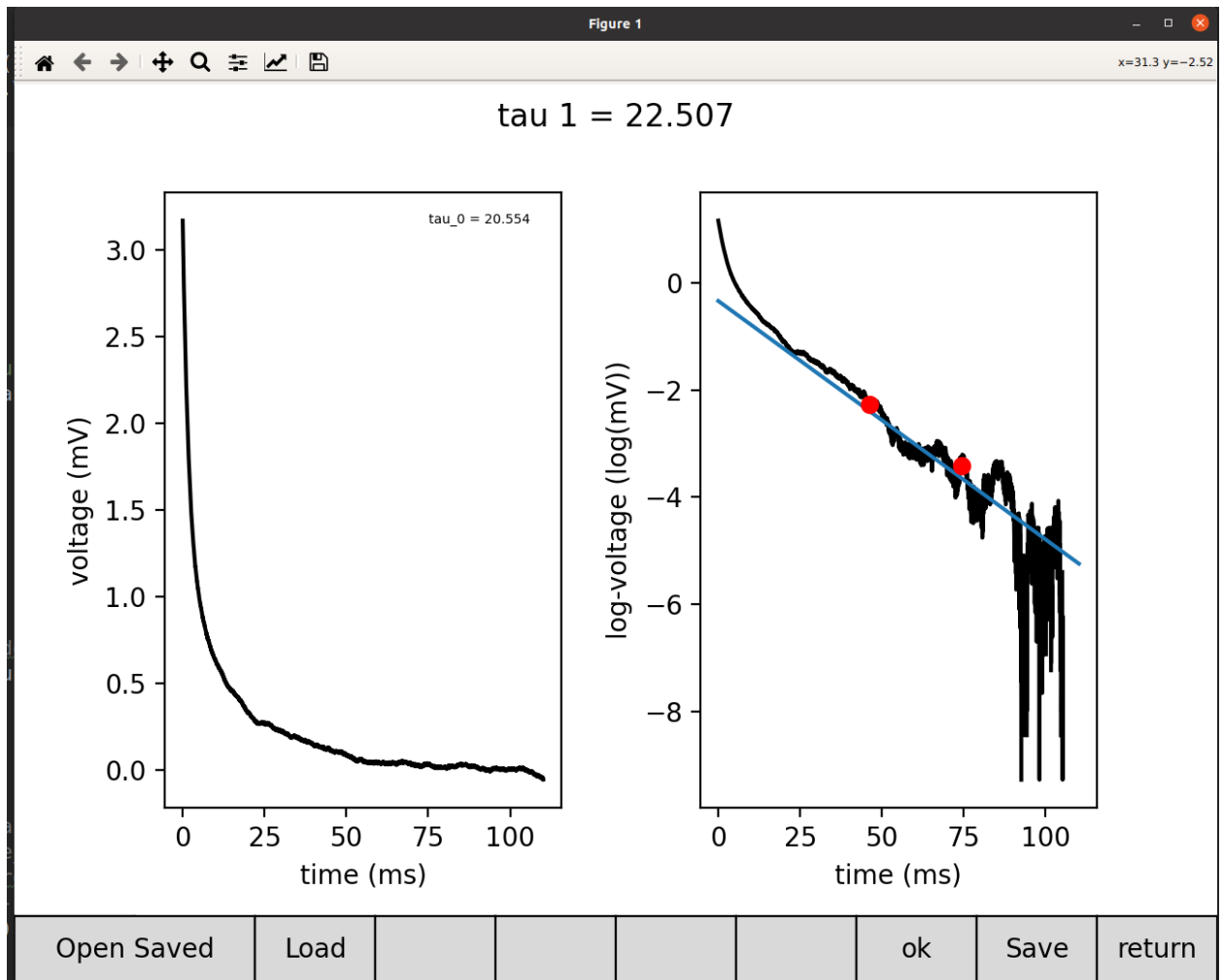
The red dots show your selected points and the line shows the line fit in log scale. The extracted time constant (tau) will appear at the plot title.
- To confirm click OK, to change selection click Return.
- After clicking OK 3 thighs will happen:
  a. The peeled voltage will be reduced from the original voltage on both the voltage and log voltage axis.
  b. The pre peeling setting will disappear.
  c. The time constant you peeled so far will be listed on the voltage plot.

Figure 1

tau_0 = 22.507

x=33.5 y=1.809

voltage (mV)

log-voltage (log(mV))

time (ms)

time (ms)

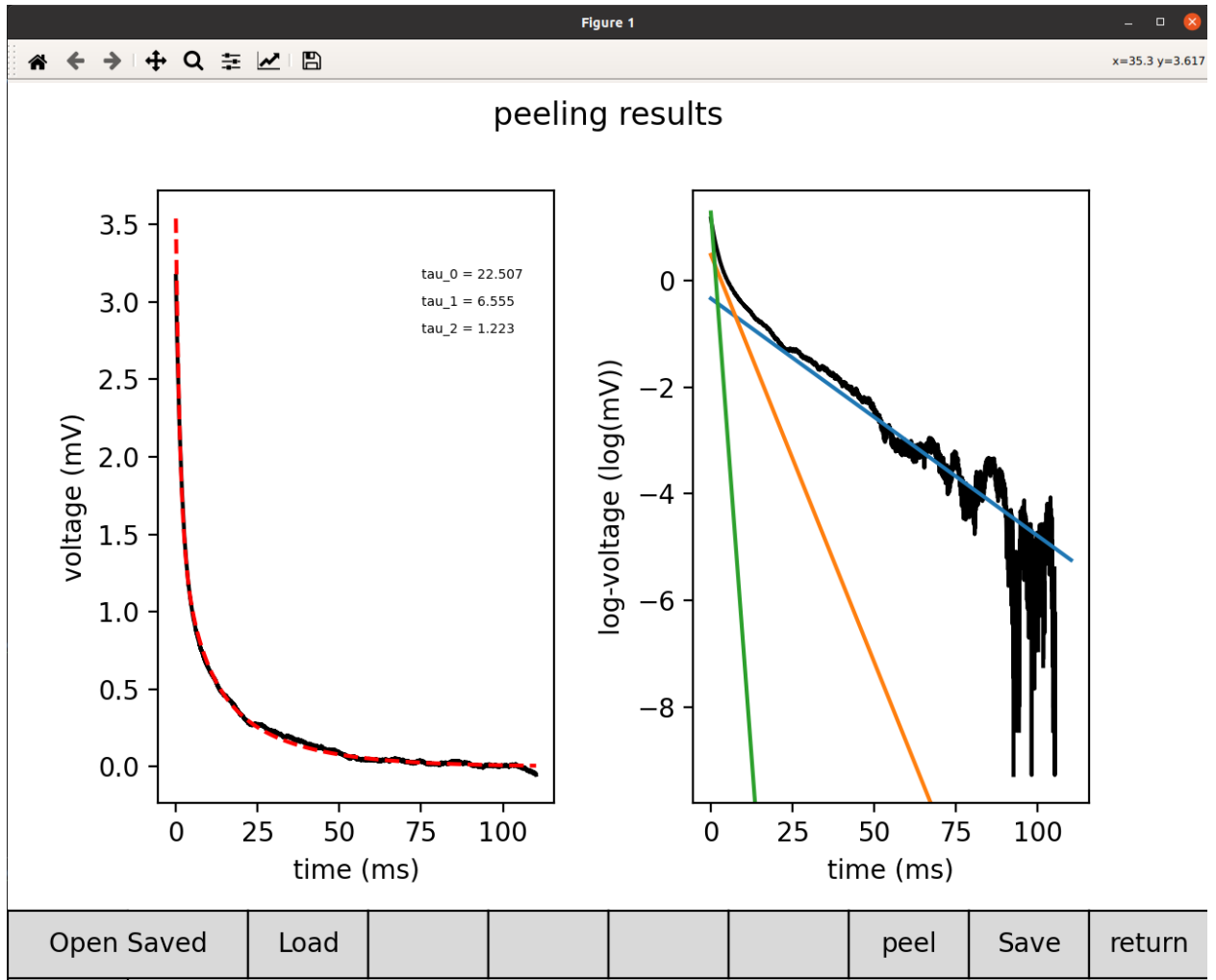| Open Saved	Load					peel	Save	return

- You can continue to peel the nex exponent by clicking peel again.

Saving the result
- You can click on Save that will open the file manager. Choose the location where you want to save the file and click save.

- The plot of the fitting:

Will be saved to the location you chose, and also a pickle object that you can load via Open saved button.
- The plots to the left show the cutted voltage part (solid black) and the peeling result in dashed red (how much of the signal is explained).
- The plot to the right shows the log voltage in (solid black) and the peeling lines in colors.

For any question please send an email to yoni.leibner@mail..huji.ac.il