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fNIRS Data Analysis with Homer3

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Outline

- **Homer file formats**
- **Basic processing :**
  - Intensity to hemoglobin concentrations
  - Filtering
  - Block-averaging
- **More advanced processing :**
  - Other useful Homer functions
  - Exporting results
  - Plot probe
  - Group analysis

File formats

Probe source-detector geometry : **.sd** files

fNIRS experimental data : **.nirs** files

fNIRS experimental data* : **.snirf** files **(new)**

Data processing stream : **.cfg** files

Processed data files : **groupResults.mat**

.SD file format

Describes the 2D source/detector geometry

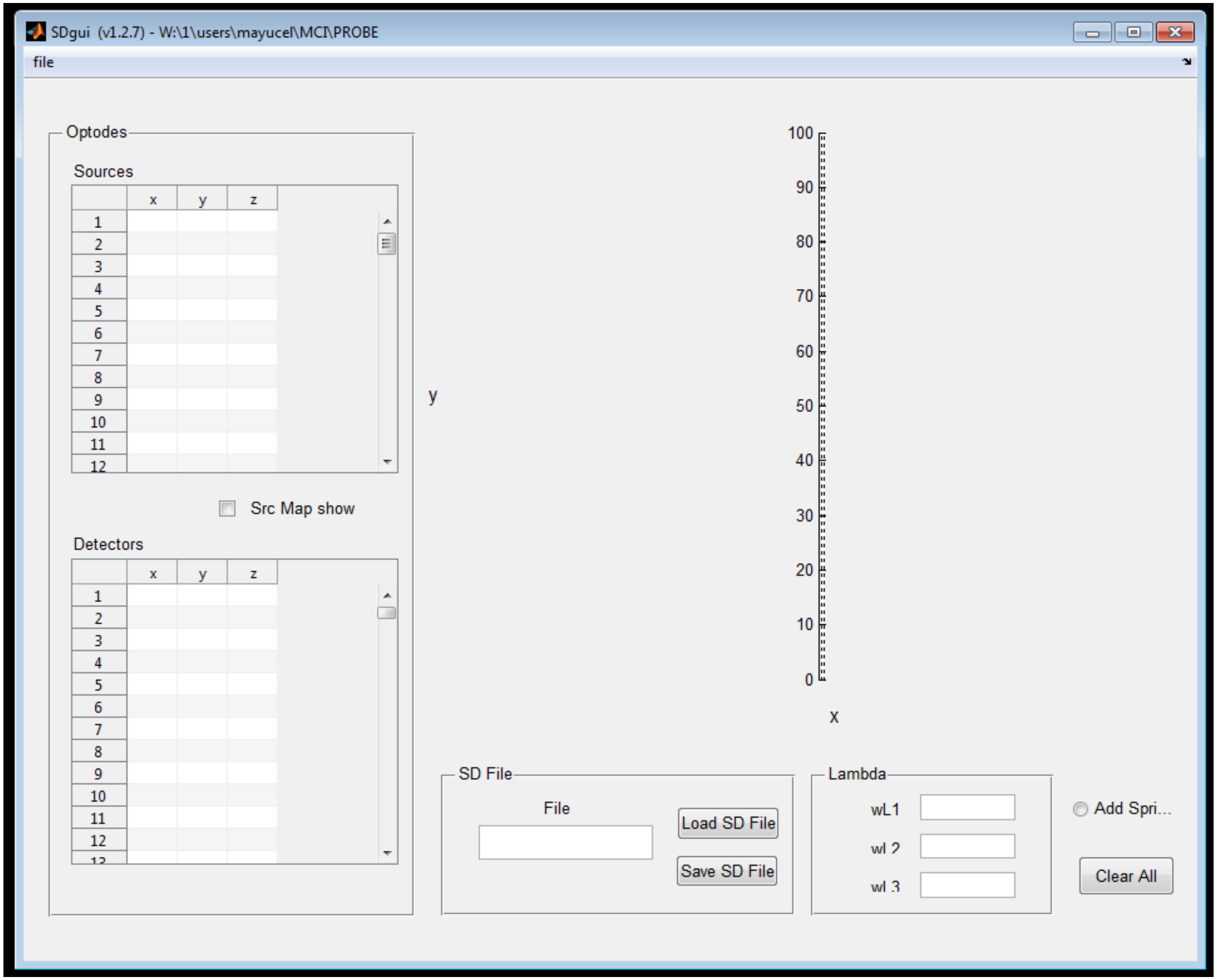
Matlab .sd file containing the structured variable **SD** with the following fields:

Field	Definition	Size	Example
Lambda	Wavelengths used for data acquisition	$1 \times n_{Wavelengths}$	[690 830]
nSrcs	Number of sources	1×1	1
nDets	Number of detectors	1×1	2
SrcPos	Array of source coordinates	nSrcs × 3	[0 0 0]
DetPos	Array of detector coordinates	nDets × 3	[30 0 0; 0 30 0]
MeasList	List of measurement channels column 1: source idx column 2: detector idx column 3: unused column 4: wavelength idx	$n_{Channels} \times 4$	[1 1 1 1; 1 2 1 1; 1 1 1 2; 1 2 1 2]

Note: The SD structure is also incorporated in the .nirs file format we will see in a few slides

.SD file format: the SDgui

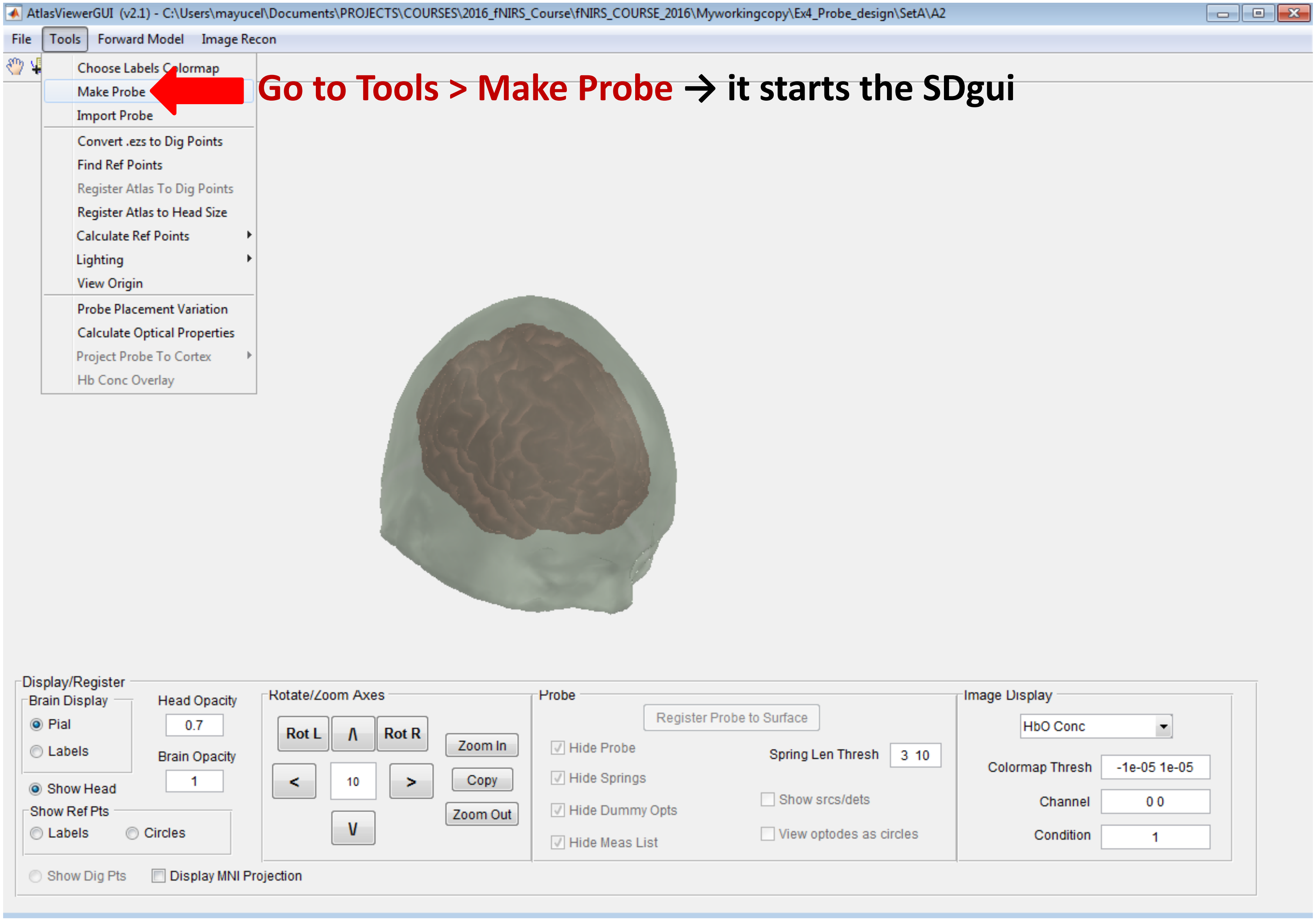
Enables you to create your own .sd files



Sub-GUI of AtlasViewer

.SD file format: the SDgui

Start AtlasViewer



Head Opacity 0.7

Brain Opacity 1

Brain Display: ● Pial ○ Labels

● Show Head

Show Ref Pts: ○ Labels ○ Circles

○ Show Dig Pts ☐ Display MNI Projection

Rotate/Zoom Axes: 10

☑ Hide Probe

☑ Hide Springs

☑ Hide Dummy Opts

☑ Hide Meas List

Spring Len Thresh 3 10

☐ Show srcs/dets

☐ View optodes as circles

Image Display: HbO Conc

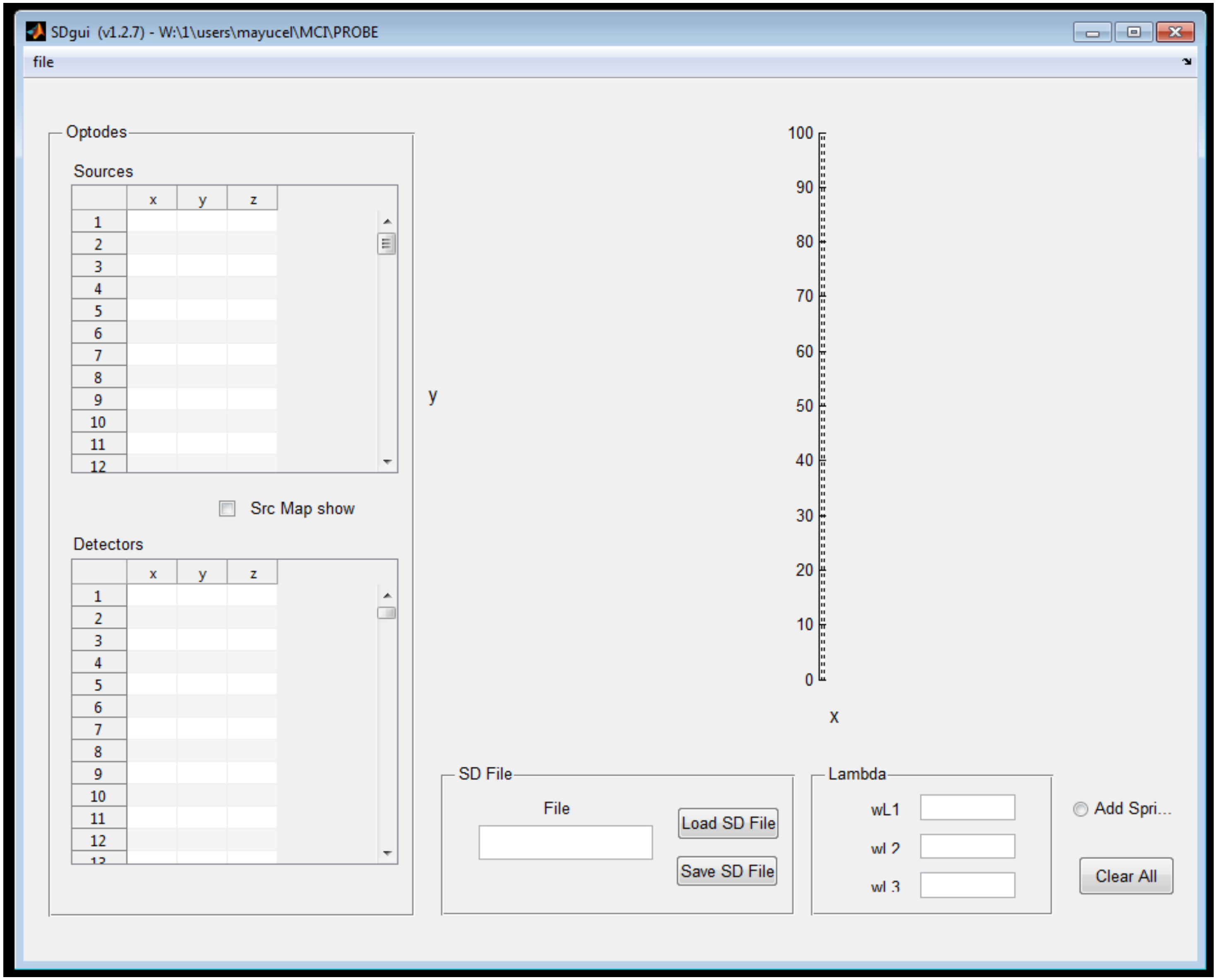
Colormap Thresh -1e-05 1e-05

Channel 0 0

Condition 1

Go to Tools > Make Probe → it starts the SDgui

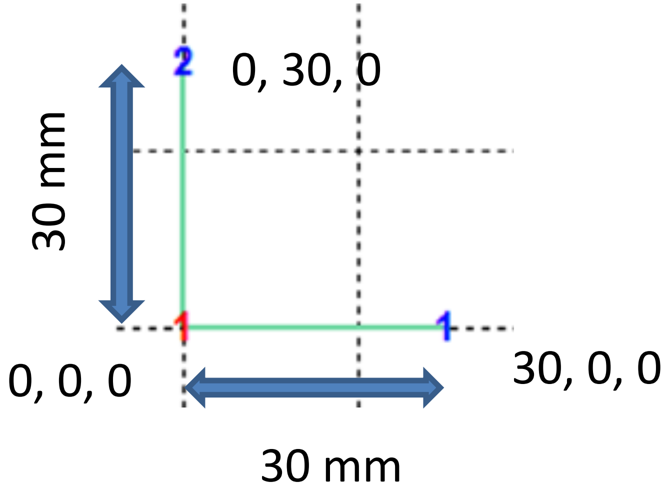
SDgui


SDgui (v1.2.7) - W:\1\users\mayucel\MCI\PROBE
file
Optodes
Sources
x
y
z
1
2
3
4
5
6
7
8
9
10
11
12
☐ Src Map show
Detectors
x
y
z
1
2
3
4
5
6
7
8
9
10
11
12
13
y
100
90
80
70
60
50
40
30
20
10
0
x
SD File
File
Load SD File
Save SD File
Lambda
wL1
wl 2
wl 3
○ Add Spri...
Clear All

How to start

1. Begin by naming the new probe using the text box at the bottom-center of the GUI
2. Enter the wavelengths of light that will be used in the experiment (690 830)

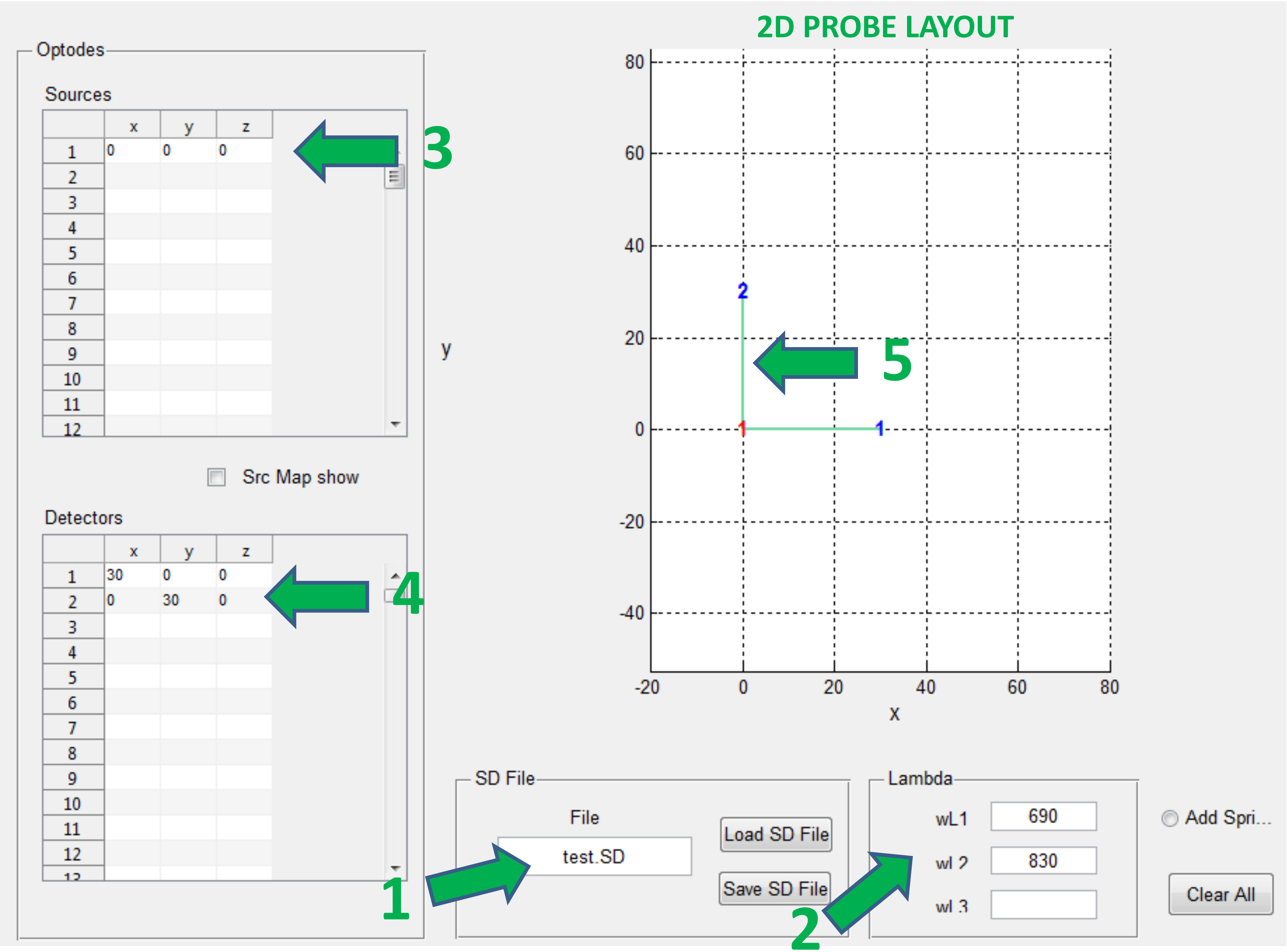
Hint: easier if you have your 2D design on a piece of paper with the distances eg:



Adding sources, detectors and channels

3. Place a source at **(0, 0, 0)**
4. Add detectors at **(30, 0, 0)** and **(0, 30, 0)**
5. Connect measurement channels by clicking on optodes
   - to remove a channel do the same
   - you cannot connect two detectors or two sources

2D PROBE LAYOUT



Optodes

Sources

	x	y	z
1	0	0	0
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

☐ Src Map show

Detectors

	x	y	z
1	30	0	0
2	0	30	0
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

SD File

File: test.SD

Lambda

wL1: 690

wl 2: 830

wl 3:

○ Add Spri...

.NIRS file format

Contains an fNIRS dataset

Matlab .nirs file containing the following variables:

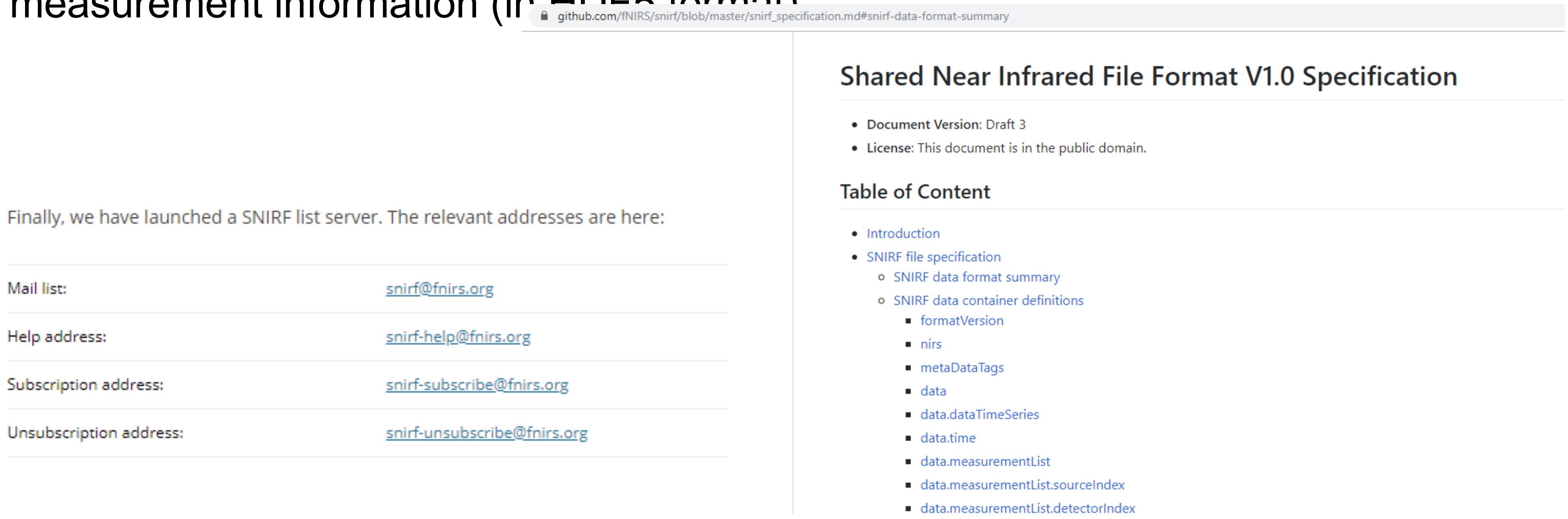
Field	Definition	Size
SD	Probe geometry, same as .sd files	Structured variable
t	Array of data time points	$N_{\text{Time\_points}} \times 1$
d	Array of raw intensity time course	$N_{\text{Time\_points}} \times N_{\text{Channels}}$
s	Array of stimulus onsets. Different conditions are a way to separate stimuli into different groups	$N_{\text{Time\_points}} \times N_{\text{Conditions}}$
aux	Array of auxiliary signals	$N_{\text{Time\_points}} \times N_{\text{Aux channels}}$

Note 1: In addition to the above parameters, additional parameters can appear in the .nirs file as a result of processing the data set in HOMER3.

Note 2: Conversion scripts are available for some other data formats (Hitachi, NIRx, Shimadzu, …), see *http://homer-fnirs.org/faq/*

.SNIRF file format

- many different fNIRS data file format
- difficult to use specific data analysis software and share data with collaborators
- **Common format: S**hared **N**ear **I**nfra**R**ed **F**ile **F**ormat http://github.com/fNIRS/snirf
- SNIRF provides numeric fNIRS data with time stamps and a so-called ‘measurement list’ for detailed measurement information (in HDF5 format)



github.com/fNIRS/snirf/blob/master/snirf_specification.md#snirf-data-format-summary

Finally, we have launched a SNIRF list server. The relevant addresses are here:

Mail list:	snirf@fnirs.org
Help address:	snirf-help@fnirs.org
Subscription address:	snirf-subscribe@fnirs.org
Unsubscription address:	snirf-unsubscribe@fnirs.org

Shared Near Infrared File Format V1.0 Specification

- **Document Version:** Draft 3
- **License:** This document is in the public domain.

Table of Content

- Introduction
- SNIRF file specification
    - SNIRF data format summary
    - SNIRF data container definitions
        - formatVersion
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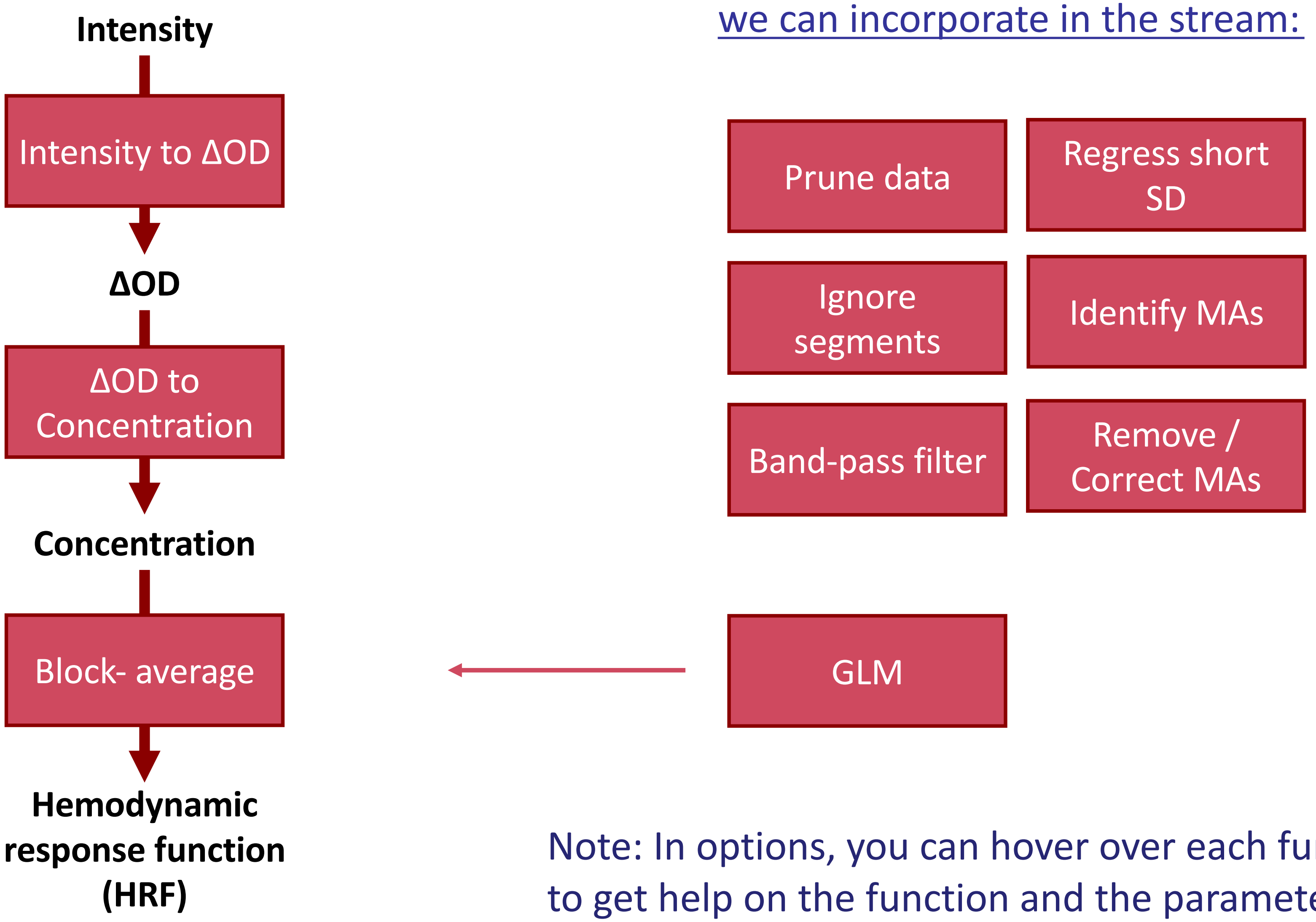
        - metaDataTags
        - data
        - data.dataTimeSeries
        - data.time
        - data.measurementList
        - data.measurementList.sourceIndex
        - data.measurementList.detectorIndex

.CFG file format

A .cfg file describes the steps of data analysis, a sequence of HOMER3 functions

Simplest processing stream:

Multiple more advanced functions we can incorporate in the stream:



Intensity

Intensity to ΔOD

ΔOD

ΔOD to Concentration

Concentration

Block- average

Hemodynamic response function (HRF)

Prune data

Regress short SD

Ignore segments

Identify MAs

Band-pass filter

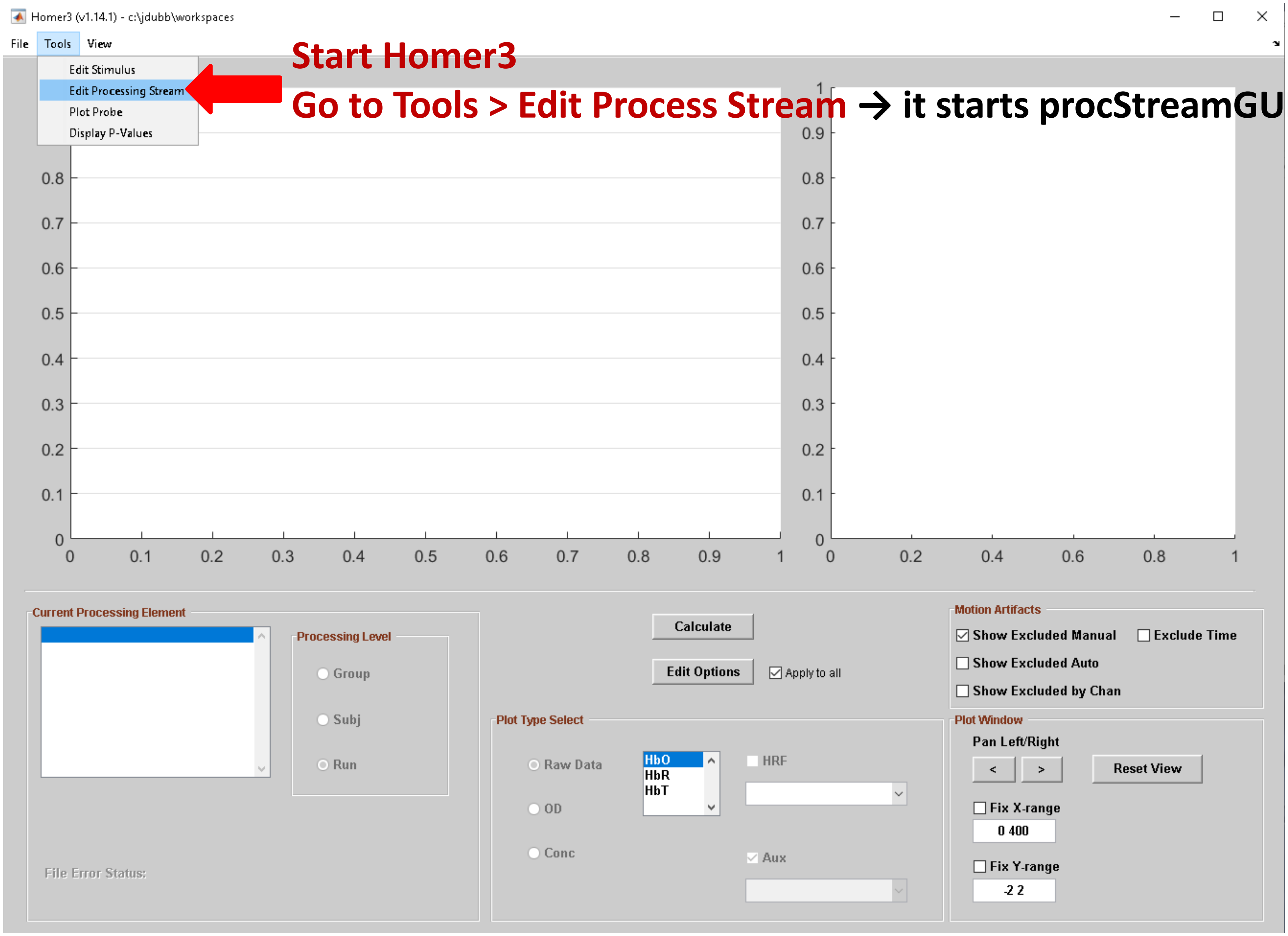
Remove / Correct MAs

GLM

Note: In options, you can hover over each function to get help on the function and the parameters

.CFG file format: the Process Stream GUI

The Process Stream GUI enables you to create your own .cfg files



Start Homer3

Go to Tools > Edit Process Stream → it starts procStreamGUI

☑ Show Excluded Manual
☐ Exclude Time
☐ Show Excluded Auto
☐ Show Excluded by Chan
☑ Apply to all
☐ Fix X-range 0 400
☐ Fix Y-range -2 2

.CFG file format

Add, remove, and move function usages in processing stream

The processing stream you're creating

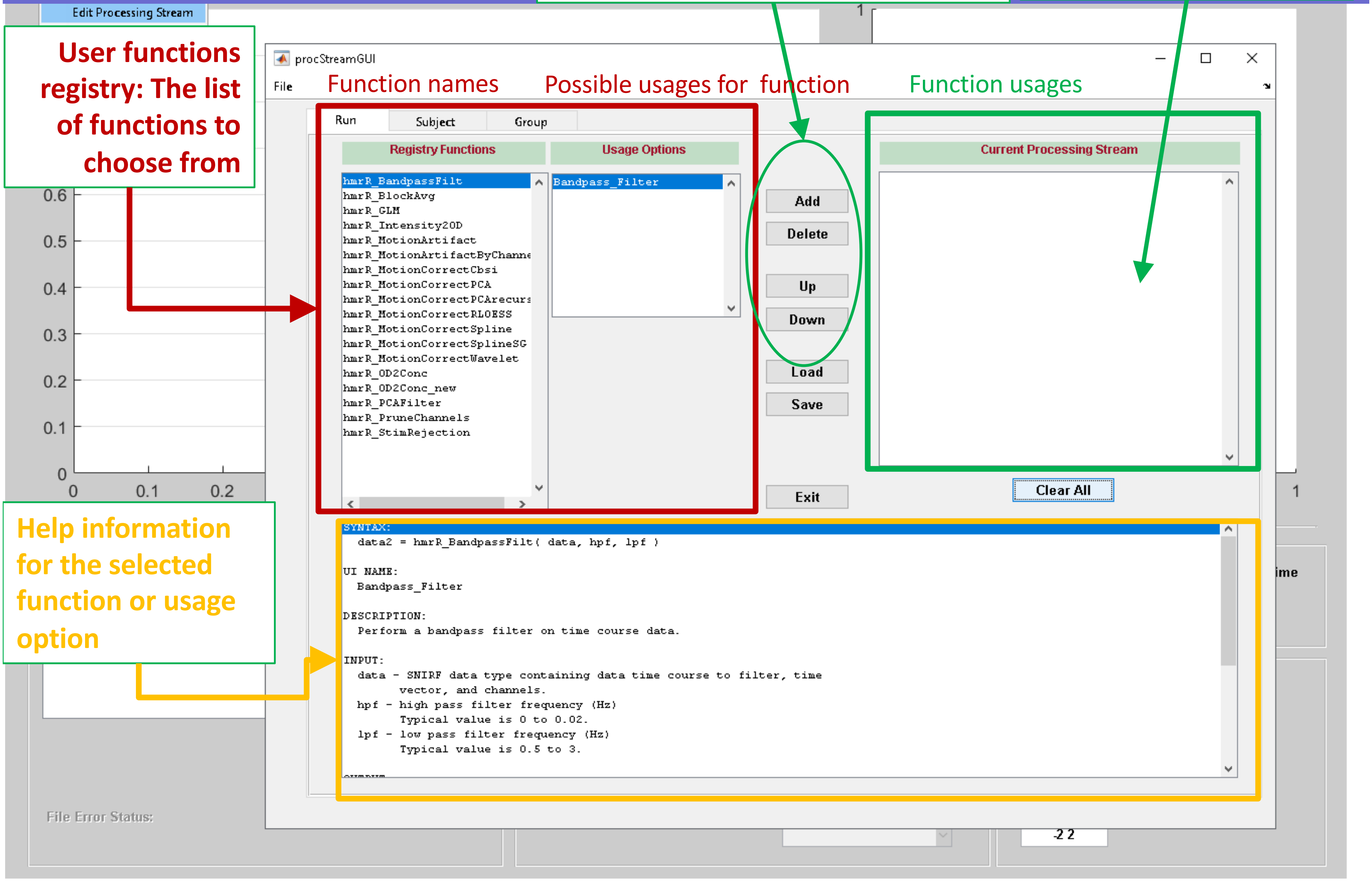
User functions registry: The list of functions to choose from

Function names

Possible usages for function

Function usages

Help information for the selected function or usage option



Registry Functions:

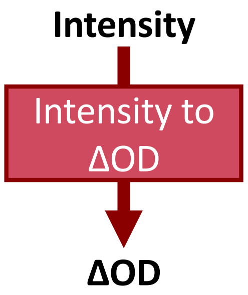
- hmrR_BandpassFilt
- hmrR_BlockAvg
- hmrR_GLM
- hmrR_Intensity2OD
- hmrR_MotionArtifact
- hmrR_MotionArtifactByChanne
- hmrR_MotionCorrectCbsi
- hmrR_MotionCorrectPCA
- hmrR_MotionCorrectPCArecurs
- hmrR_MotionCorrectRLOESS
- hmrR_MotionCorrectSpline
- hmrR_MotionCorrectSplineSG
- hmrR_MotionCorrectWavelet
- hmrR_OD2Conc
- hmrR_OD2Conc_new
- hmrR_PCAFilter
- hmrR_PruneChannels
- hmrR_StimRejection

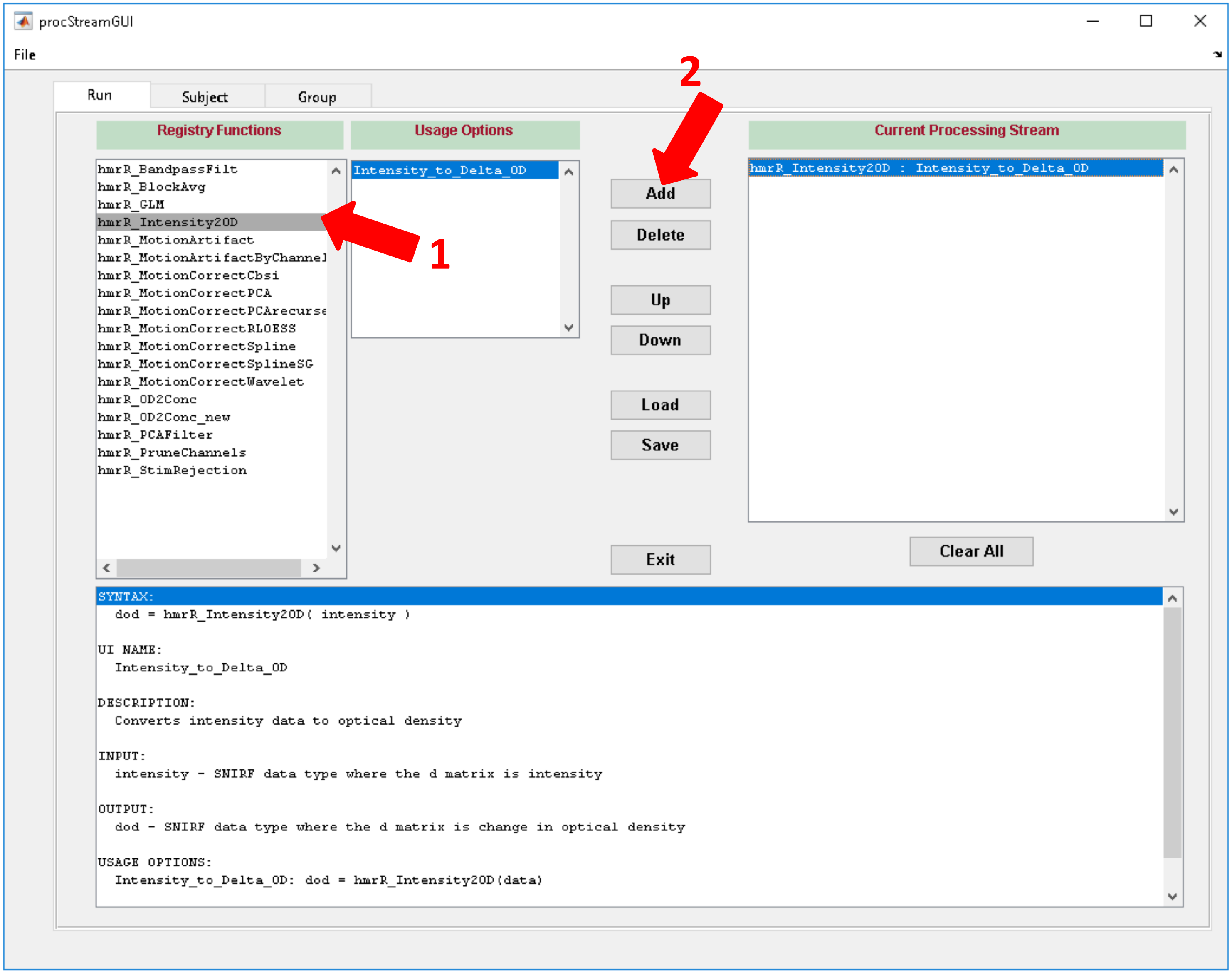
Usage Options:

- Bandpass_Filter

```
SYNTAX:
  data2 = hmrR_BandpassFilt( data, hpf, lpf )

UI NAME:
  Bandpass_Filter

DESCRIPTION:
  Perform a bandpass filter on time course data.

INPUT:
  data - SNIRF data type containing data time course to filter, time
         vector, and channels.
  hpf - high pass filter frequency (Hz)
         Typical value is 0 to 0.02.
  lpf - low pass filter frequency (Hz)
         Typical value is 0.5 to 3.
```

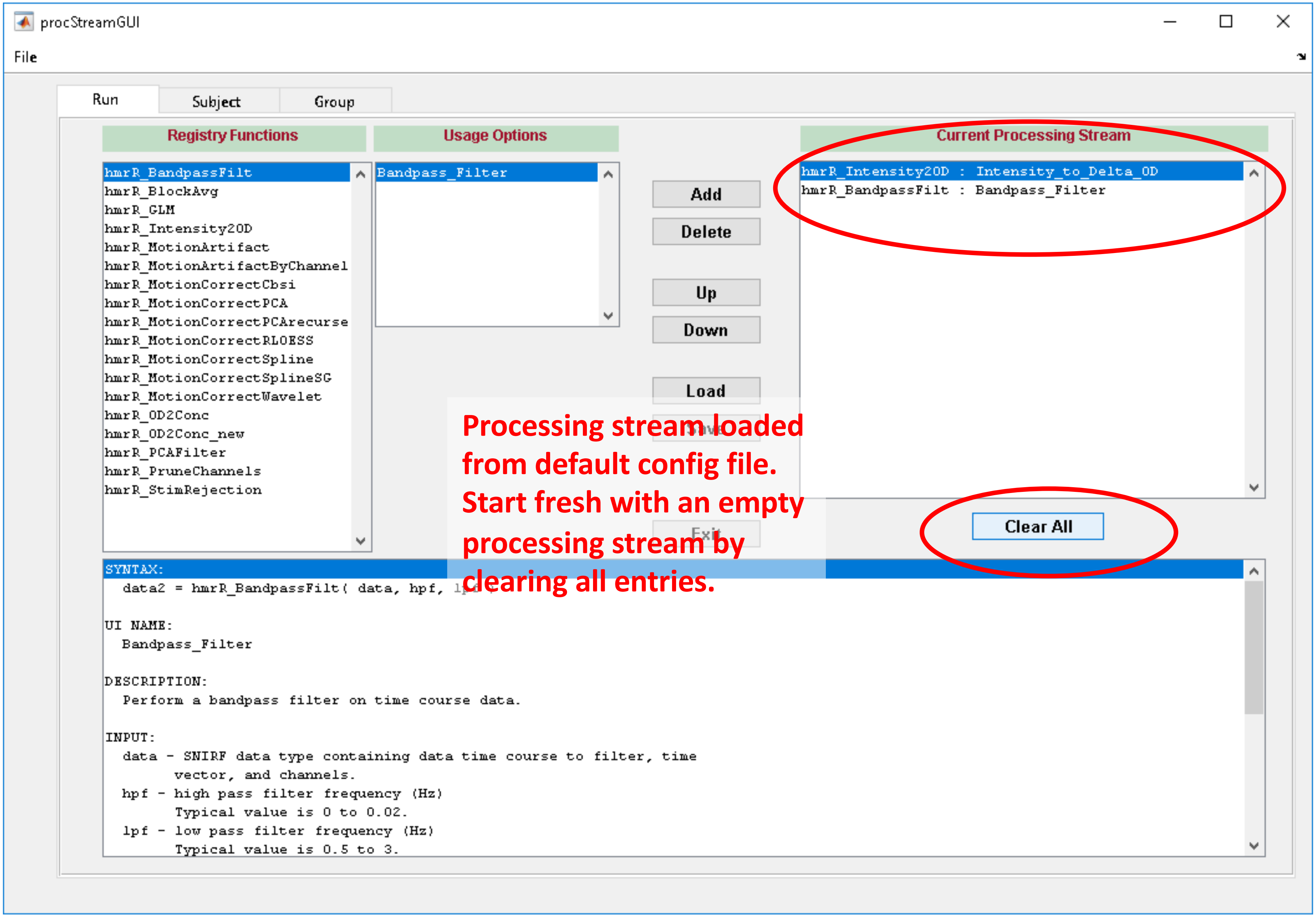
.CFG file format





```
SYNTAX:
   dod = hmrR_Intensity2OD( intensity )

UI NAME:
   Intensity_to_Delta_OD

DESCRIPTION:
   Converts intensity data to optical density

INPUT:
   intensity - SNIRF data type where the d matrix is intensity

OUTPUT:
   dod - SNIRF data type where the d matrix is change in optical density

USAGE OPTIONS:
   Intensity_to_Delta_OD: dod = hmrR_Intensity2OD(data)
```

.CFG file format



hmrR_BandpassFilt
hmrR_BlockAvg
hmrR_GLM
hmrR_Intensity2OD
hmrR_MotionArtifact
hmrR_MotionArtifactByChannel
hmrR_MotionCorrectCbsi
hmrR_MotionCorrectPCA
hmrR_MotionCorrectPCArecurse
hmrR_MotionCorrectRLOESS
hmrR_MotionCorrectSpline
hmrR_MotionCorrectSplineSG
hmrR_MotionCorrectWavelet
hmrR_OD2Conc
hmrR_OD2Conc_new
hmrR_PCAFilter
hmrR_PruneChannels
hmrR_StimRejection

Bandpass_Filter

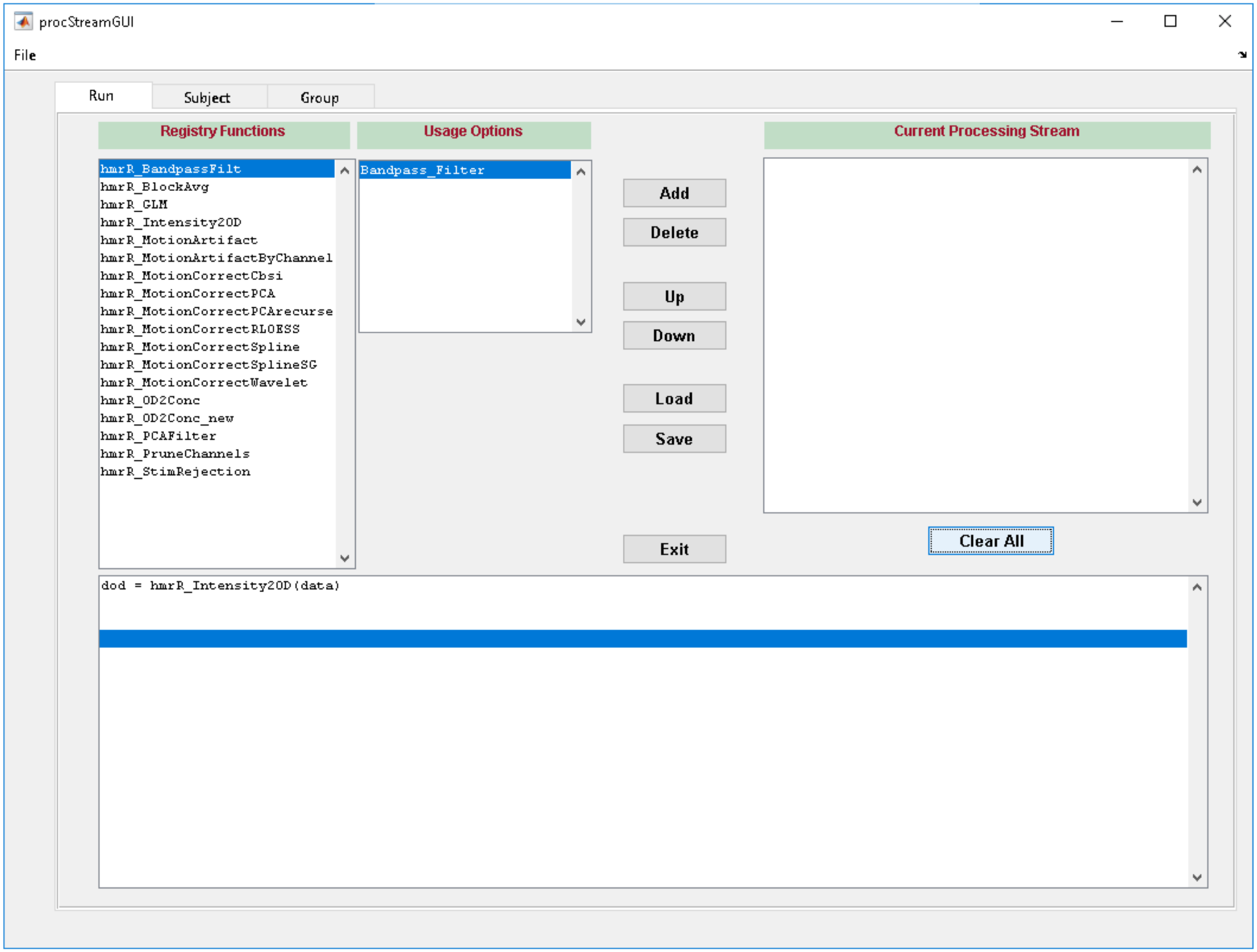
hmrR_Intensity2OD : Intensity_to_Delta_OD
hmrR_BandpassFilt : Bandpass_Filter

```
SYNTAX:
  data2 = hmrR_BandpassFilt( data, hpf, lp

UI NAME:
  Bandpass_Filter

DESCRIPTION:
  Perform a bandpass filter on time course data.

INPUT:
  data - SNIRF data type containing data time course to filter, time
         vector, and channels.
  hpf - high pass filter frequency (Hz)
         Typical value is 0 to 0.02.
  lpf - low pass filter frequency (Hz)
         Typical value is 0.5 to 3.
```

Processing stream loaded from default config file. Start fresh with an empty processing stream by clearing all entries.

.CFG file format

Your GUI should look like this now, with no entries in Current Processing Stream window



```
hmrR_BandpassFilt
hmrR_BlockAvg
hmrR_GLM
hmrR_Intensity2OD
hmrR_MotionArtifact
hmrR_MotionArtifactByChannel
hmrR_MotionCorrectCbsi
hmrR_MotionCorrectPCA
hmrR_MotionCorrectPCArecurse
hmrR_MotionCorrectRLOESS
hmrR_MotionCorrectSpline
hmrR_MotionCorrectSplineSG
hmrR_MotionCorrectWavelet
hmrR_OD2Conc
hmrR_OD2Conc_new
hmrR_PCAFilter
hmrR_PruneChannels
hmrR_StimRejection
```

```
Bandpass_Filter
```

```
dod = hmrR_Intensity2OD(data)
```

.CFG file format

Intensity

Intensity to ΔOD

ΔOD

Band-pass filter

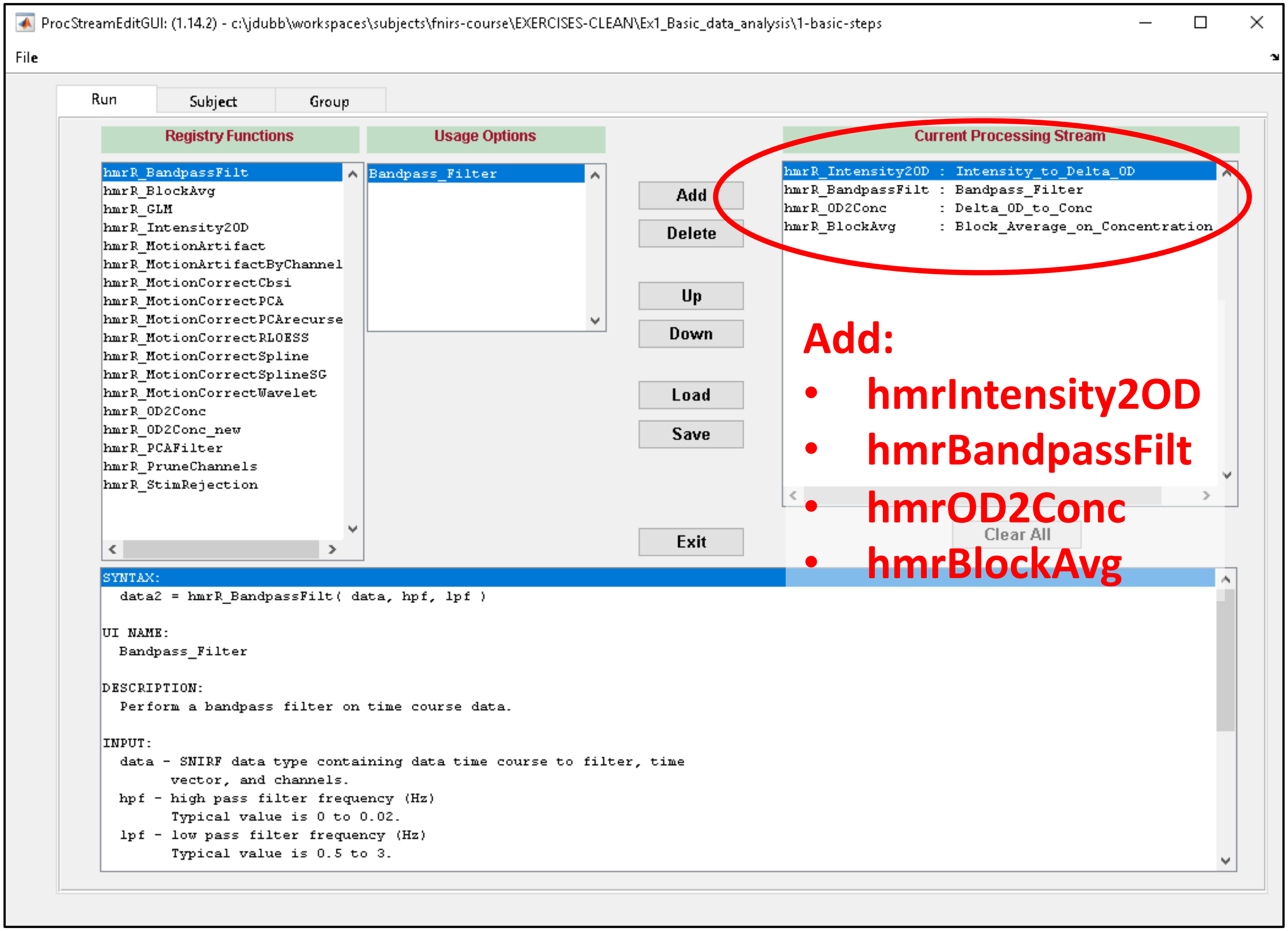
ΔOD, filtered

ΔOD to Concentration

Concentration

Block-average

Hemodynamic response function (HRF)



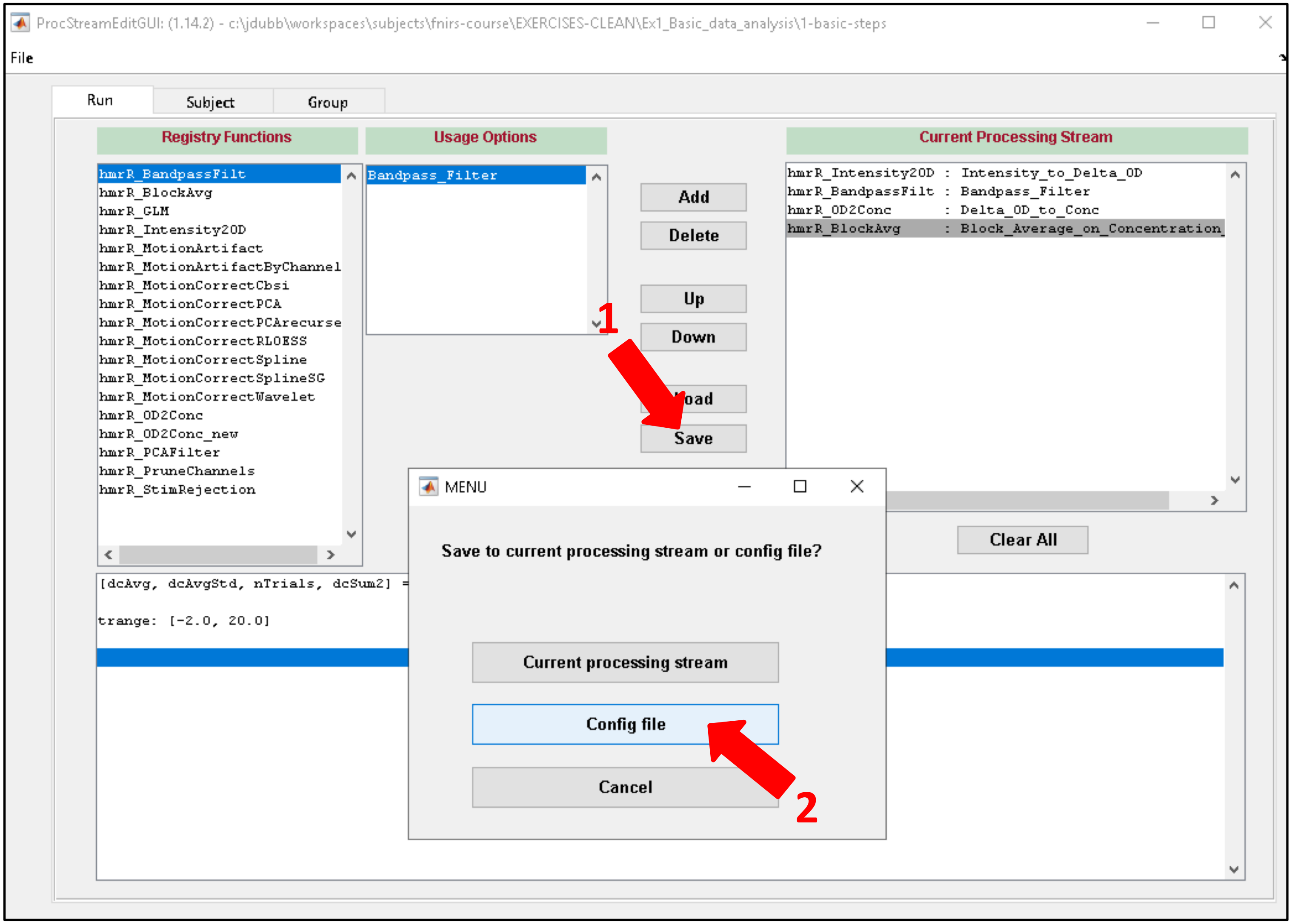
```
hmrR_Intensity2OD  : Intensity_to_Delta_OD
hmrR_BandpassFilt  : Bandpass_Filter
hmrR_OD2Conc       : Delta_OD_to_Conc
hmrR_BlockAvg      : Block_Average_on_Concentration
```

```
SYNTAX:
  data2 = hmrR_BandpassFilt( data, hpf, lpf )

UI NAME:
  Bandpass_Filter

DESCRIPTION:
  Perform a bandpass filter on time course data.

INPUT:
  data - SNIRF data type containing data time course to filter, time
         vector, and channels.
  hpf - high pass filter frequency (Hz)
        Typical value is 0 to 0.02.
  lpf - low pass filter frequency (Hz)
        Typical value is 0.5 to 3.
```

Add:

- hmrIntensity2OD
- hmrBandpassFilt
- hmrOD2Conc
- hmrBlockAvg

.CFG file format



ProcStreamEditGUI: (1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

```
hmrR_BandpassFilt
hmrR_BlockAvg
hmrR_GLM
hmrR_Intensity2OD
hmrR_MotionArtifact
hmrR_MotionArtifactByChannel
hmrR_MotionCorrectCbsi
hmrR_MotionCorrectPCA
hmrR_MotionCorrectPCArecurse
hmrR_MotionCorrectRLOESS
hmrR_MotionCorrectSpline
hmrR_MotionCorrectSplineSG
hmrR_MotionCorrectWavelet
hmrR_OD2Conc
hmrR_OD2Conc_new
hmrR_PCAFilter
hmrR_PruneChannels
hmrR_StimRejection
```

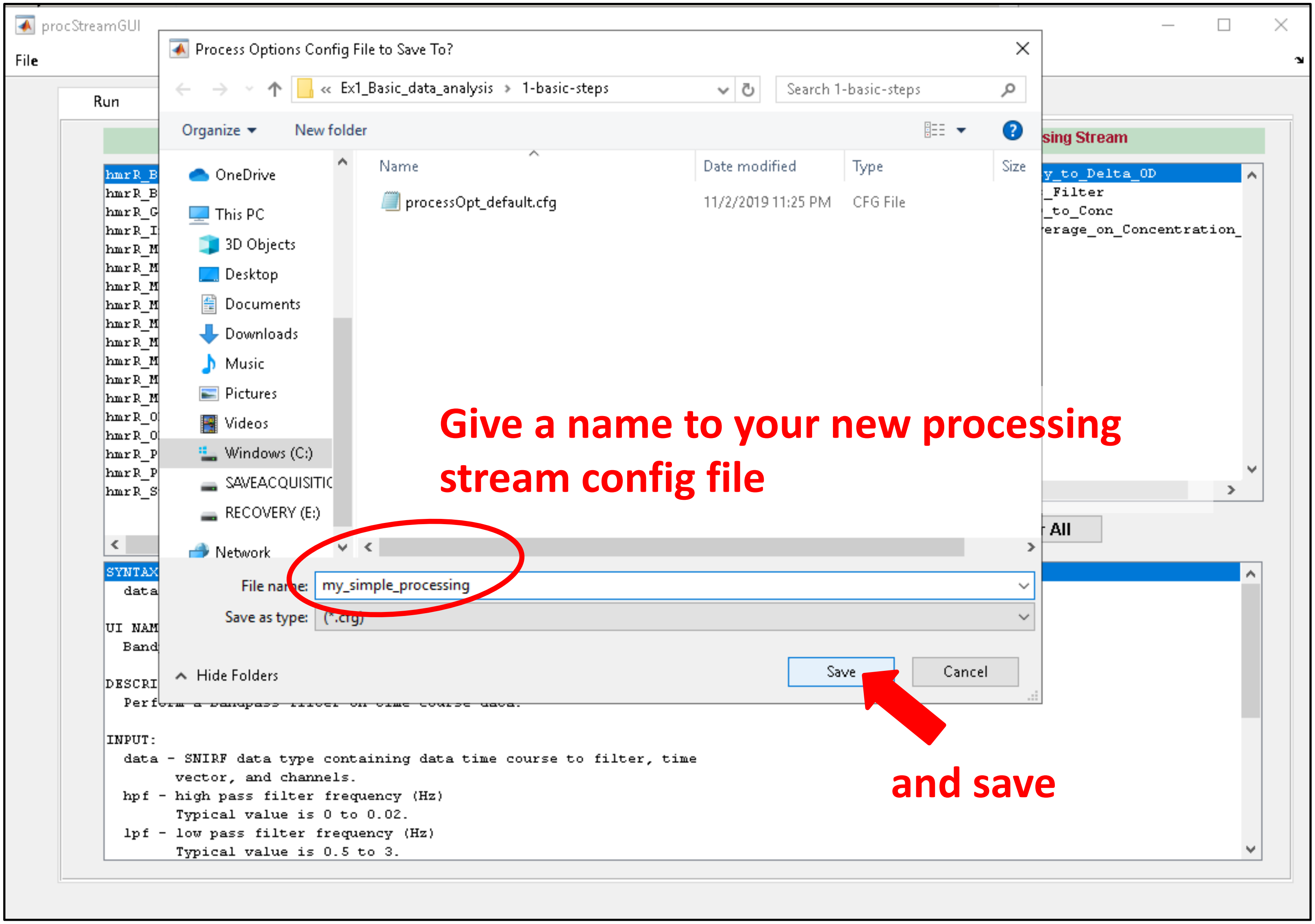
```
Bandpass_Filter
```

```
hmrR_Intensity2OD : Intensity_to_Delta_OD
hmrR_BandpassFilt : Bandpass_Filter
hmrR_OD2Conc      : Delta_OD_to_Conc
hmrR_BlockAvg     : Block_Average_on_Concentration_
```

```
[dcAvg, dcAvgStd, nTrials, dcSum2] =

trange: [-2.0, 20.0]
```

Save to current processing stream or config file?

.CFG file format



Name	Date modified	Type	Size
processOpt_default.cfg	11/2/2019 11:25 PM	CFG File	

File name: my_simple_processing

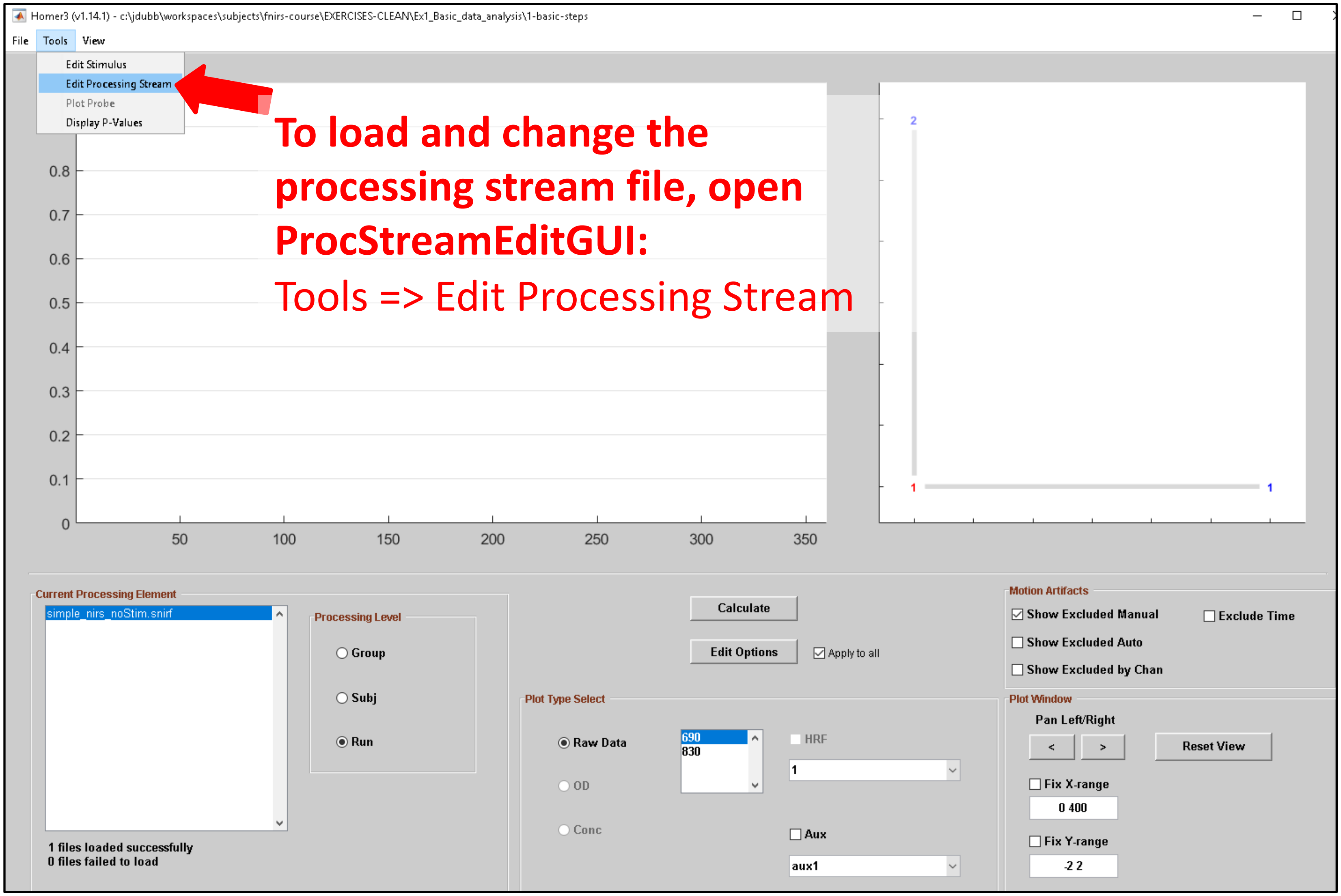
Save as type: (*.cfg)

```
SYNTAX
  data

UI NAM
  Band

DESCRI
  Perform a bandpass filter on time course data.

INPUT:
  data - SNIRF data type containing data time course to filter, time
        vector, and channels.
  hpf - high pass filter frequency (Hz)
        Typical value is 0 to 0.02.
  lpf - low pass filter frequency (Hz)
        Typical value is 0.5 to 3.
```

Give a name to your new processing stream config file

and save

.CFG file format



To load and change the processing stream file, open ProcStreamEditGUI:

Tools => Edit Processing Stream

Homer3 (v1.14.1) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

Current Processing Element: simple_nirs_noStim.snirf

1 files loaded successfully
0 files failed to load

Processing Level: ○ Group ○ Subj ● Run

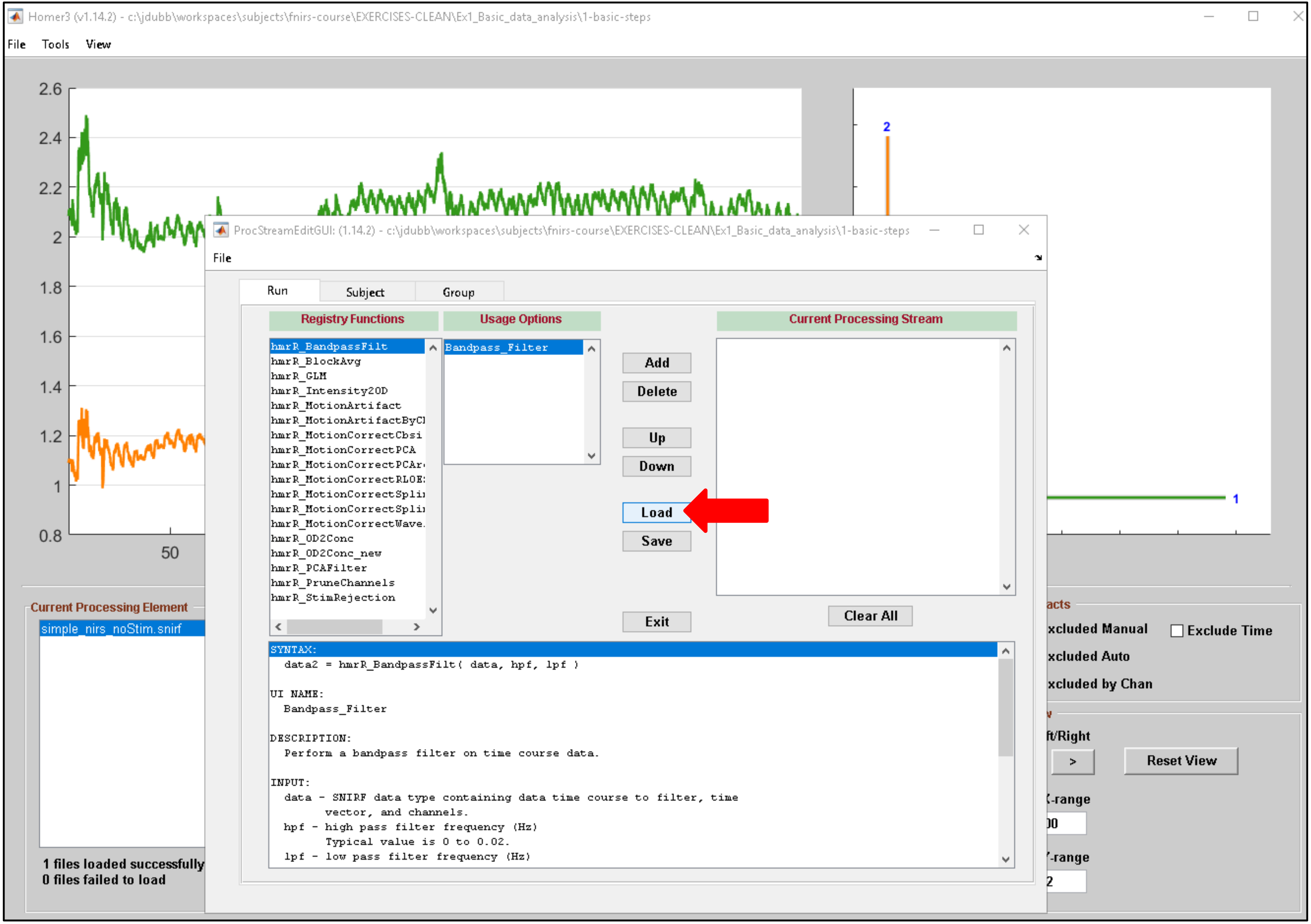
Plot Type Select: ● Raw Data ○ OD ○ Conc

☑ Apply to all

Motion Artifacts: ☑ Show Excluded Manual ☐ Show Excluded Auto ☐ Show Excluded by Chan ☐ Exclude Time

Plot Window: ☐ Fix X-range 0 400 ☐ Fix Y-range -2 2

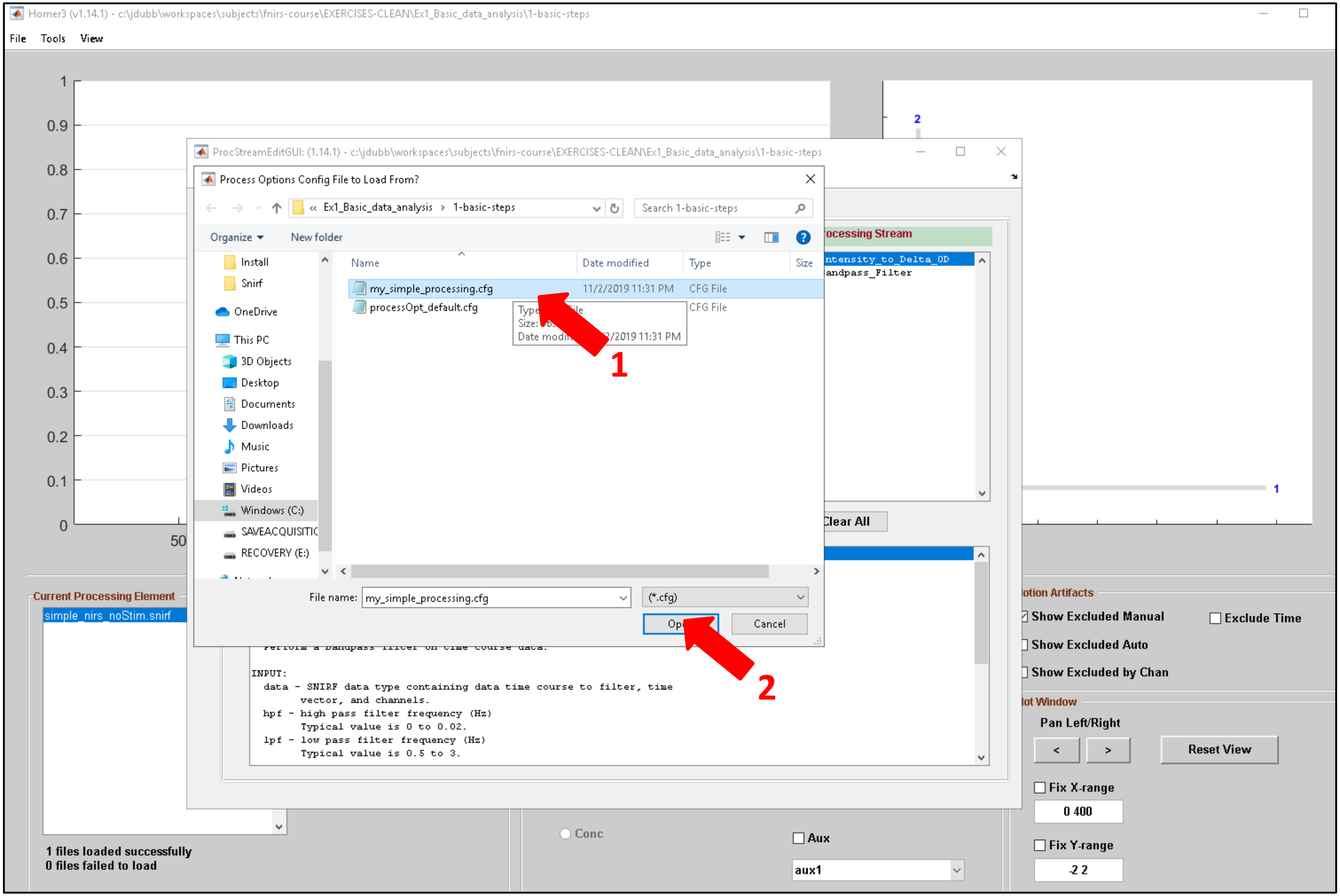
.CFG file format



```
SYNTAX:
  data2 = hmrR_BandpassFilt( data, hpf, lpf )

UI NAME:
  Bandpass_Filter

DESCRIPTION:
  Perform a bandpass filter on time course data.

INPUT:
  data - SNIRF data type containing data time course to filter, time
         vector, and channels.
  hpf - high pass filter frequency (Hz)
         Typical value is 0 to 0.02.
  lpf - low pass filter frequency (Hz)
```

```
1 files loaded successfully
0 files failed to load
```

.CFG file format



Homer3 (v1.14.1) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

ProcStreamEditGUI: (1.14.1) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

Process Options Config File to Load From?

Name	Date modified	Type
my_simple_processing.cfg	11/2/2019 11:31 PM	CFG File
processOpt_default.cfg		CFG File

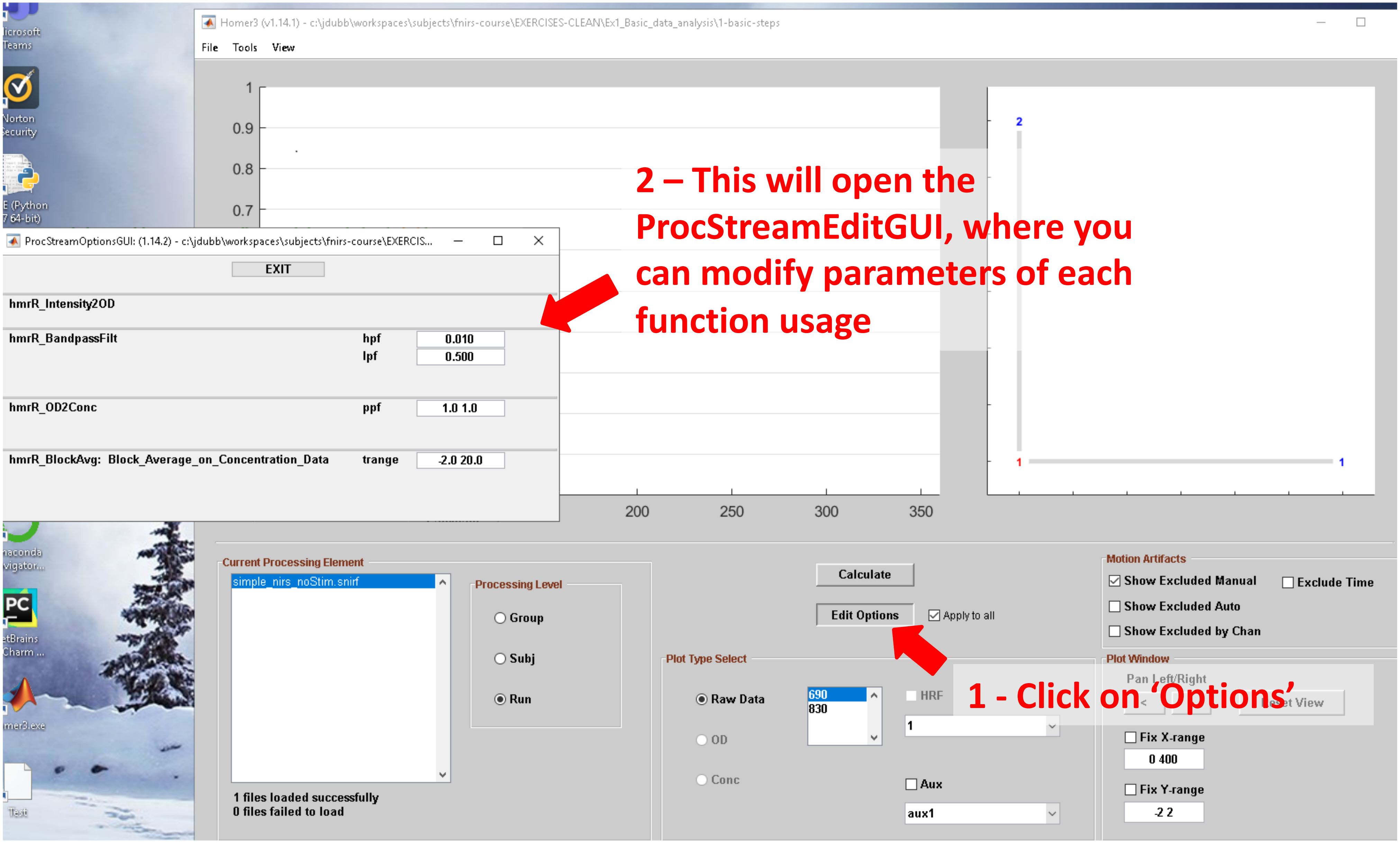
File name: my_simple_processing.cfg (*.cfg)

```
  Perform a bandpass filter on time course data.

INPUT:
  data - SNIRF data type containing data time course to filter, time
         vector, and channels.
  hpf - high pass filter frequency (Hz)
         Typical value is 0 to 0.02.
  lpf - low pass filter frequency (Hz)
         Typical value is 0.5 to 3.
```

Current Processing Element: simple_nirs_noStim.snirf

1 files loaded successfully
0 files failed to load

.CFG file format



Homer3 (v1.14.1) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

ProcStreamOptionsGUI: (1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCIS...

hmrR_Intensity2OD		
hmrR_BandpassFilt	hpf	0.010
	lpf	0.500
hmrR_OD2Conc	ppf	1.0 1.0
hmrR_BlockAvg: Block_Average_on_Concentration_Data	trange	-2.0 20.0

Current Processing Element: simple_nirs_noStim.snirf

1 files loaded successfully
0 files failed to load

Processing Level: ○ Group ○ Subj ● Run

Plot Type Select: ● Raw Data ○ OD ○ Conc

☑ Apply to all

Motion Artifacts: ☑ Show Excluded Manual ☐ Exclude Time ☐ Show Excluded Auto ☐ Show Excluded by Chan

Plot Window: ☐ Fix X-range 0 400 ☐ Fix Y-range -2 2

2 – This will open the ProcStreamEditGUI, where you can modify parameters of each function usage

1 - Click on ‘Options’

Let’s analyze some fNIRS data: HOMER3_UI

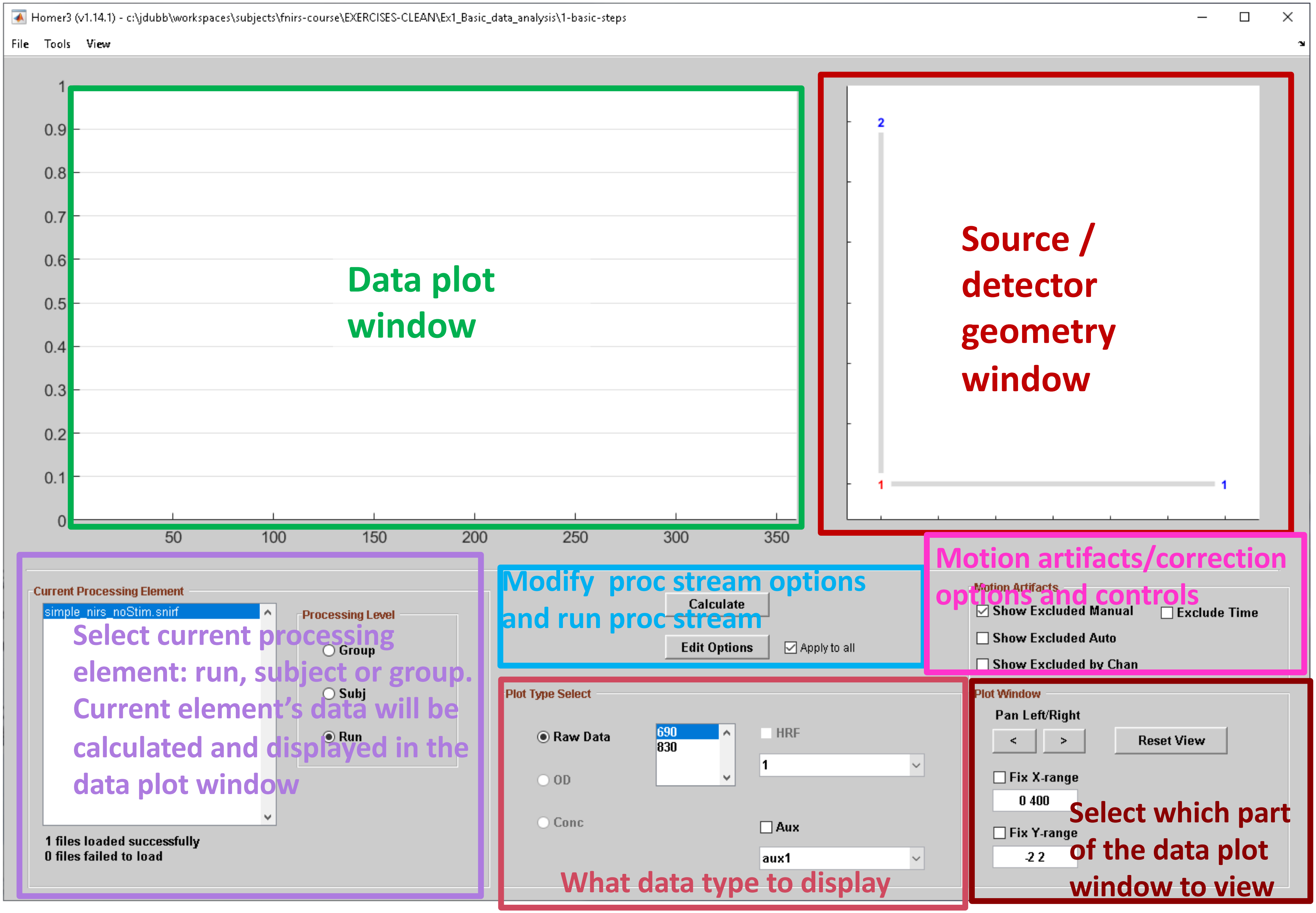
When opening Homer3, you need to select:

- **The dataset(s)**: a folder containing at least one **.snirf** (or **.nirs)** file. If all you have are **.nirs** files, Homer3 will convert the files to the **.snirf** format.
- **The data processing stream**: a **.cfg** file. If you click ‘Cancel’, a default process stream will load.
- **Start Homer3**
- When prompted to select a .nirs folder, navigate to and select folder **/Exercises/Ex1_Basic_data_analysis/**
- When prompted to select a .cfg file, select **my_simple_processing.cfg** file we just created.

Note: If you’re already in Homer3 and need to change the data directory or the .cfg file:

- Go to **File > Change Directory,** and select your nirs folder
- Go to **Tools > Edit Processing Stream** and click the Load button to select .cfg file

Homer3 MainGUI



Homer3 (v1.14.1) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

simple_nirs_noStim.snirf

1 files loaded successfully
0 files failed to load

Data plot window

Source / detector geometry window

Select current processing element: run, subject or group. Current element's data will be calculated and displayed in the data plot window

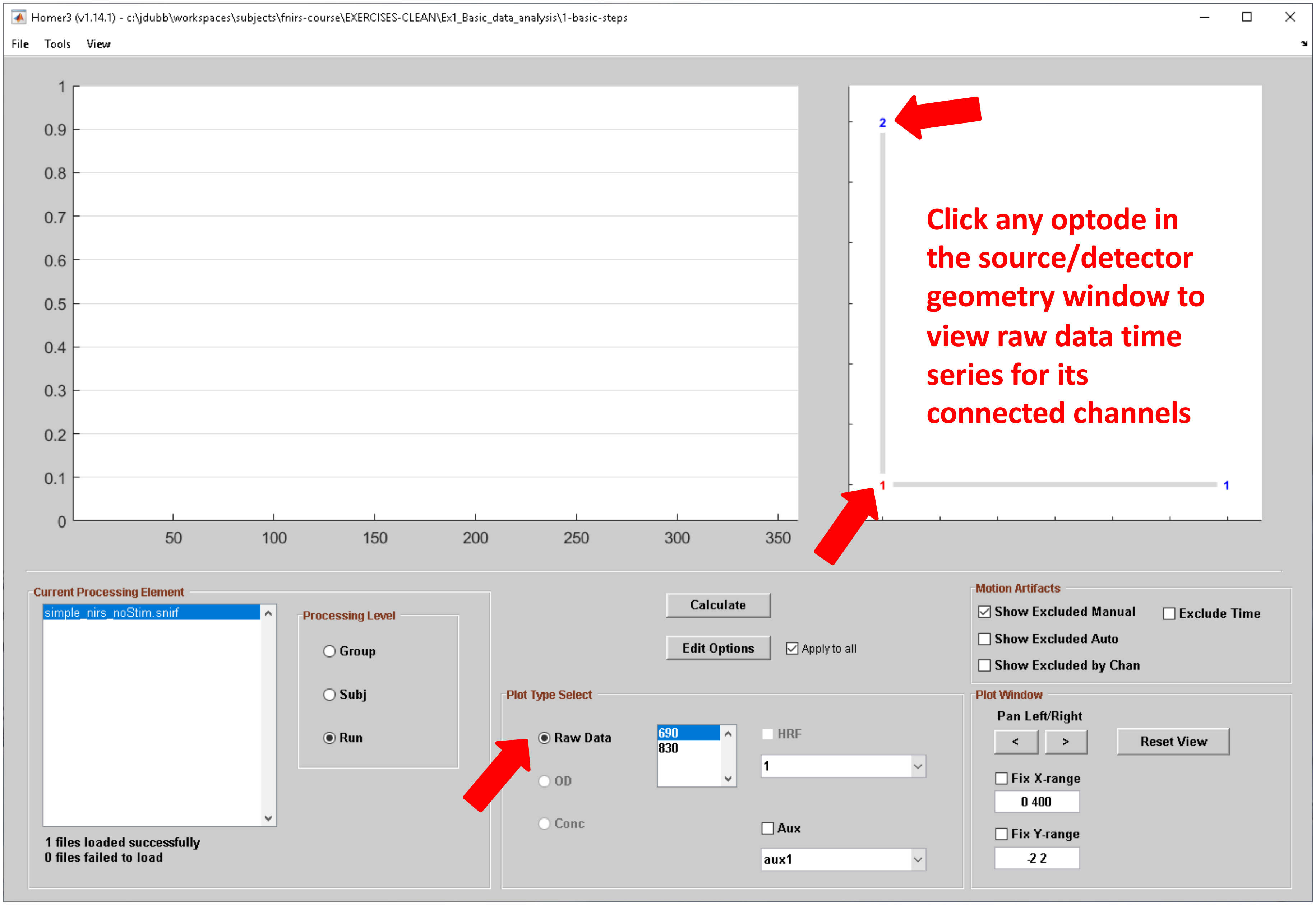
Modify proc stream options and run proc stream

Motion artifacts/correction options and controls

What data type to display

Select which part of the data plot window to view

Displaying raw fNIRS data



Homer3 (v1.14.1) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

Current Processing Element: simple_nirs_noStim.snirf

1 files loaded successfully
0 files failed to load

Processing Level: ○ Group ○ Subj ● Run

Plot Type Select: ● Raw Data ○ OD ○ Conc

Wavelength: 690 (selected), 830

☐ HRF: 1

☐ Aux: aux1

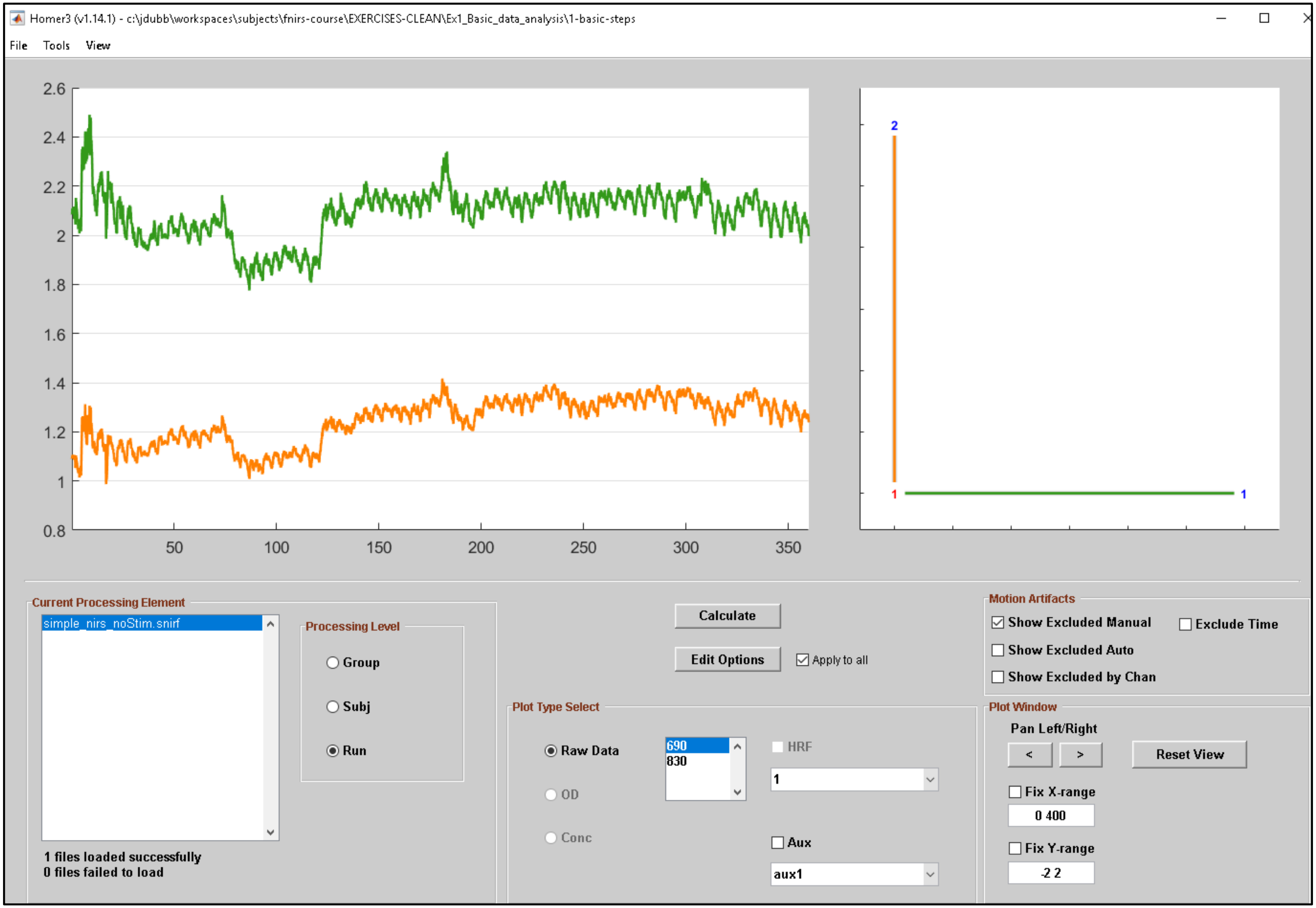
☑ Apply to all

Motion Artifacts: ☑ Show Excluded Manual ☐ Exclude Time ☐ Show Excluded Auto ☐ Show Excluded by Chan

Plot Window: ☐ Fix X-range 0 400 ☐ Fix Y-range -2 2

Click any optode in the source/detector geometry window to view raw data time series for its connected channels

Displaying raw fNIRS data



Homer3 (v1.14.1) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

Current Processing Element

simple_nirs_noStim.snirf

1 files loaded successfully
0 files failed to load

Processing Level
○ Group
○ Subj
● Run

☑ Apply to all

Plot Type Select
● Raw Data
○ OD
○ Conc

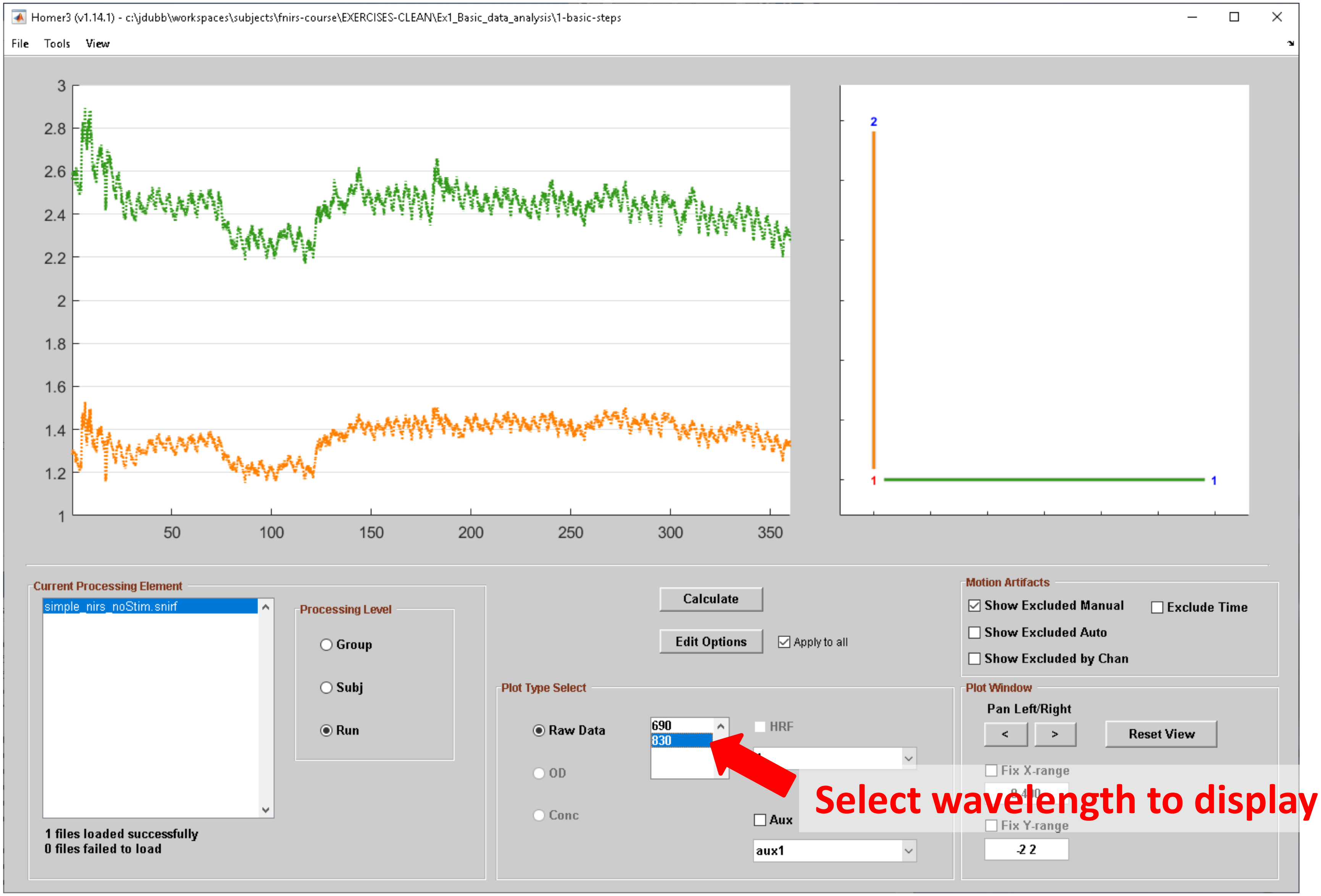
690
830

☐ HRF
1
☐ Aux
aux1

Motion Artifacts
☑ Show Excluded Manual
☐ Exclude Time
☐ Show Excluded Auto
☐ Show Excluded by Chan

Plot Window
Pan Left/Right
☐ Fix X-range
0 400
☐ Fix Y-range
-2 2

Displaying the raw fNIRS data


Homer3 (v1.14.1) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

Current Processing Element: simple_nirs_noStim.snirf

1 files loaded successfully
0 files failed to load

Processing Level: ○ Group ○ Subj ● Run

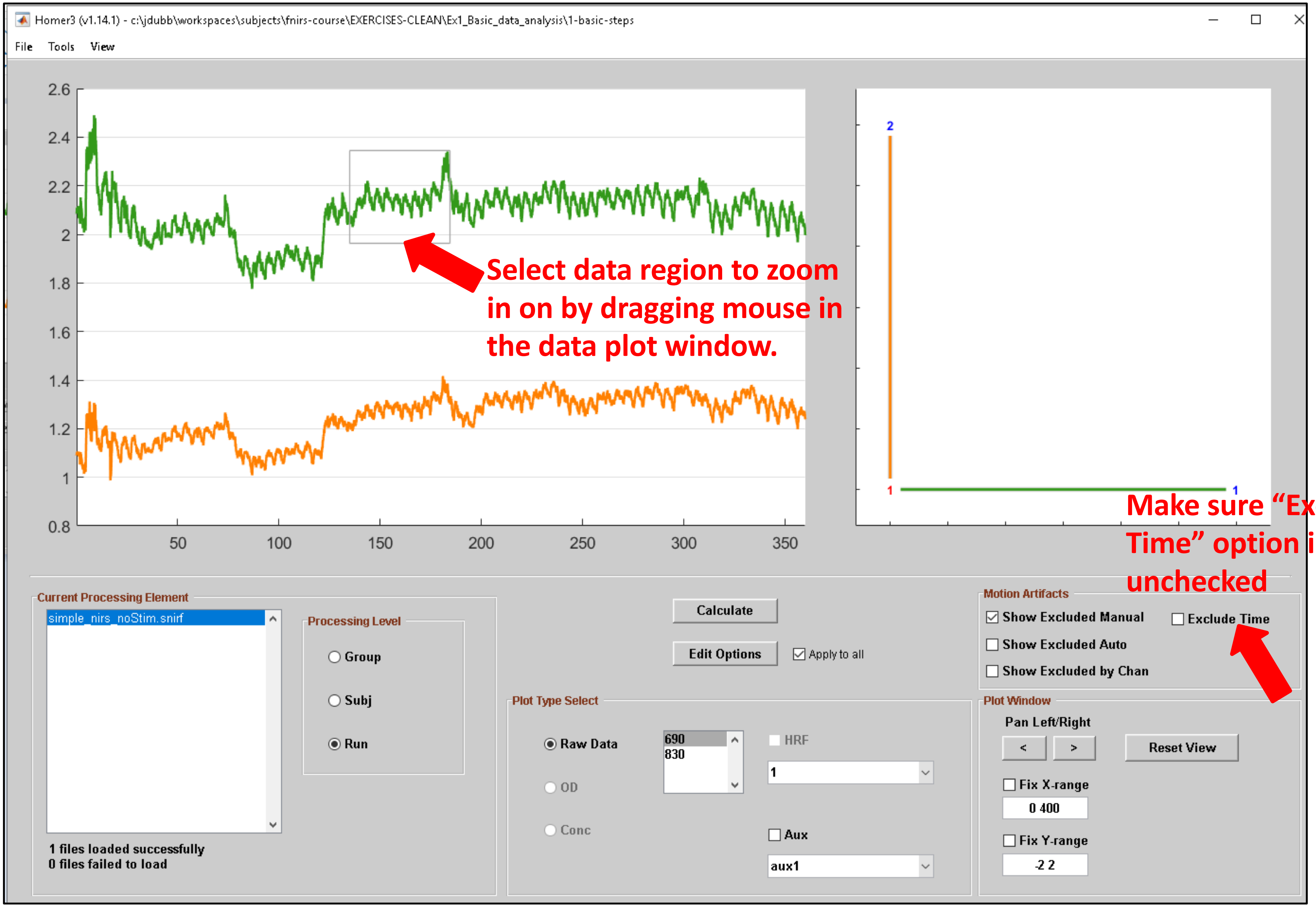
Plot Type Select: ● Raw Data ○ OD ○ Conc; wavelength 830 selected (690, 830)

Motion Artifacts: ☑ Show Excluded Manual ☐ Exclude Time ☐ Show Excluded Auto ☐ Show Excluded by Chan

☑ Apply to all

Select wavelength to display

Zooming in on data



Current Processing Element

simple_nirs_noStim.snirf

1 files loaded successfully
0 files failed to load

Processing Level

- ○ Group
- ○ Subj
- ● Run

☑ Apply to all

Plot Type Select

- ● Raw Data
- ○ OD
- ○ Conc

690
830

☐ HRF

1

☐ Aux

aux1

Motion Artifacts

- ☑ Show Excluded Manual
- ☐ Exclude Time
- ☐ Show Excluded Auto
- ☐ Show Excluded by Chan

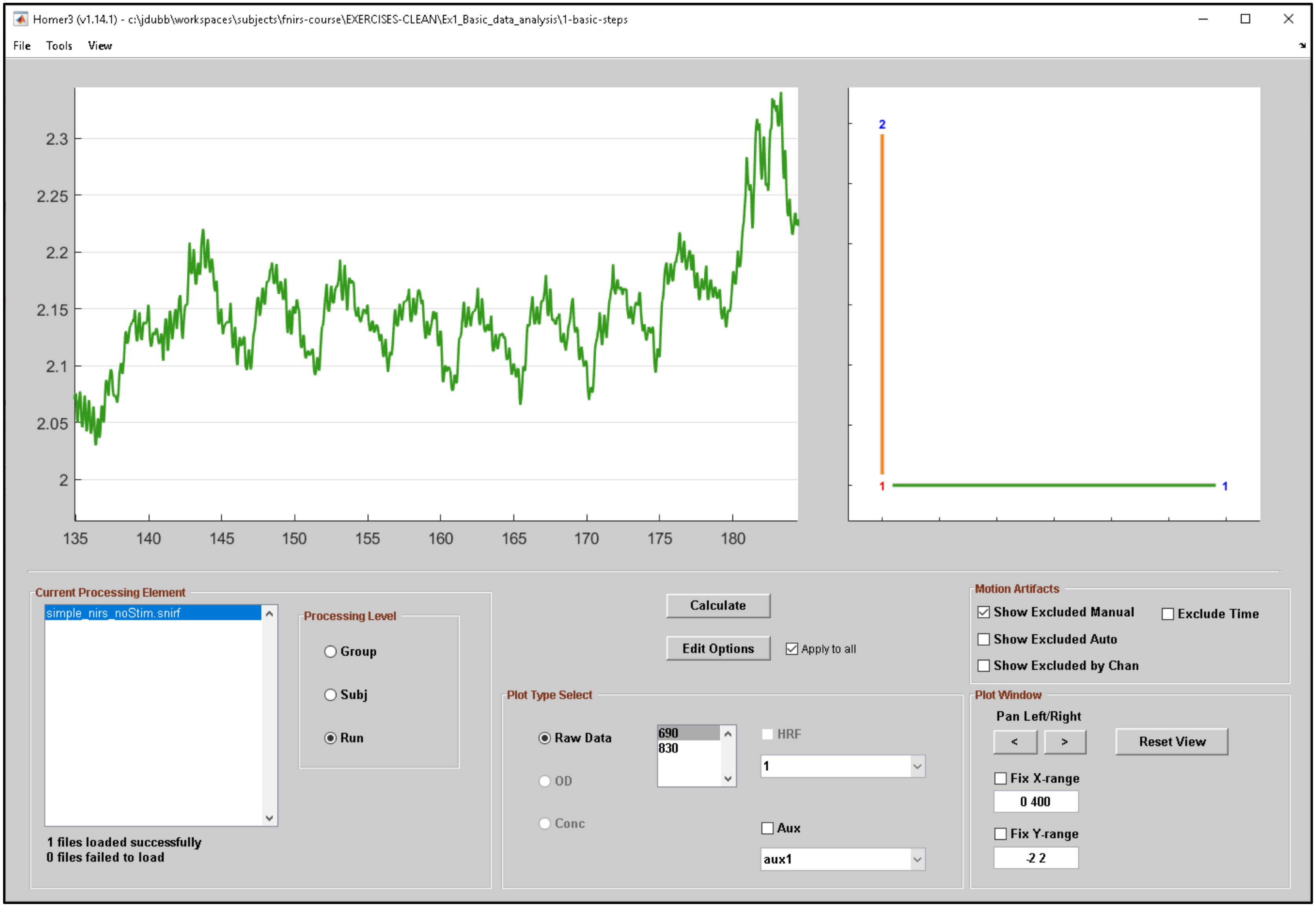
Plot Window

- ☐ Fix X-range: 0 400
- ☐ Fix Y-range: -2 2

Select data region to zoom in on by dragging mouse in the data plot window.

Make sure "Exclude Time" option is unchecked

Zooming in



Current Processing Element

simple_nirs_noStim.snirf

1 files loaded successfully
0 files failed to load

Processing Level

○ Group
○ Subj
● Run

☑ Apply to all

Plot Type Select

● Raw Data
○ OD
○ Conc

690
830

☐ HRF
1
☐ Aux
aux1

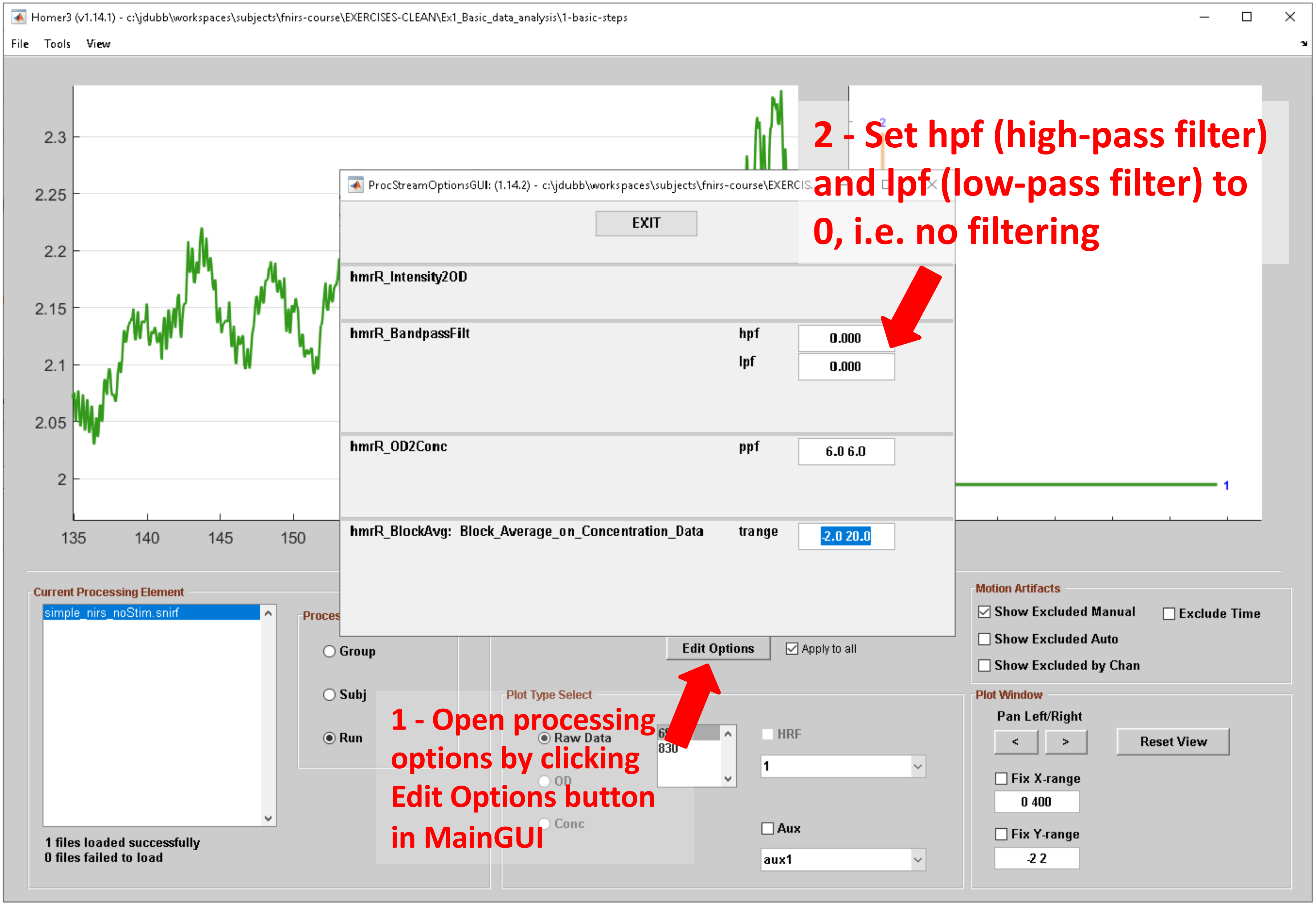
Motion Artifacts

☑ Show Excluded Manual
☐ Exclude Time
☐ Show Excluded Auto
☐ Show Excluded by Chan

Plot Window

☐ Fix X-range
0 400
☐ Fix Y-range
-2 2

Modifying processing stream options



hmrR_Intensity2OD

hmrR_BandpassFilt — hpf: 0.000, lpf: 0.000

hmrR_OD2Conc — ppf: 6.0 6.0

hmrR_BlockAvg: Block_Average_on_Concentration_Data — trange: -2.0 20.0

Current Processing Element: simple_nirs_noStim.snirf

1 files loaded successfully
0 files failed to load

○ Group
○ Subj
● Run

● Raw Data
○ OD
○ Conc

☑ Apply to all

☐ HRF
1

☐ Aux
aux1

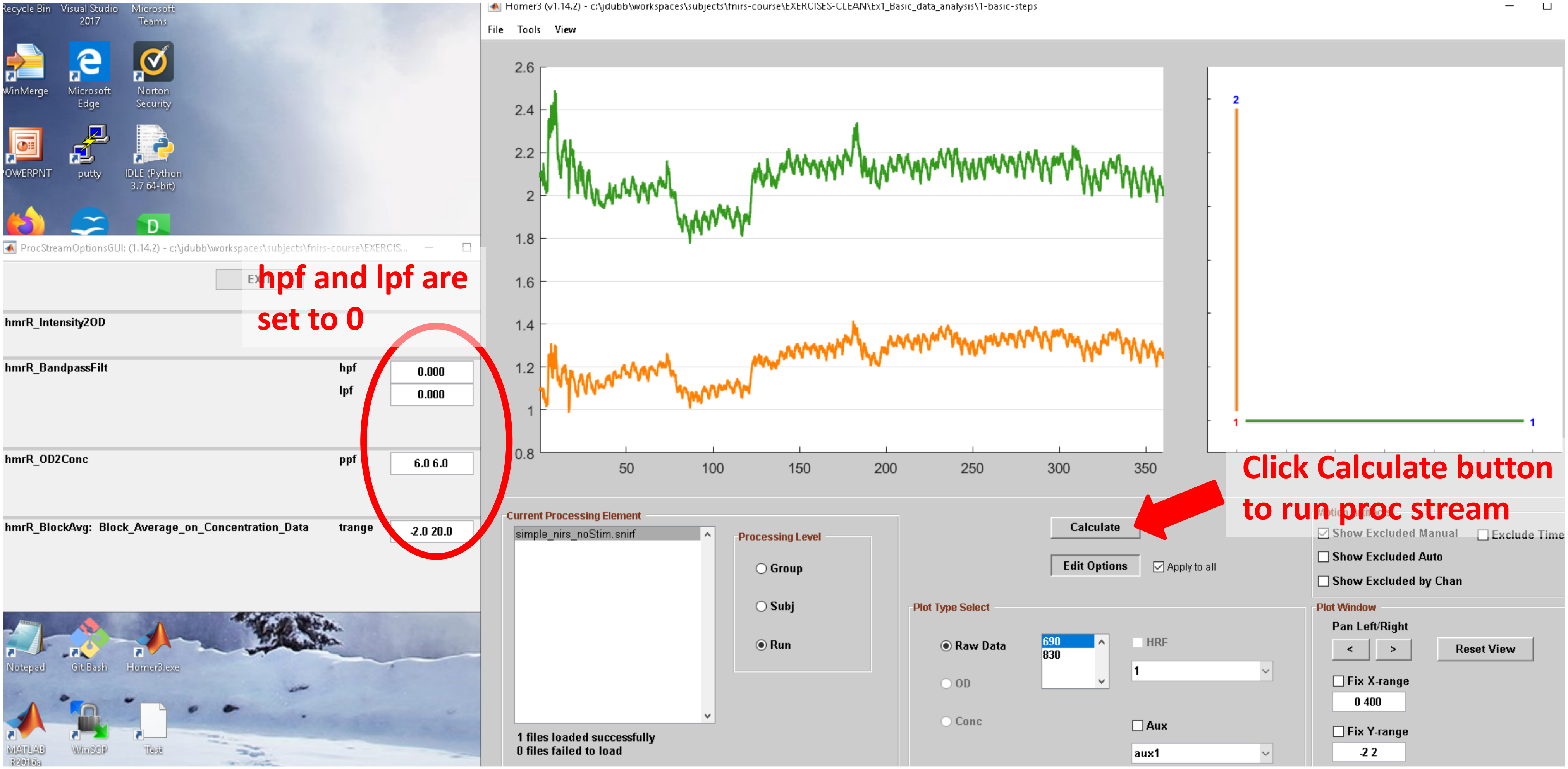
☑ Show Excluded Manual
☐ Exclude Time
☐ Show Excluded Auto
☐ Show Excluded by Chan

☐ Fix X-range
0 400
☐ Fix Y-range
-2 2

2 - Set hpf (high-pass filter) and lpf (low-pass filter) to 0, i.e. no filtering

1 - Open processing options by clicking Edit Options button in MainGUI

Running the processing stream



hpf and lpf are set to 0

Click Calculate button to run proc stream

ProcStreamOptionsGUI: (1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCIS...

hmrR_Intensity2OD

hmrR_BandpassFilt hpf 0.000 lpf 0.000

hmrR_OD2Conc ppf 6.0 6.0

hmrR_BlockAvg: Block_Average_on_Concentration_Data trange -2.0 20.0

Homer3 (v1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

Current Processing Element: simple_nirs_noStim.snirf

1 files loaded successfully
0 files failed to load

Processing Level: ○ Group ○ Subj ● Run

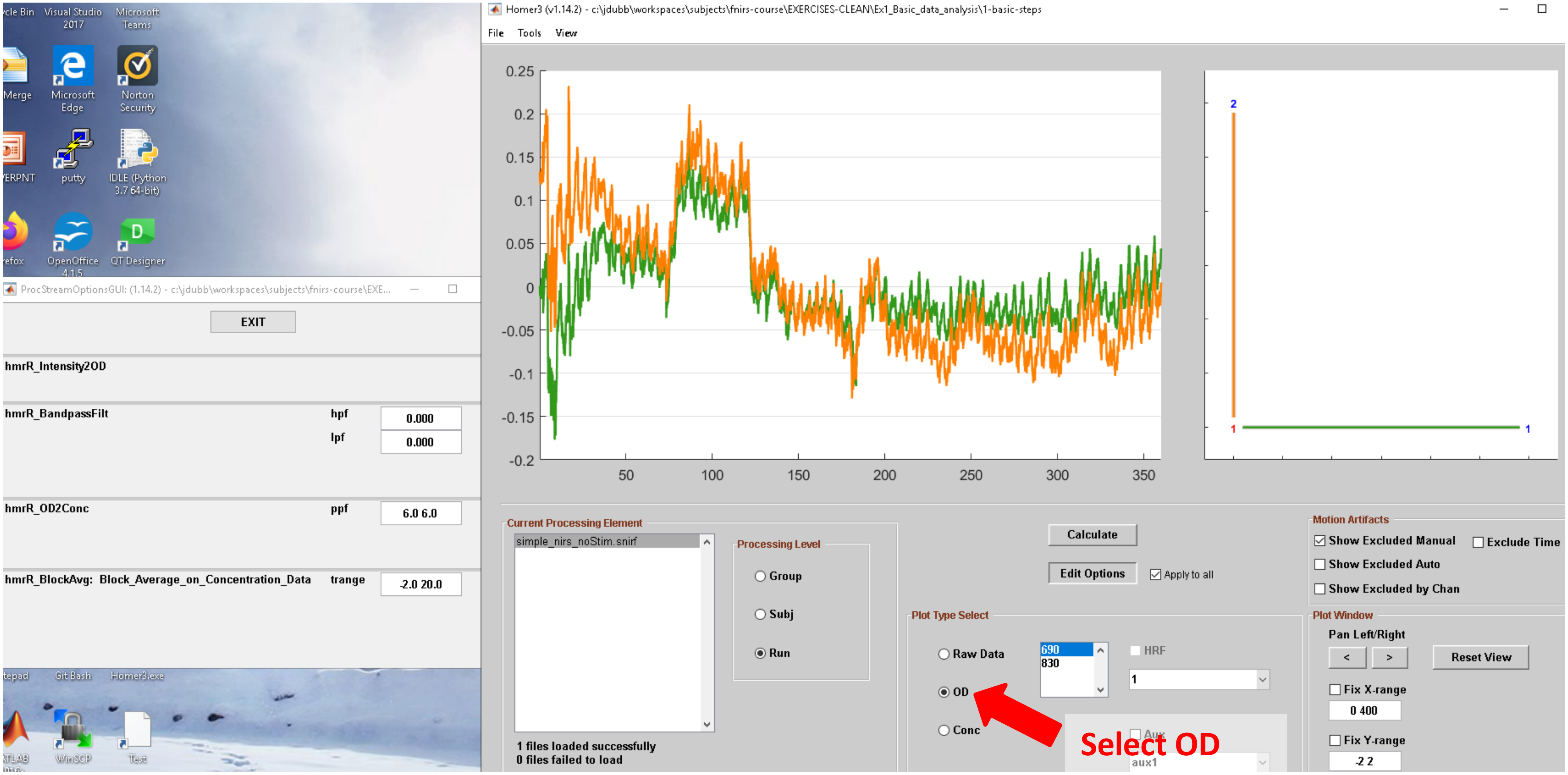
Plot Type Select: ● Raw Data ○ OD ○ Conc; 690 830 (690 selected); ☐ HRF 1; ☐ Aux aux1

☑ Apply to all

☑ Show Excluded Manual ☐ Exclude Time
☐ Show Excluded Auto
☐ Show Excluded by Chan

Plot Window: ☐ Fix X-range 0 400; ☐ Fix Y-range -2 2

Intensity to ΔOD



ProcStreamOptionsGUI: (1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXE...

hmrR_Intensity2OD

hmrR_BandpassFilt hpf 0.000

lpf 0.000

hmrR_OD2Conc ppf 6.0 6.0

hmrR_BlockAvg: Block_Average_on_Concentration_Data trange -2.0 20.0

Homer3 (v1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

Current Processing Element

simple_nirs_noStim.snirf

1 files loaded successfully
0 files failed to load

Processing Level

○ Group
○ Subj
● Run

☑ Apply to all

Plot Type Select

○ Raw Data
● OD
○ Conc

690
830

☐ HRF

1

☐ Aux

aux1

Motion Artifacts

☑ Show Excluded Manual
☐ Exclude Time
☐ Show Excluded Auto
☐ Show Excluded by Chan

Plot Window

Pan Left/Right

☐ Fix X-range

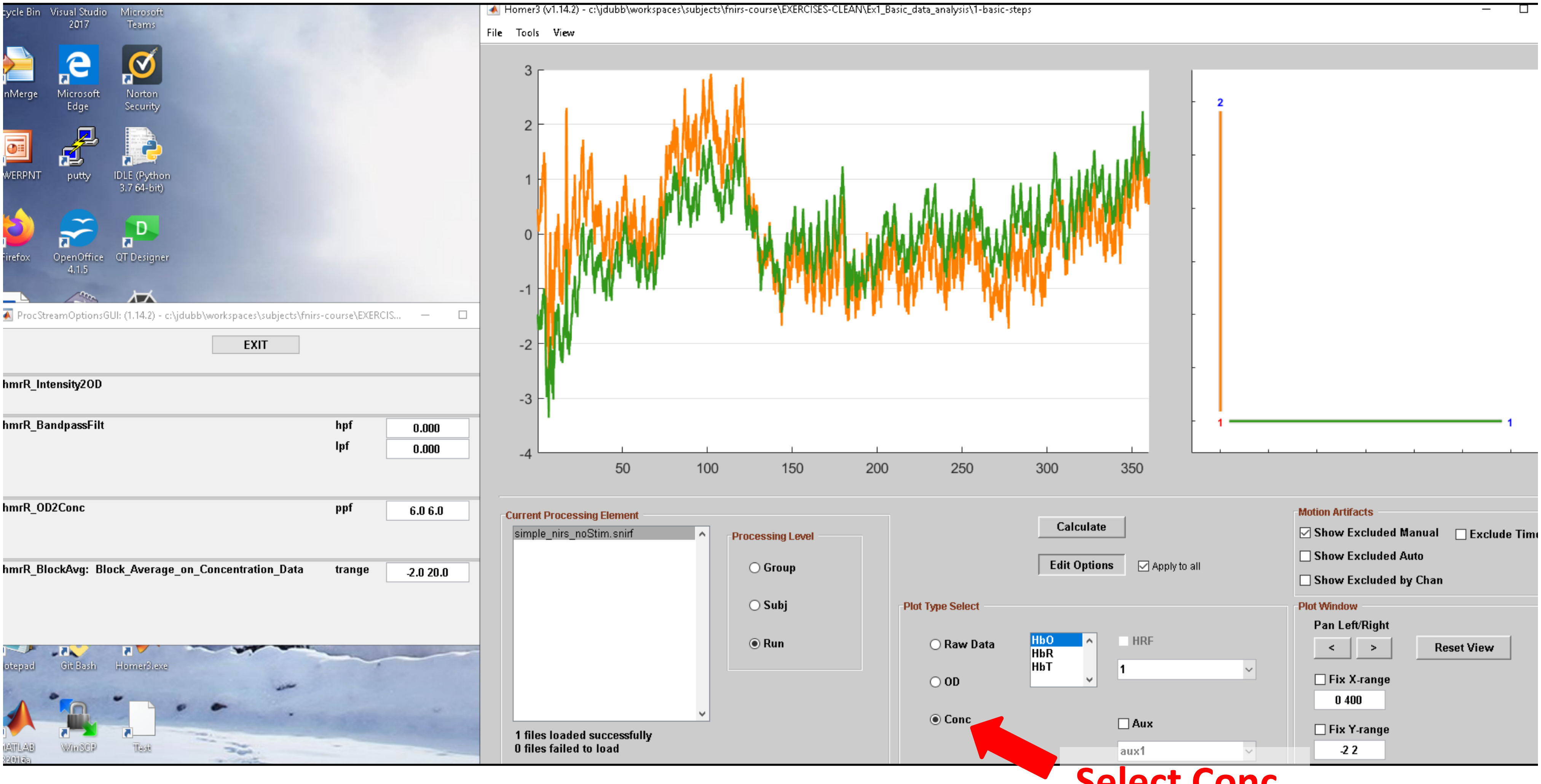
0 400

☐ Fix Y-range

-2 2

Select OD

ΔOD to Hb concentrations



Homer3 (v1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

ProcStreamOptionsGUI: (1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCIS...

hmrR_Intensity2OD

hmrR_BandpassFilt hpf 0.000 lpf 0.000

hmrR_OD2Conc ppf 6.0 6.0

hmrR_BlockAvg: Block_Average_on_Concentration_Data trange -2.0 20.0

simple_nirs_noStim.snirf

1 files loaded successfully
0 files failed to load

Processing Level
○ Group
○ Subj
● Run

☑ Apply to all

Plot Type Select
○ Raw Data
○ OD
● Conc

HbO
HbR
HbT

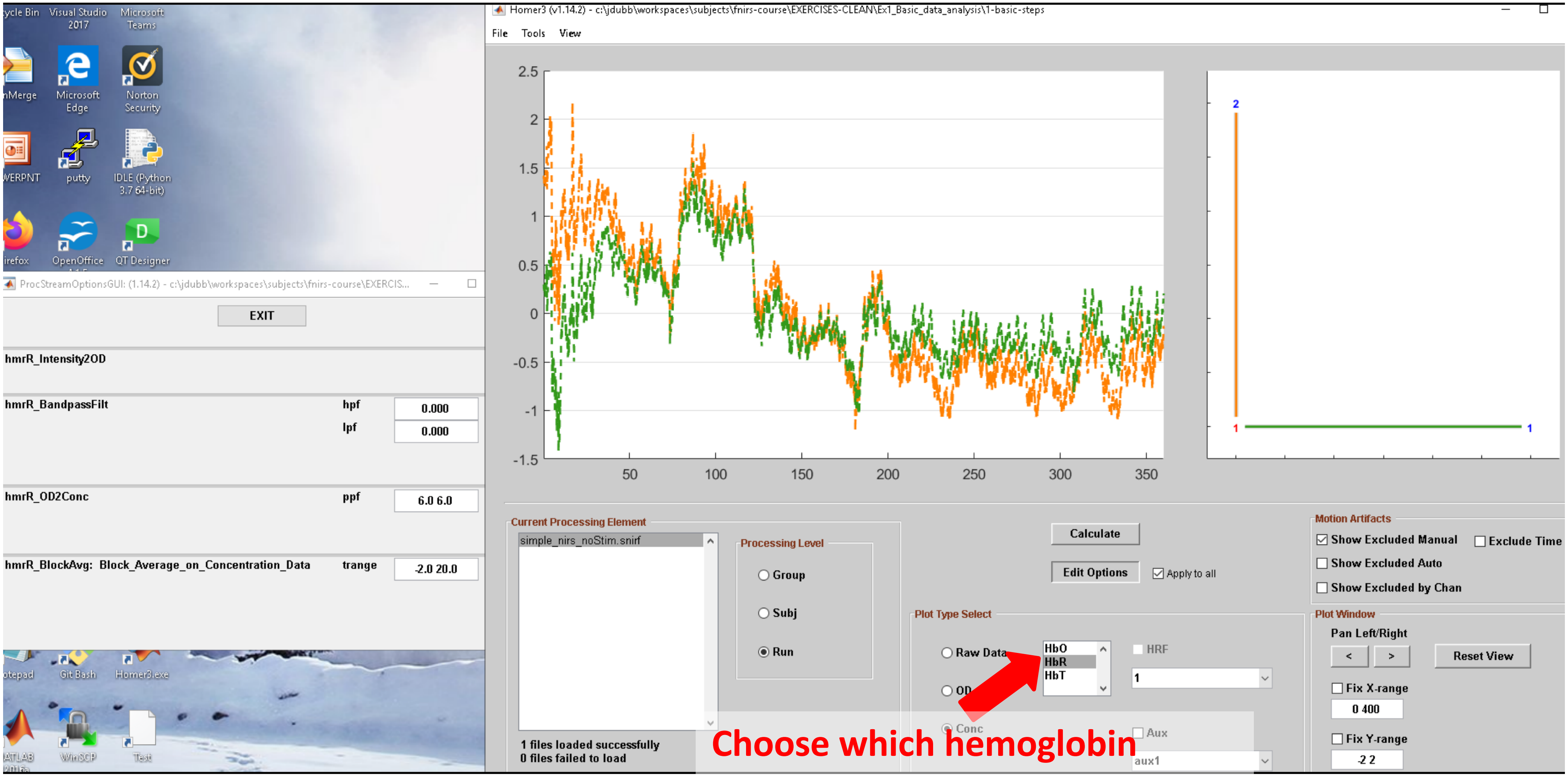
☐ HRF
1
☐ Aux
aux1

☑ Show Excluded Manual
☐ Exclude Time
☐ Show Excluded Auto
☐ Show Excluded by Chan

☐ Fix X-range 0 400
☐ Fix Y-range -2 2

Select Conc

ΔOD to Hb concentrations



hmrR_Intensity2OD

hmrR_BandpassFilt hpf 0.000
lpf 0.000

hmrR_OD2Conc ppf 6.0 6.0

hmrR_BlockAvg: Block_Average_on_Concentration_Data trange -2.0 20.0

simple_nirs_noStim.snirf

1 files loaded successfully
0 files failed to load

○ Group
○ Subj
● Run

☑ Apply to all

☑ Show Excluded Manual ☐ Exclude Time
☐ Show Excluded Auto
☐ Show Excluded by Chan

○ Raw Data
○ OD
● Conc

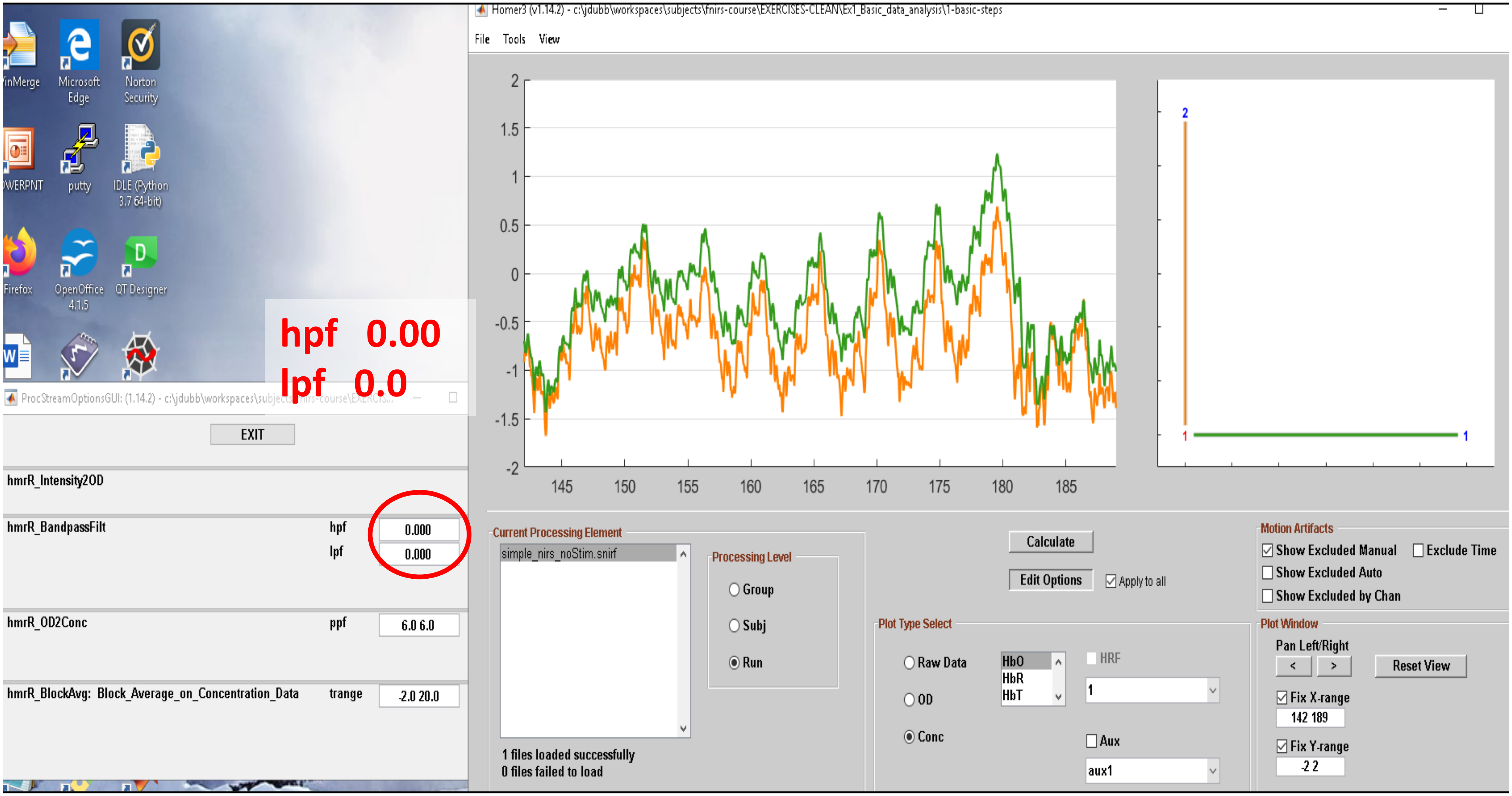
HbO
HbR
HbT

☐ HRF
1
☐ Aux
aux1

☐ Fix X-range
0 400
☐ Fix Y-range
-2 2

Choose which hemoglobin specie(s) to display

Band-pass filtering



hpf 0.00
lpf 0.0

Homer3 (v1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

ProcStreamOptionsGUI: (1.14.2) - c:\jdubb\workspaces\subject\fnirs-course\EXERCIS...

hmrR_Intensity2OD

hmrR_BandpassFilt hpf 0.000
lpf 0.000

hmrR_OD2Conc ppf 6.0 6.0

hmrR_BlockAvg: Block_Average_on_Concentration_Data trange -2.0 20.0

Current Processing Element
simple_nirs_noStim.snirf

1 files loaded successfully
0 files failed to load

Processing Level
○ Group
○ Subj
● Run

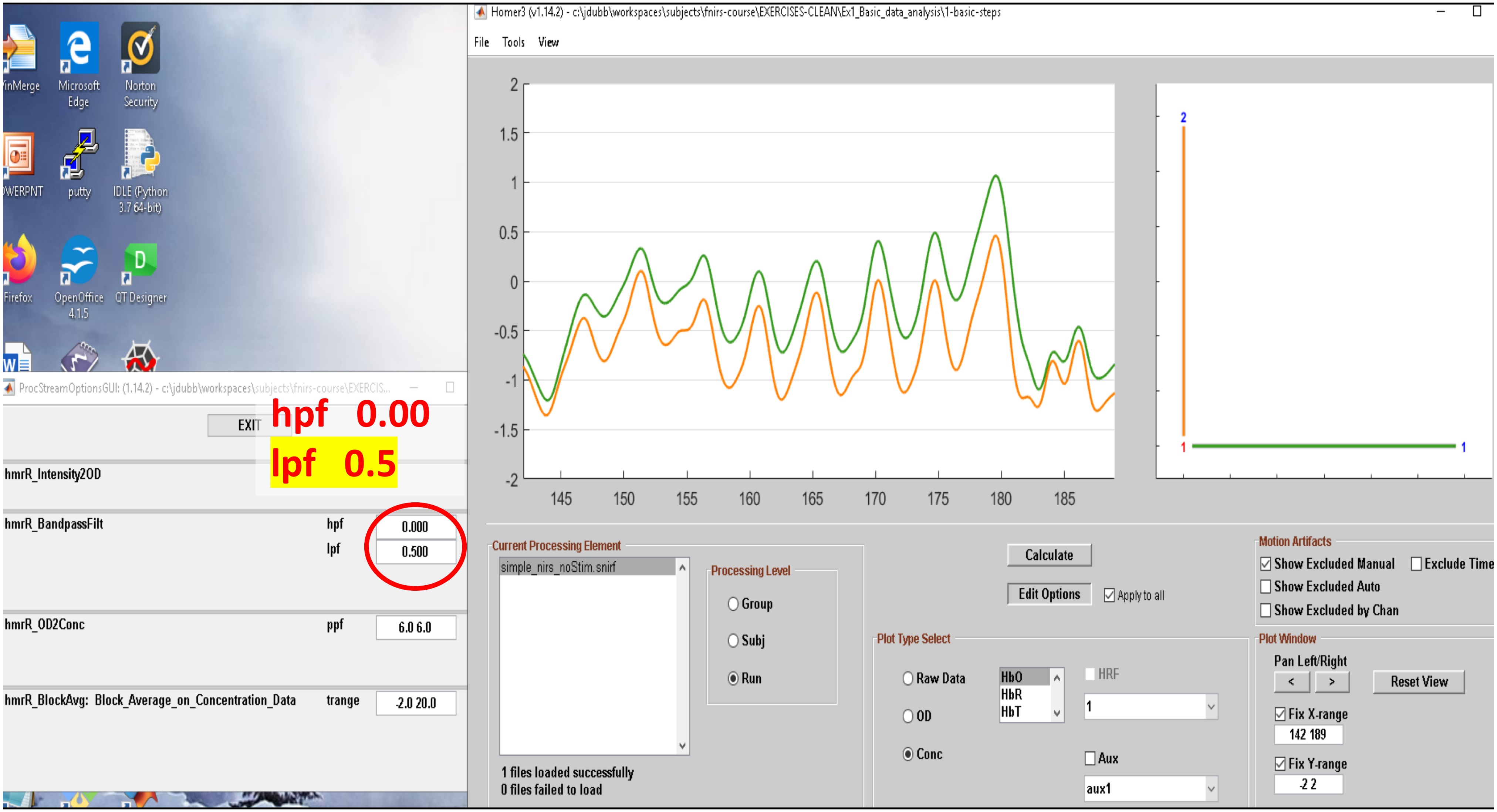
Plot Type Select
○ Raw Data
○ OD
● Conc
HbO
HbR
HbT
☐ HRF
1
☐ Aux
aux1

☑ Apply to all

Motion Artifacts
☑ Show Excluded Manual
☐ Exclude Time
☐ Show Excluded Auto
☐ Show Excluded by Chan

Plot Window
☑ Fix X-range 142 189
☑ Fix Y-range -2 2

Band-pass filtering



hpf 0.00

lpf 0.5

ProcStreamOptionsGUI: (1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCIS...

hmrR_Intensity2OD		
hmrR_BandpassFilt	hpf	0.000
	lpf	0.500
hmrR_OD2Conc	ppf	6.0 6.0
hmrR_BlockAvg: Block_Average_on_Concentration_Data	trange	-2.0 20.0

Homer3 (v1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

Current Processing Element: simple_nirs_noStim.snirf

1 files loaded successfully
0 files failed to load

Processing Level: ○ Group ○ Subj ● Run

Plot Type Select: ○ Raw Data ○ OD ● Conc

HbO, HbR, HbT

☐ HRF

1

☐ Aux

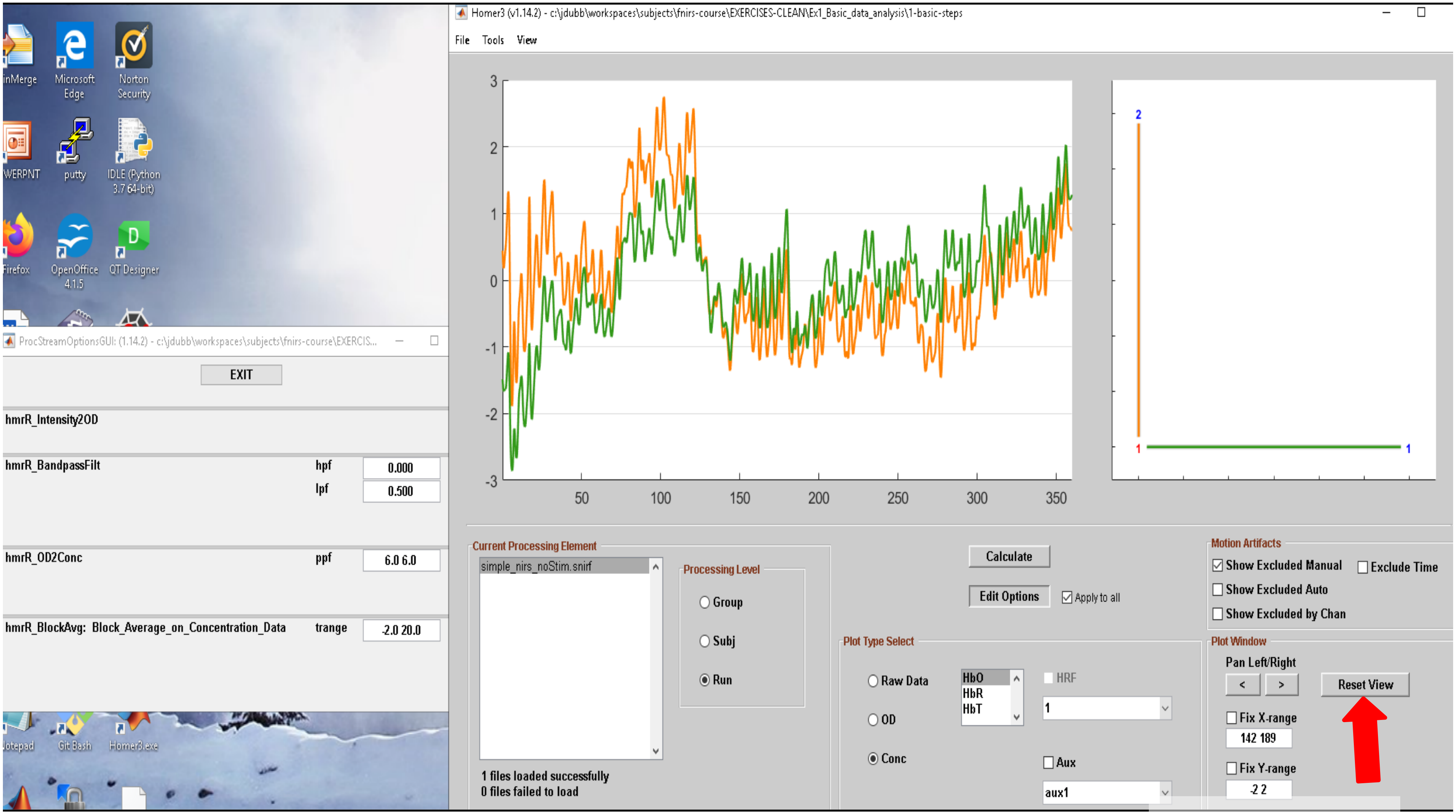
aux1

☑ Apply to all

Motion Artifacts: ☑ Show Excluded Manual ☐ Exclude Time ☐ Show Excluded Auto ☐ Show Excluded by Chan

Plot Window: ☑ Fix X-range 142 189 ☑ Fix Y-range -2 2

Band-pass filtering



Homer3 (v1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

ProcStreamOptionsGUI: (1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCIS...

hmrR_Intensity2OD

hmrR_BandpassFilt hpf 0.000

lpf 0.500

hmrR_OD2Conc ppf 6.0 6.0

hmrR_BlockAvg: Block_Average_on_Concentration_Data trange -2.0 20.0

Current Processing Element: simple_nirs_noStim.snirf

1 files loaded successfully
0 files failed to load

Processing Level: ○ Group ○ Subj ● Run

Plot Type Select: ○ Raw Data ○ OD ● Conc

☐ HRF

☐ Aux aux1

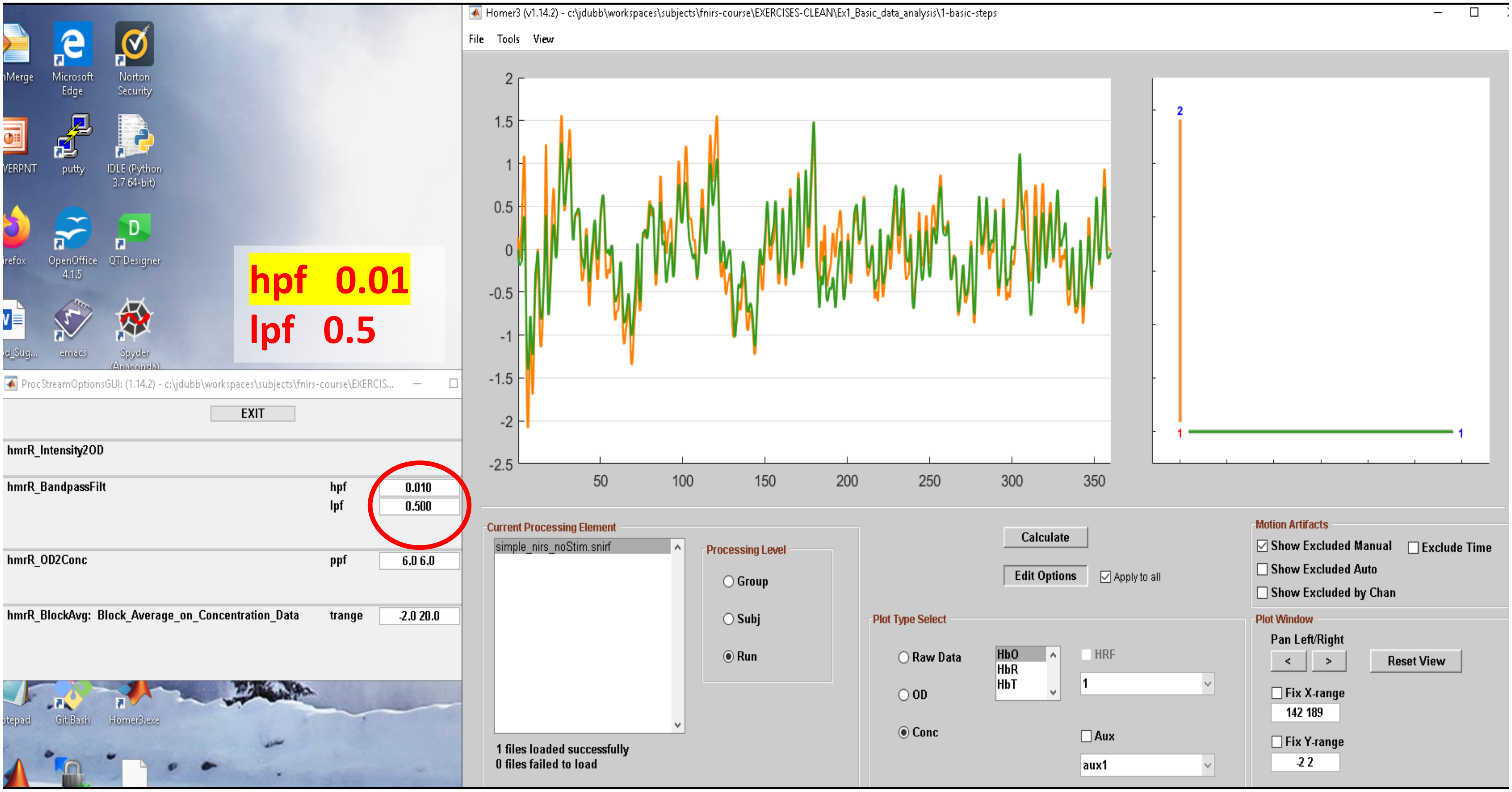
☑ Apply to all

Motion Artifacts: ☑ Show Excluded Manual ☐ Exclude Time ☐ Show Excluded Auto ☐ Show Excluded by Chan

Plot Window: ☐ Fix X-range 142 189 ☐ Fix Y-range -2 2

Reset data plot view

Band-pass filtering



hpf 0.01

lpf 0.5

ProcStreamOptionsGUI: (1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCIS...

hmrR_Intensity2OD

hmrR_BandpassFilt hpf 0.010 lpf 0.500

hmrR_OD2Conc ppf 6.0 6.0

hmrR_BlockAvg: Block_Average_on_Concentration_Data trange -2.0 20.0

Homer3 (v1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

Current Processing Element: simple_nirs_noStim.snirf

1 files loaded successfully
0 files failed to load

Processing Level: ○ Group ○ Subj ● Run

Plot Type Select: ○ Raw Data ○ OD ● Conc — HbO

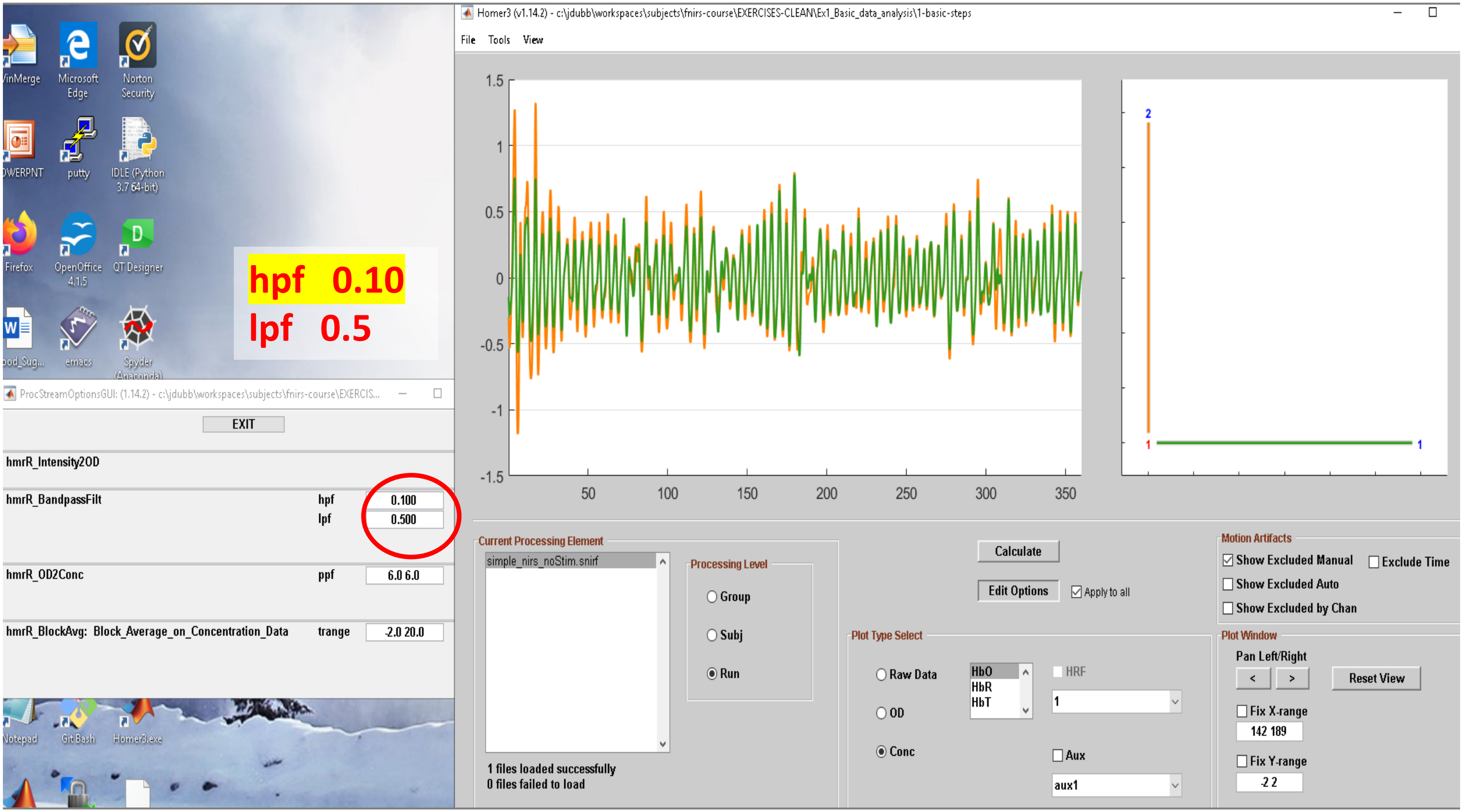
☐ Aux aux1

Motion Artifacts: ☑ Show Excluded Manual ☐ Exclude Time ☐ Show Excluded Auto ☐ Show Excluded by Chan

☑ Apply to all

Plot Window: ☐ Fix X-range 142 189 ☐ Fix Y-range -2 2

Band-pass filtering



hpf 0.10

lpf 0.5

Homer3 (v1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

ProcStreamOptionsGUI: (1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCIS...

hmrR_Intensity2OD

hmrR_BandpassFilt	hpf	0.100
	lpf	0.500
hmrR_OD2Conc	ppf	6.0 6.0
hmrR_BlockAvg: Block_Average_on_Concentration_Data	trange	-2.0 20.0

Current Processing Element

simple_nirs_noStim.snirf

1 files loaded successfully
0 files failed to load

Processing Level

○ Group
○ Subj
● Run

☑ Apply to all

Plot Type Select

○ Raw Data
○ OD
● Conc

HbO
HbR
HbT

☐ HRF

1

☐ Aux

aux1

Motion Artifacts

☑ Show Excluded Manual
☐ Exclude Time
☐ Show Excluded Auto
☐ Show Excluded by Chan

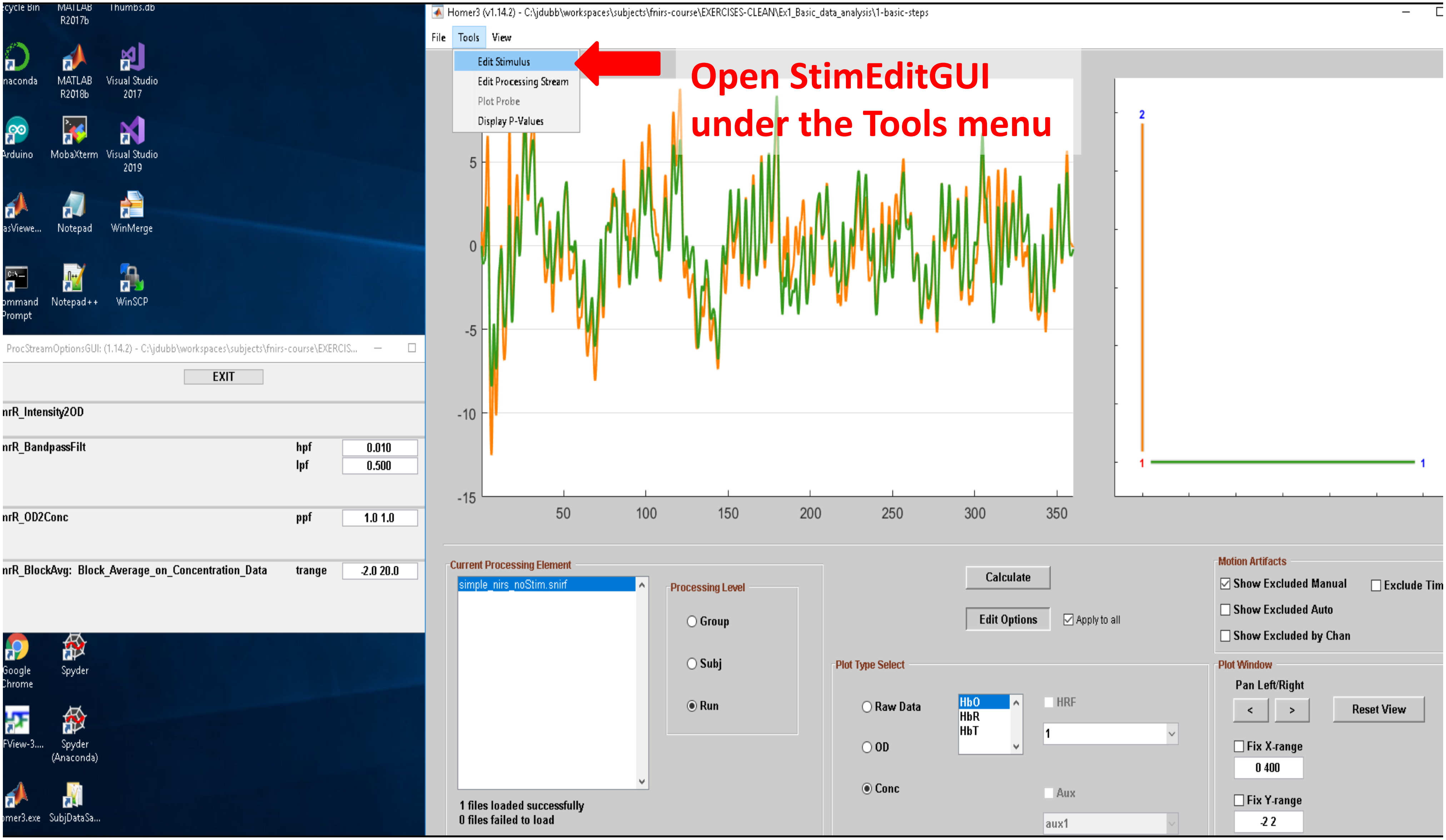
Plot Window

Pan Left/Right

☐ Fix X-range
142 189

☐ Fix Y-range
-2 2

This dataset doesn't have stimulus onsets, so we will enter them manually



Open StimEditGUI under the Tools menu

Homer3 (v1.14.2) - C:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

ProcStreamOptionsGUI: (1.14.2) - C:\jdubb\workspaces\subjects\fnirs-course\EXERCIS...

nrR_Intensity2OD

nrR_BandpassFilt hpf 0.010 lpf 0.500

nrR_OD2Conc ppf 1.0 1.0

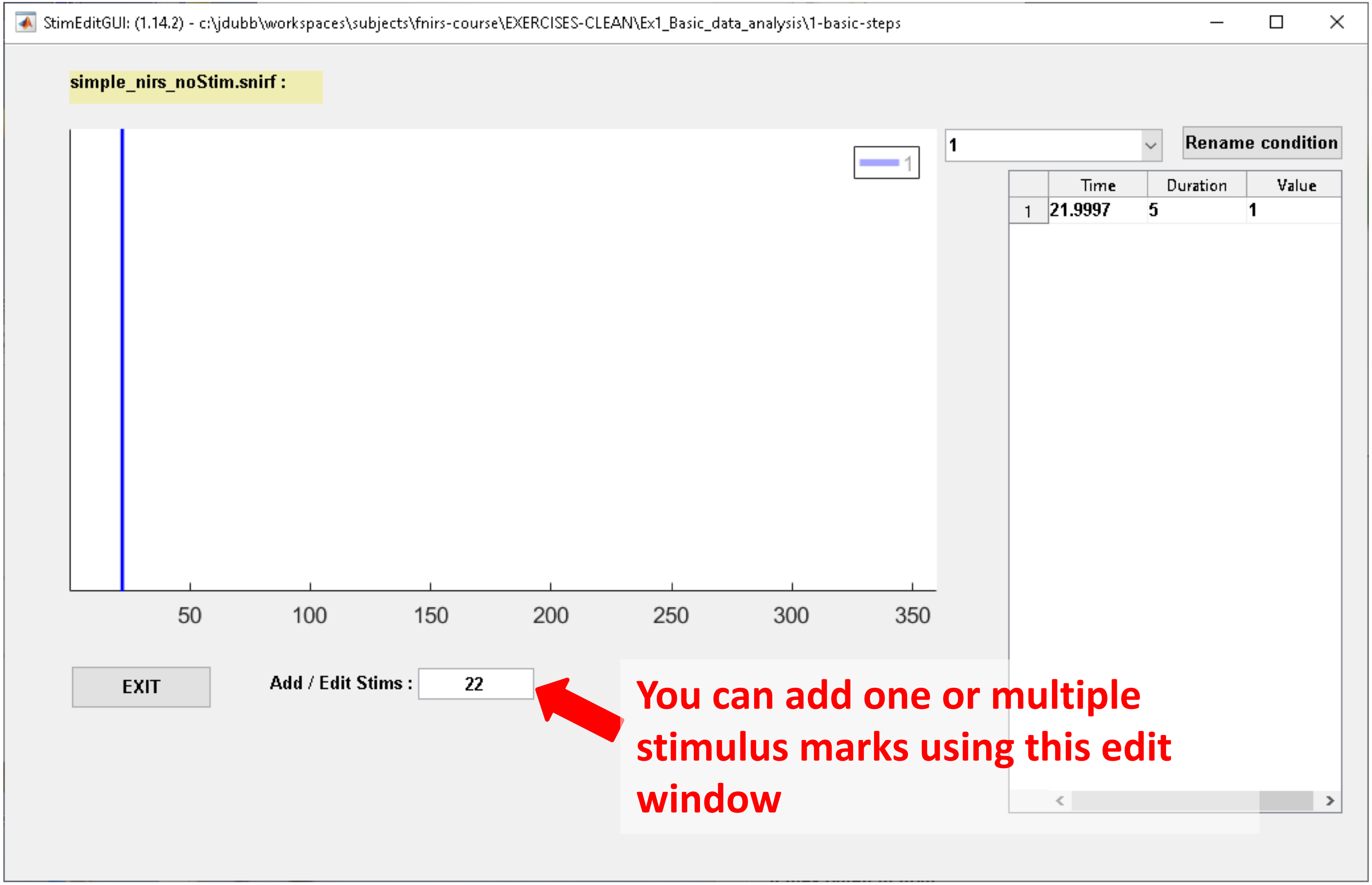
nrR_BlockAvg: Block_Average_on_Concentration_Data trange -2.0 20.0

Current Processing Element: simple_nirs_noStim.snirf

1 files loaded successfully
0 files failed to load

StimEditGUI

NOTE: Any edits to stims you make in StimEditGUI will automatically update the data plot window in MainGUI



StimEditGUI: (1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

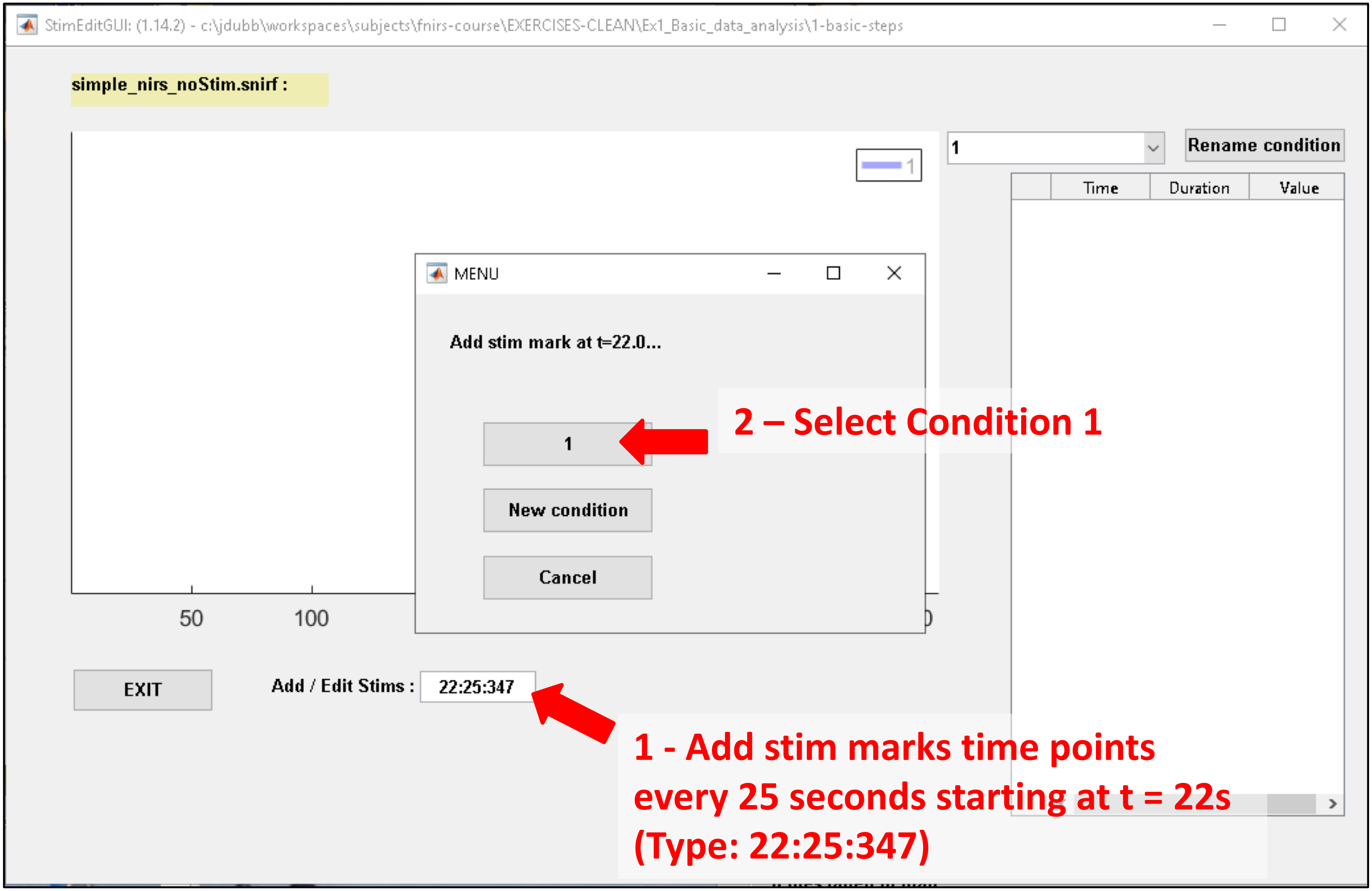
simple_nirs_noStim.snirf :

	Time	Duration	Value
1	21.9997	5	1

Add / Edit Stims : 22

You can add one or multiple stimulus marks using this edit window

StimEditGUI

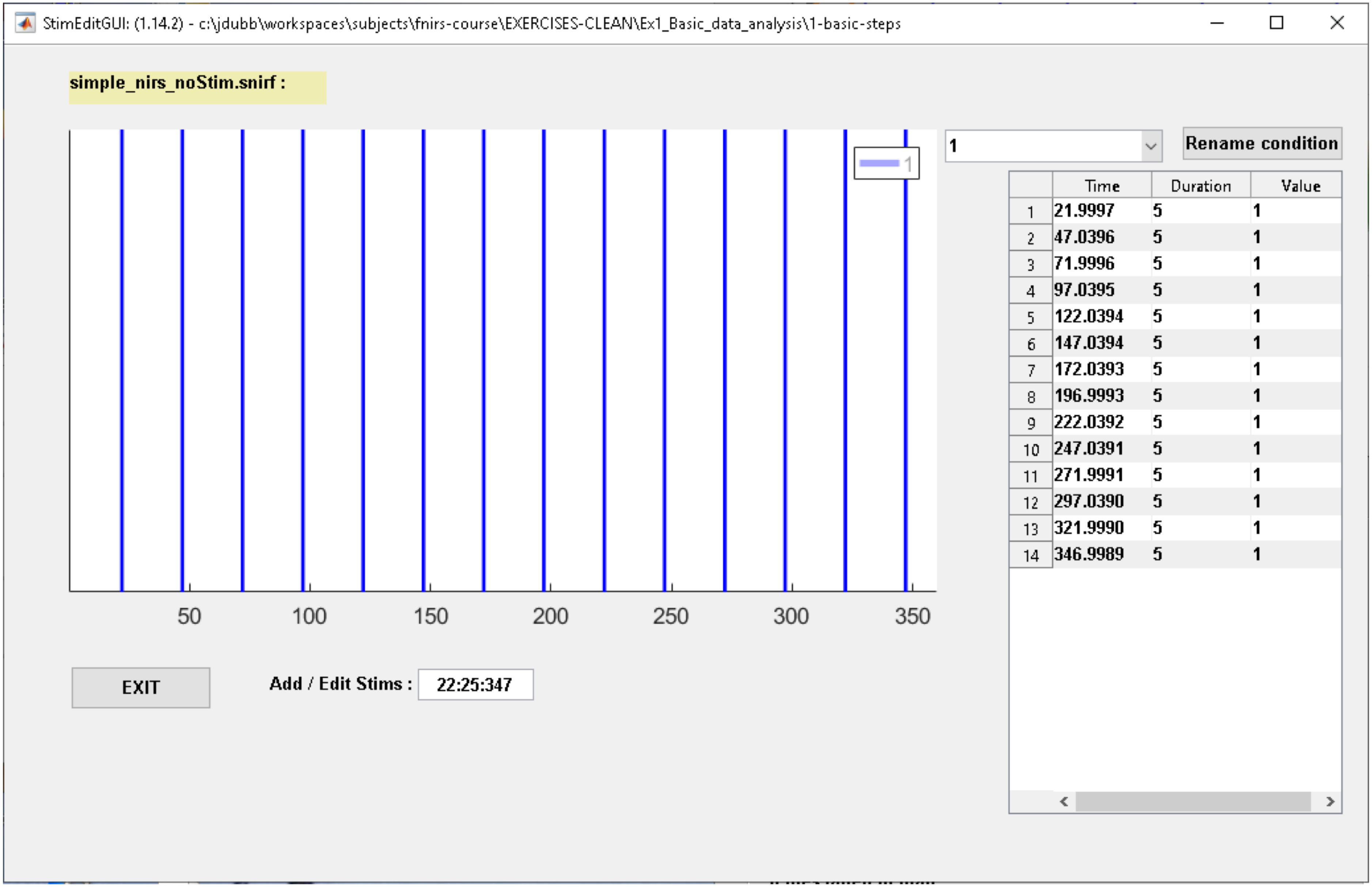


Add / Edit Stims : 22:25:347

2 – Select Condition 1

1 - Add stim marks time points every 25 seconds starting at t = 22s (Type: 22:25:347)

StimEditGUI



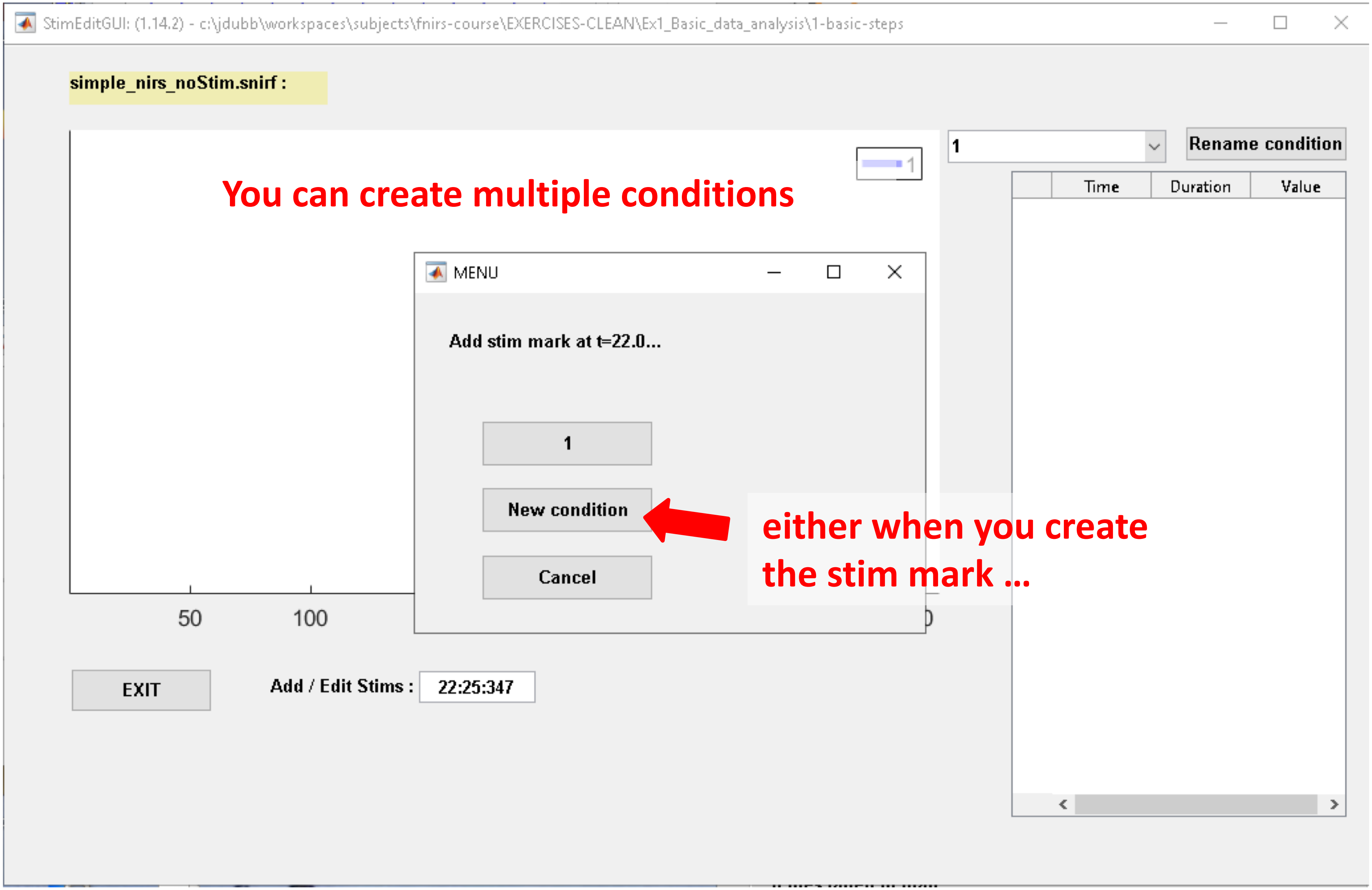
StimEditGUI: (1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

simple_nirs_noStim.snirf :

	Time	Duration	Value
1	21.9997	5	1
2	47.0396	5	1
3	71.9996	5	1
4	97.0395	5	1
5	122.0394	5	1
6	147.0394	5	1
7	172.0393	5	1
8	196.9993	5	1
9	222.0392	5	1
10	247.0391	5	1
11	271.9991	5	1
12	297.0390	5	1
13	321.9990	5	1
14	346.9989	5	1

Add / Edit Stims : 22:25:347

StimEditGUI: Multiple conditions



StimEditGUI: (1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

simple_nirs_noStim.snirf :

MENU

Add stim mark at t=22.0...

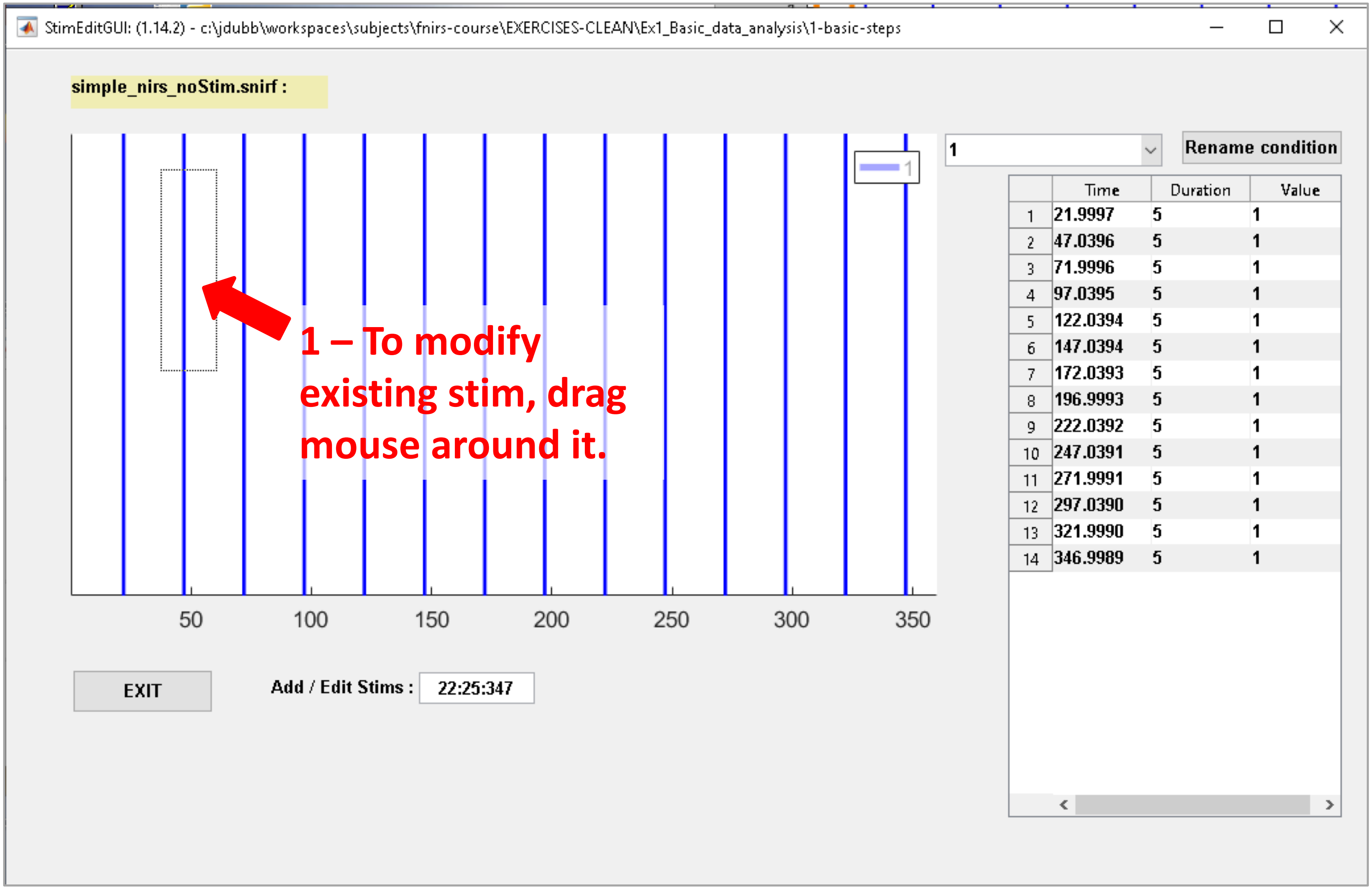
Add / Edit Stims : 22:25:347

You can create multiple conditions

either when you create the stim mark …

StimEditGUI: Multiple conditions

… or by modifying existing stim marks

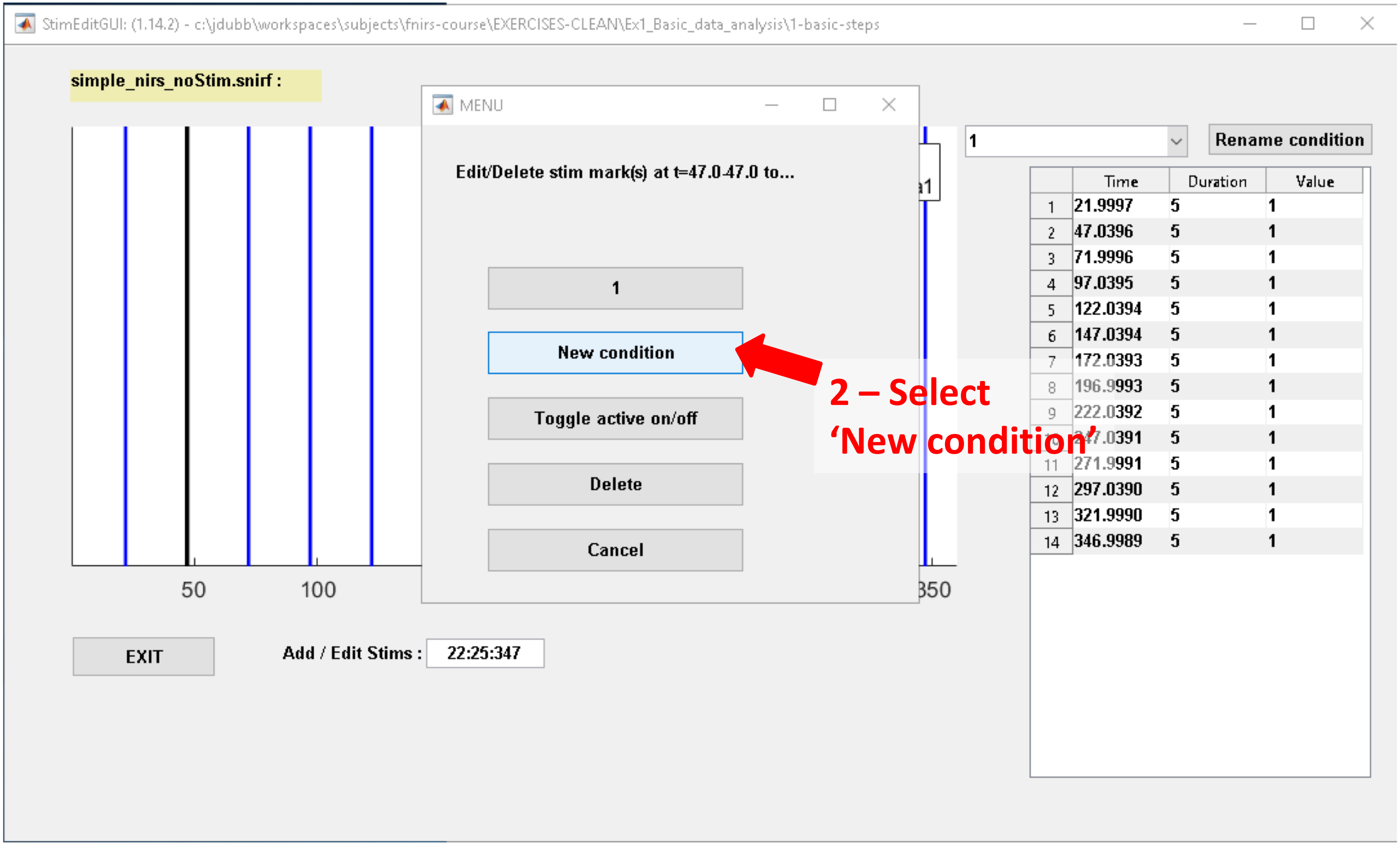


1 – To modify existing stim, drag mouse around it.

Add / Edit Stims : 22:25:347

	Time	Duration	Value
1	21.9997	5	1
2	47.0396	5	1
3	71.9996	5	1
4	97.0395	5	1
5	122.0394	5	1
6	147.0394	5	1
7	172.0393	5	1
8	196.9993	5	1
9	222.0392	5	1
10	247.0391	5	1
11	271.9991	5	1
12	297.0390	5	1
13	321.9990	5	1
14	346.9989	5	1

StimEditGUI: Multiple conditions



StimEditGUI: (1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

simple_nirs_noStim.snirf :

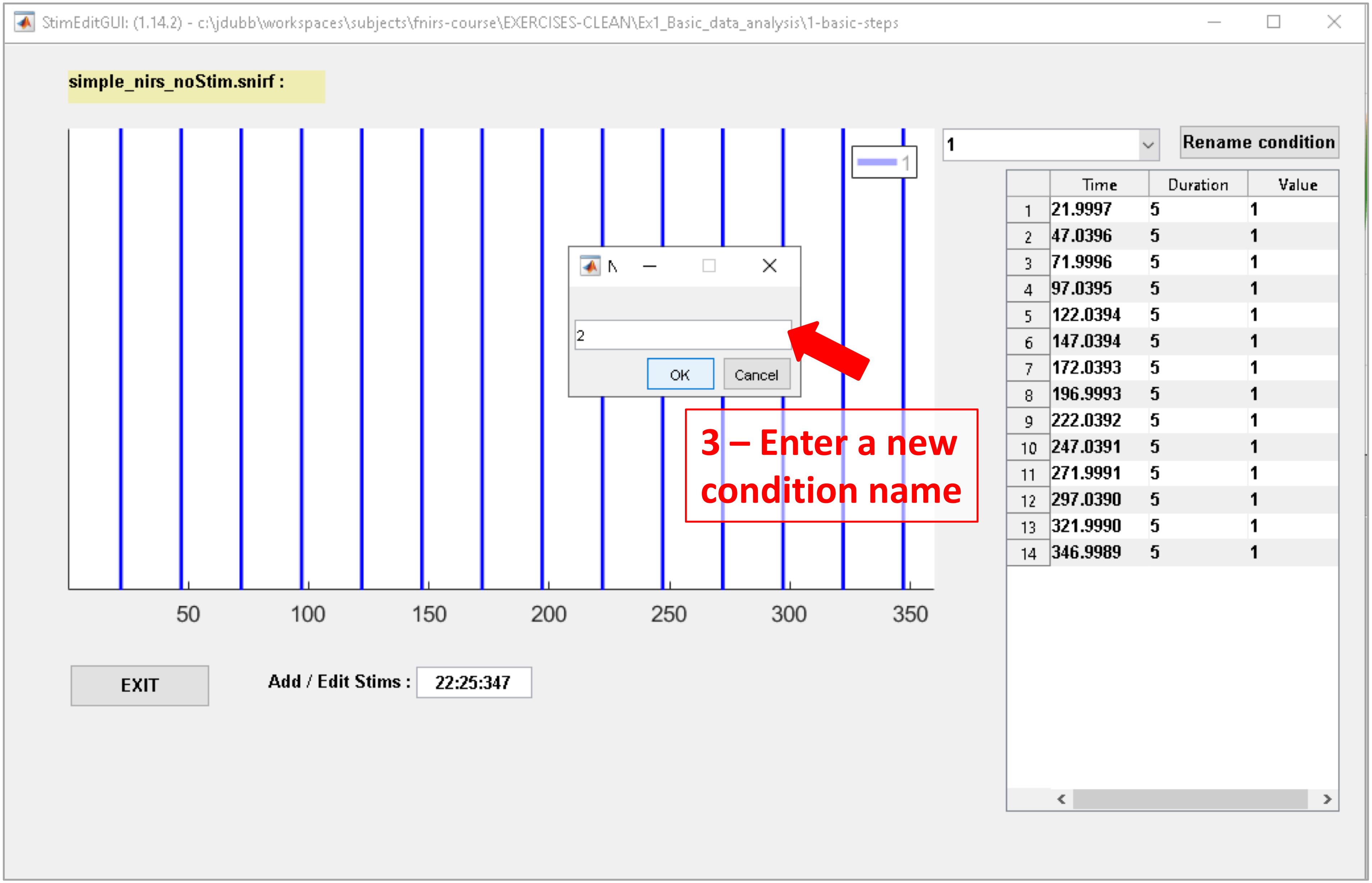
Edit/Delete stim mark(s) at t=47.0-47.0 to...

Add / Edit Stims : 22:25:347

	Time	Duration	Value
1	21.9997	5	1
2	47.0396	5	1
3	71.9996	5	1
4	97.0395	5	1
5	122.0394	5	1
6	147.0394	5	1
7	172.0393	5	1
8	196.9993	5	1
9	222.0392	5	1
10	247.0391	5	1
11	271.9991	5	1
12	297.0390	5	1
13	321.9990	5	1
14	346.9989	5	1

2 – Select ‘New condition’

StimEditGUI: Multiple conditions



StimEditGUI: (1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

simple_nirs_noStim.snirf :

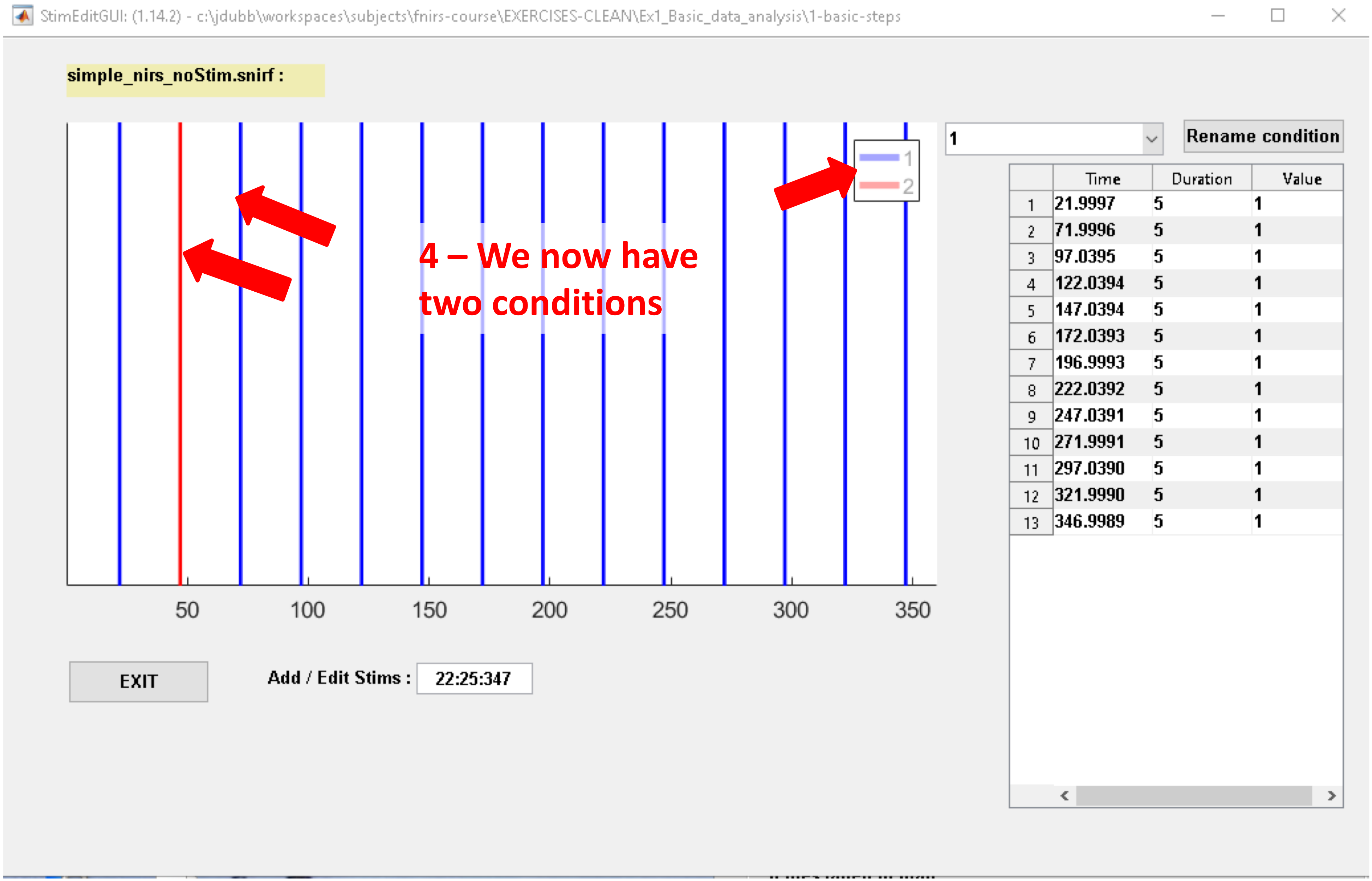
	Time	Duration	Value
1	21.9997	5	1
2	47.0396	5	1
3	71.9996	5	1
4	97.0395	5	1
5	122.0394	5	1
6	147.0394	5	1
7	172.0393	5	1
8	196.9993	5	1
9	222.0392	5	1
10	247.0391	5	1
11	271.9991	5	1
12	297.0390	5	1
13	321.9990	5	1
14	346.9989	5	1

Add / Edit Stims : 22:25:347

2

3 – Enter a new condition name

StimEditGUI: Multiple conditions


StimEditGUI: (1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

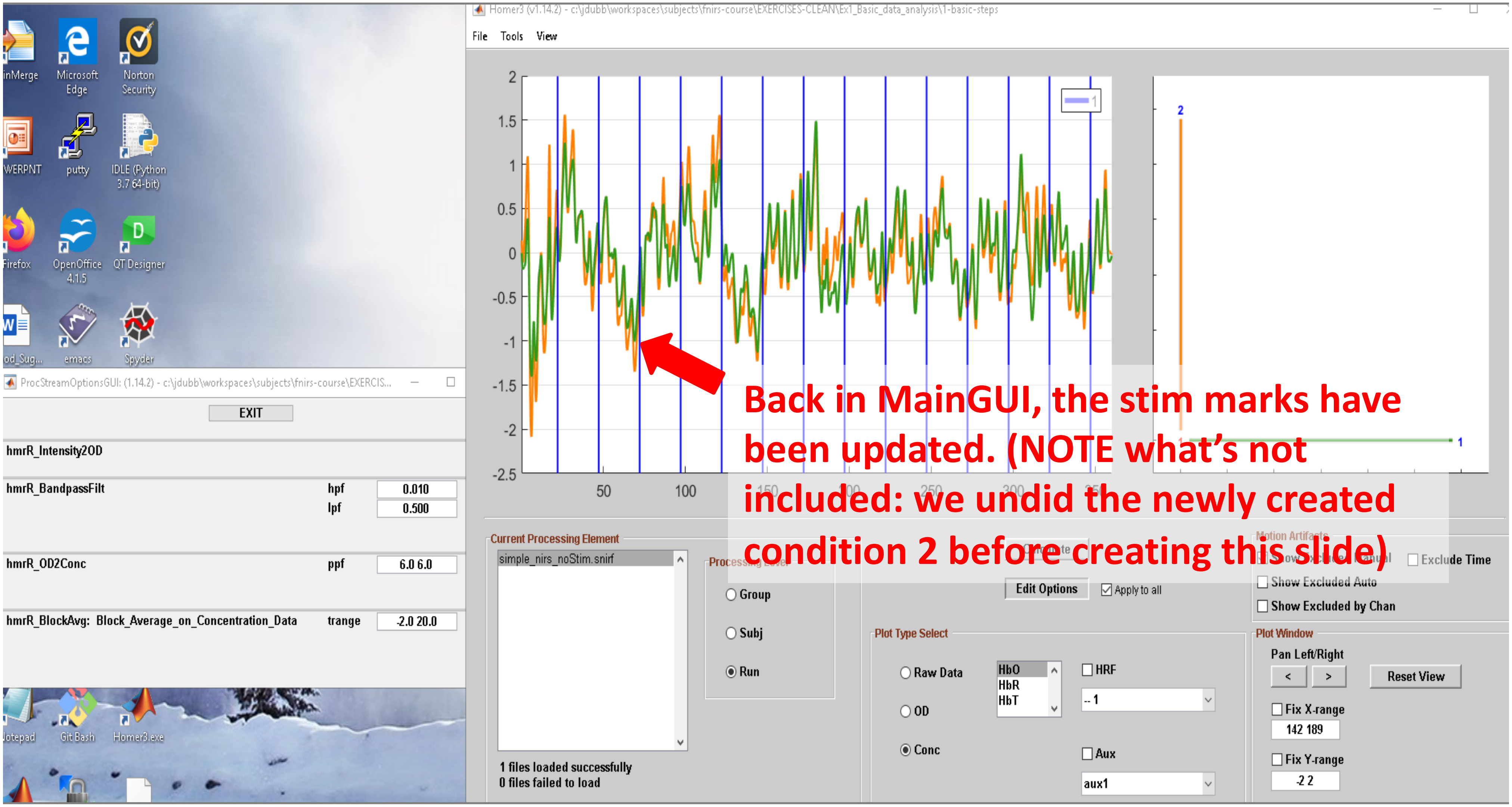
simple_nirs_noStim.snirf :

4 – We now have two conditions

	Time	Duration	Value
1	21.9997	5	1
2	71.9996	5	1
3	97.0395	5	1
4	122.0394	5	1
5	147.0394	5	1
6	172.0393	5	1
7	196.9993	5	1
8	222.0392	5	1
9	247.0391	5	1
10	271.9991	5	1
11	297.0390	5	1
12	321.9990	5	1
13	346.9989	5	1

Add / Edit Stims : 22:25:347

Stimulus onsets



Homer3 (v1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

ProcStreamOptionsGUI: (1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCIS...

hmrR_Intensity2OD

hmrR_BandpassFilt hpf 0.010
lpf 0.500

hmrR_OD2Conc ppf 6.0 6.0

hmrR_BlockAvg: Block_Average_on_Concentration_Data trange -2.0 20.0

simple_nirs_noStim.snirf

1 files loaded successfully
0 files failed to load

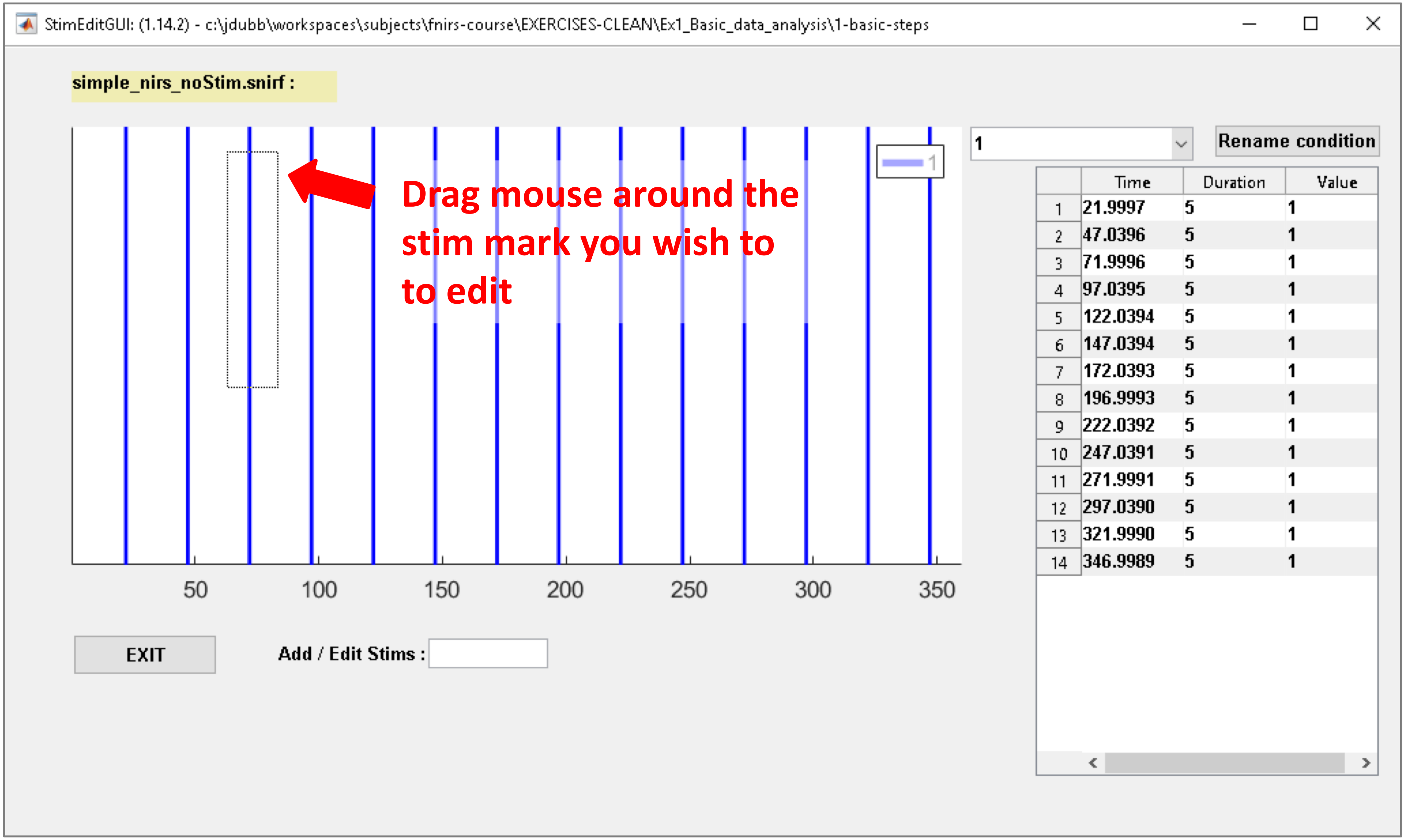
☐ Fix X-range 142 189

☐ Fix Y-range -2 2

Back in MainGUI, the stim marks have been updated. (NOTE what’s not included: we undid the newly created condition 2 before creating this slide)

Stimulus onsets: rejecting stim marks

To reject stim go back to StimEditGUI



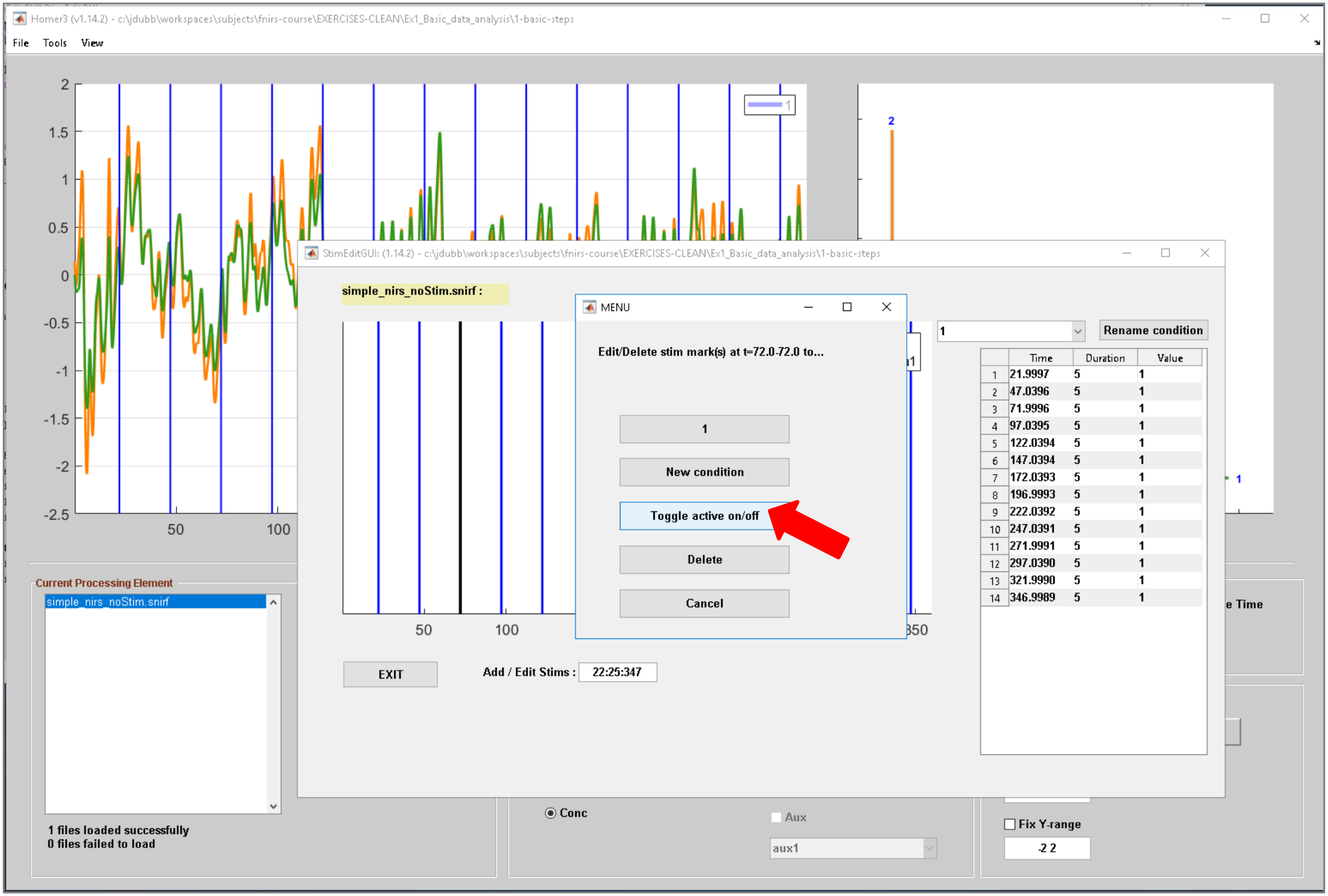
StimEditGUI: (1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

simple_nirs_noStim.snirf :

Drag mouse around the stim mark you wish to to edit

	Time	Duration	Value
1	21.9997	5	1
2	47.0396	5	1
3	71.9996	5	1
4	97.0395	5	1
5	122.0394	5	1
6	147.0394	5	1
7	172.0393	5	1
8	196.9993	5	1
9	222.0392	5	1
10	247.0391	5	1
11	271.9991	5	1
12	297.0390	5	1
13	321.9990	5	1
14	346.9989	5	1

Stimulus onsets: rejecting stim marks



Homer3 (v1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

StimEditGUI: (1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

simple_nirs_noStim.snirf :

Edit/Delete stim mark(s) at t=72.0-72.0 to...

Add / Edit Stims : 22:25:347

Condition: 1

	Time	Duration	Value
1	21.9997	5	1
2	47.0396	5	1
3	71.9996	5	1
4	97.0395	5	1
5	122.0394	5	1
6	147.0394	5	1
7	172.0393	5	1
8	196.9993	5	1
9	222.0392	5	1
10	247.0391	5	1
11	271.9991	5	1
12	297.0390	5	1
13	321.9990	5	1
14	346.9989	5	1

simple_nirs_noStim.snirf

1 files loaded successfully
0 files failed to load

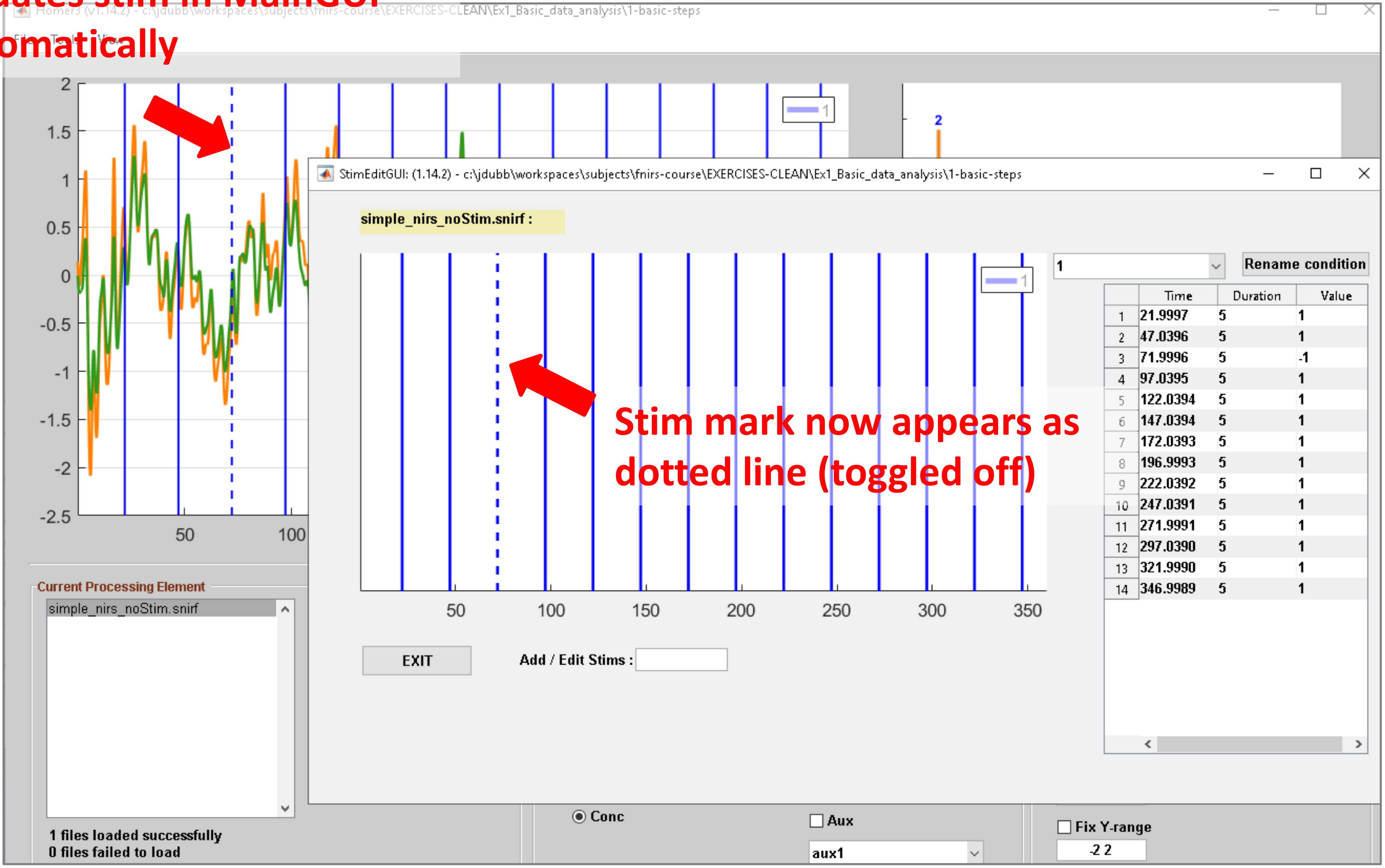
● Conc

☐ Aux: aux1

☐ Fix Y-range: -2 2

Stimulus onsets: rejecting stim marks

Updates stim in MainGUI automatically



simple_nirs_noStim.snirf :

	Time	Duration	Value
1	21.9997	5	1
2	47.0396	5	1
3	71.9996	5	-1
4	97.0395	5	1
5	122.0394	5	1
6	147.0394	5	1
7	172.0393	5	1
8	196.9993	5	1
9	222.0392	5	1
10	247.0391	5	1
11	271.9991	5	1
12	297.0390	5	1
13	321.9990	5	1
14	346.9989	5	1

Add / Edit Stims :

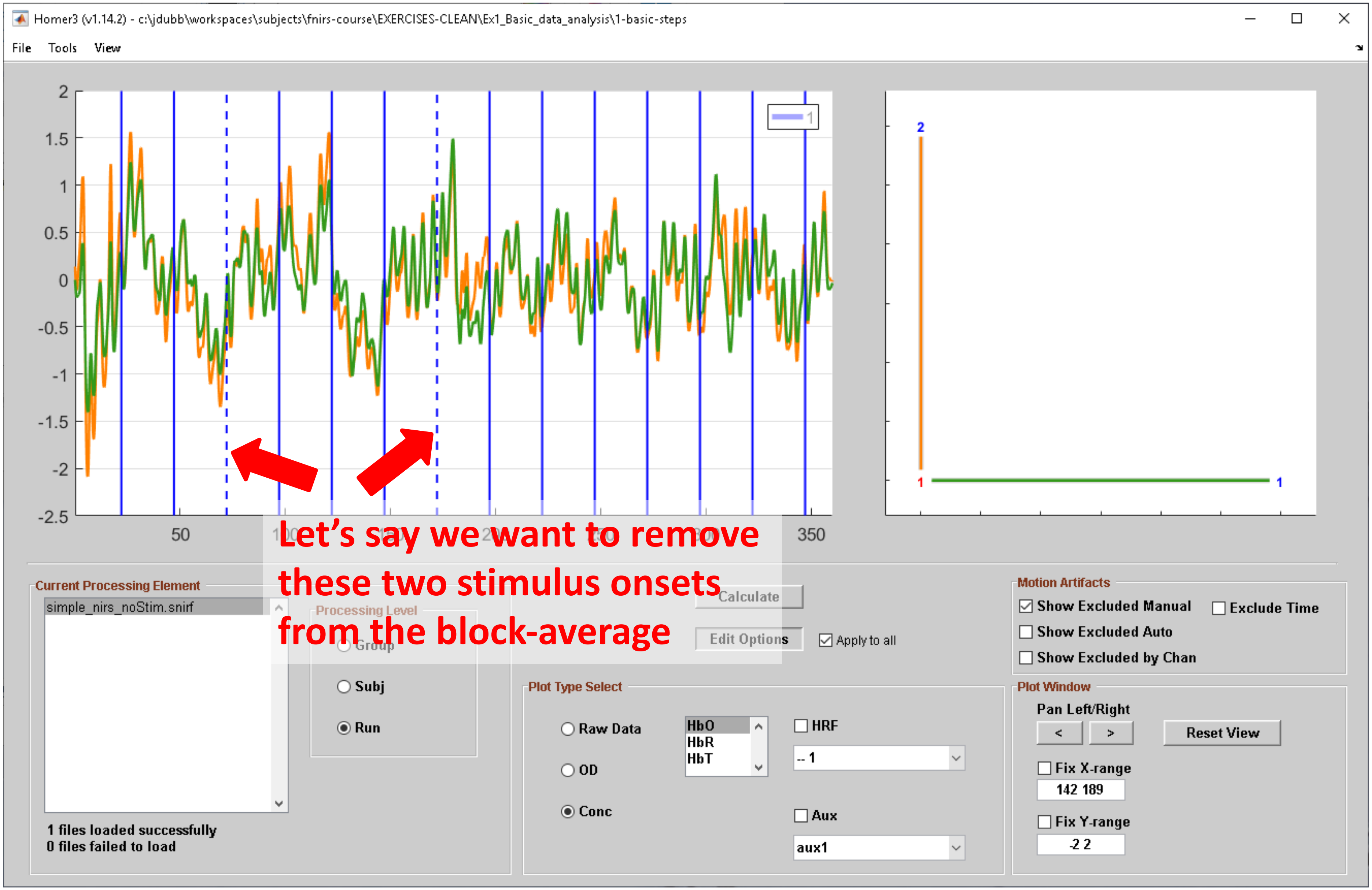
Current Processing Element

simple_nirs_noStim.snirf

1 files loaded successfully
0 files failed to load

Stim mark now appears as dotted line (toggled off)

Stimulus onsets: rejecting stim marks



Homer3 (v1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

Current Processing Element

simple_nirs_noStim.snirf

1 files loaded successfully
0 files failed to load

Processing Level

○ Group
○ Subj
● Run

☑ Apply to all

Plot Type Select

○ Raw Data
○ OD
● Conc

HbO
HbR
HbT

☐ HRF
-- 1

☐ Aux
aux1

Motion Artifacts

☑ Show Excluded Manual
☐ Exclude Time
☐ Show Excluded Auto
☐ Show Excluded by Chan

Plot Window

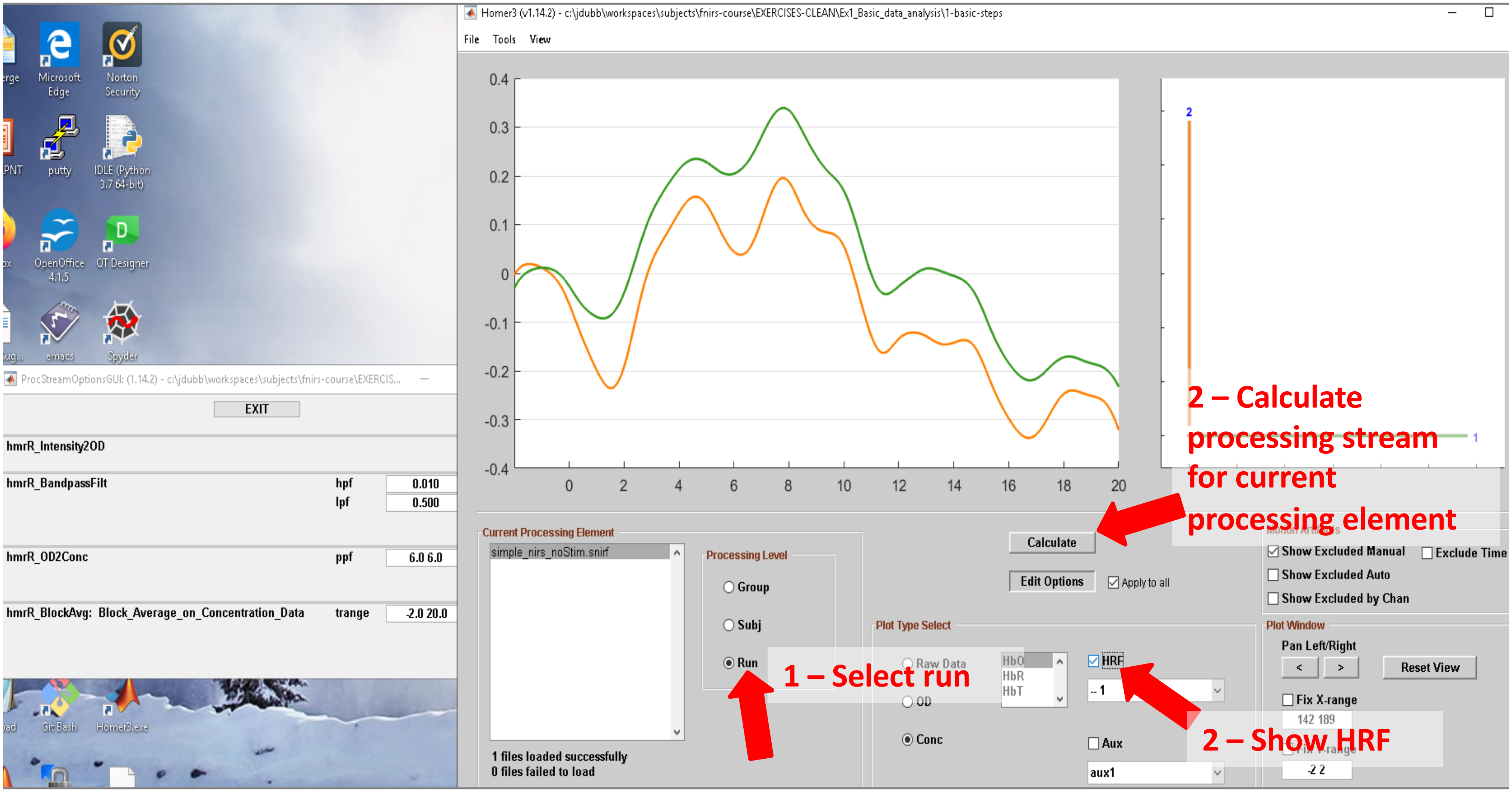
Pan Left/Right

☐ Fix X-range
142 189

☐ Fix Y-range
-2 2

Let's say we want to remove these two stimulus onsets from the block-average

Calculating and displaying the HRF



Homer3 (v1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

ProcStreamOptionsGUI: (1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCIS...

hmrR_Intensity2OD

hmrR_BandpassFilt hpf 0.010 lpf 0.500

hmrR_OD2Conc ppf 6.0 6.0

hmrR_BlockAvg: Block_Average_on_Concentration_Data trange -2.0 20.0

Current Processing Element: simple_nirs_noStim.snirf

1 files loaded successfully
0 files failed to load

Processing Level: ○ Group ○ Subj ● Run

Plot Type Select: ○ Raw Data ○ OD ● Conc ☑ HRF -- 1 ☐ Aux aux1

☑ Apply to all

☑ Show Excluded Manual ☐ Exclude Time ☐ Show Excluded Auto ☐ Show Excluded by Chan

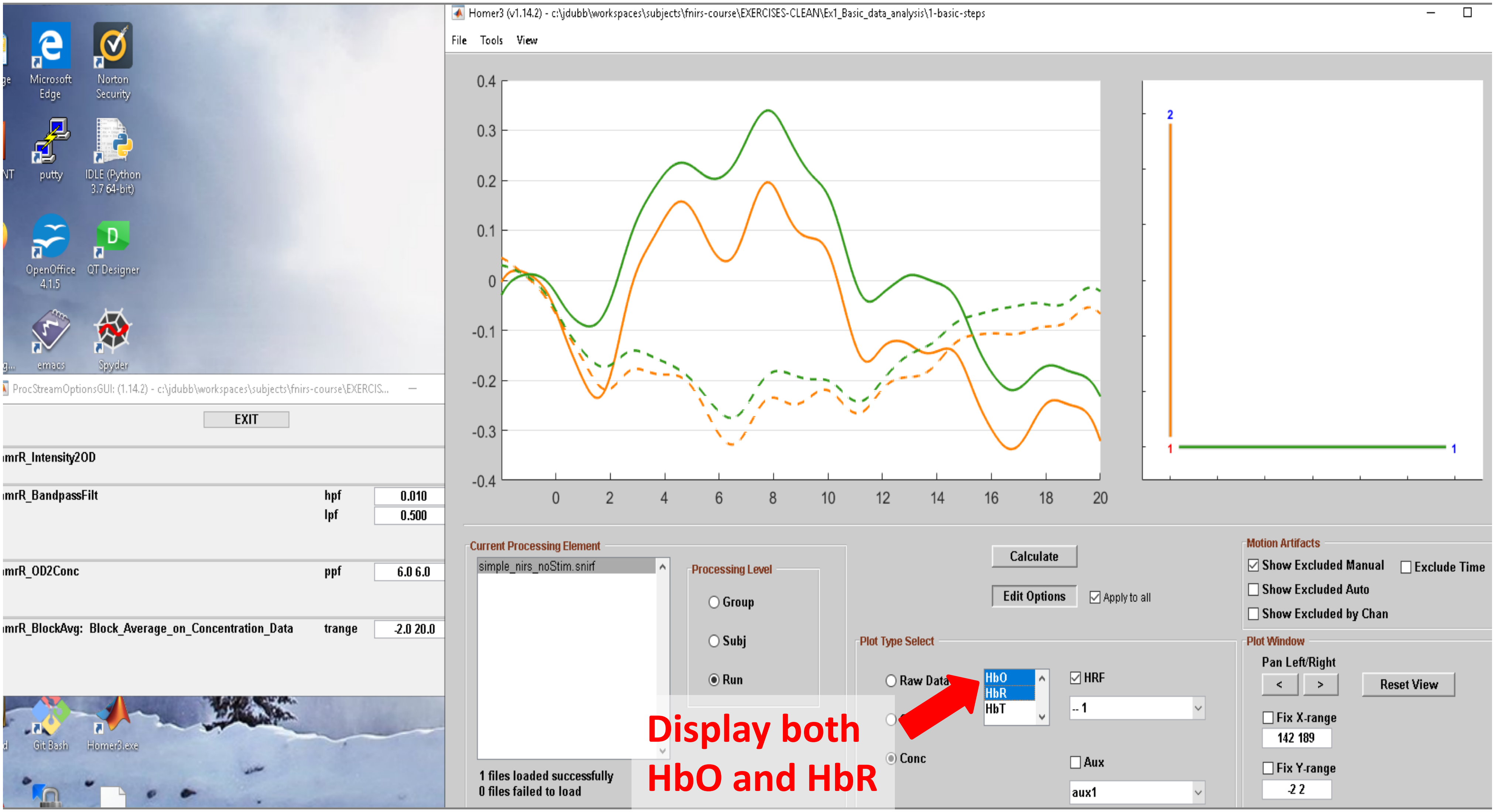
☐ Fix X-range 142 189 ☐ Fix Y-range -2 2

1 – Select run

2 – Calculate processing stream for current processing element

2 – Show HRF

Displaying the HRF



Homer3 (v1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

ProcStreamOptionsGUI: (1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCIS...

mrR_Intensity2OD

mrR_BandpassFilt hpf 0.010

lpf 0.500

mrR_OD2Conc ppf 6.0 6.0

mrR_BlockAvg: Block_Average_on_Concentration_Data trange -2.0 20.0

Current Processing Element: simple_nirs_noStim.snirf

1 files loaded successfully

0 files failed to load

Processing Level: ○ Group ○ Subj ● Run

☑ Apply to all

Plot Type Select: ○ Raw Data ○ Conc — HbO, HbR selected; ☑ HRF; -- 1; ☐ Aux; aux1

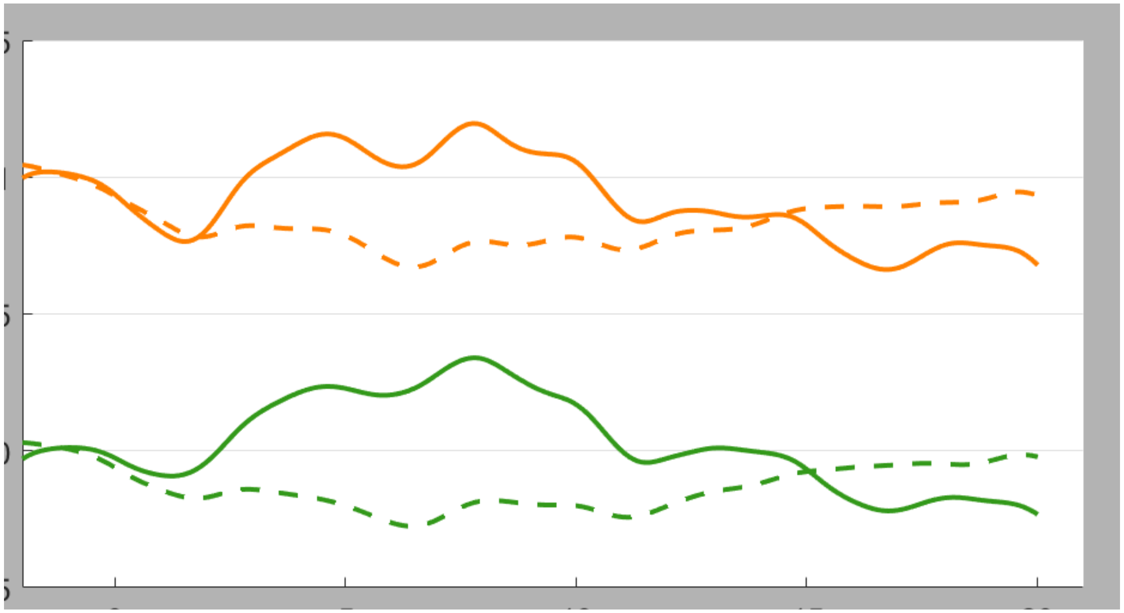
Motion Artifacts: ☑ Show Excluded Manual ☐ Exclude Time ☐ Show Excluded Auto ☐ Show Excluded by Chan

Plot Window: ☐ Fix X-range 142 189 ☐ Fix Y-range -2 2

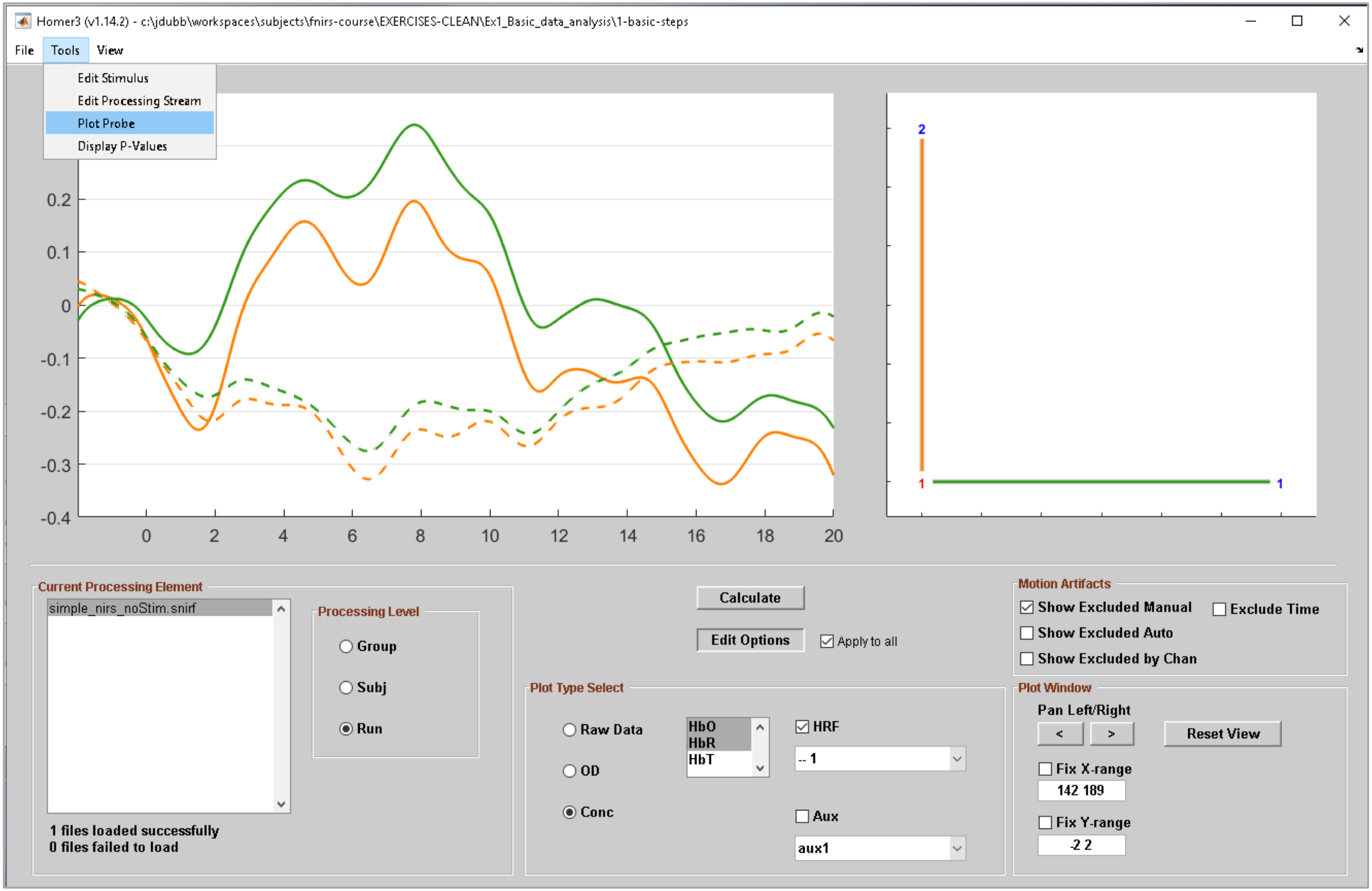
Display both HbO and HbR

Display options: waterfall

TO-DO, coming soon: Waterfall display of channels as shown below



Visualize all HRFs: the Plot Probe feature



Homer3 (v1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

Current Processing Element: simple_nirs_noStim.snirf

1 files loaded successfully
0 files failed to load

Processing Level: ● Run

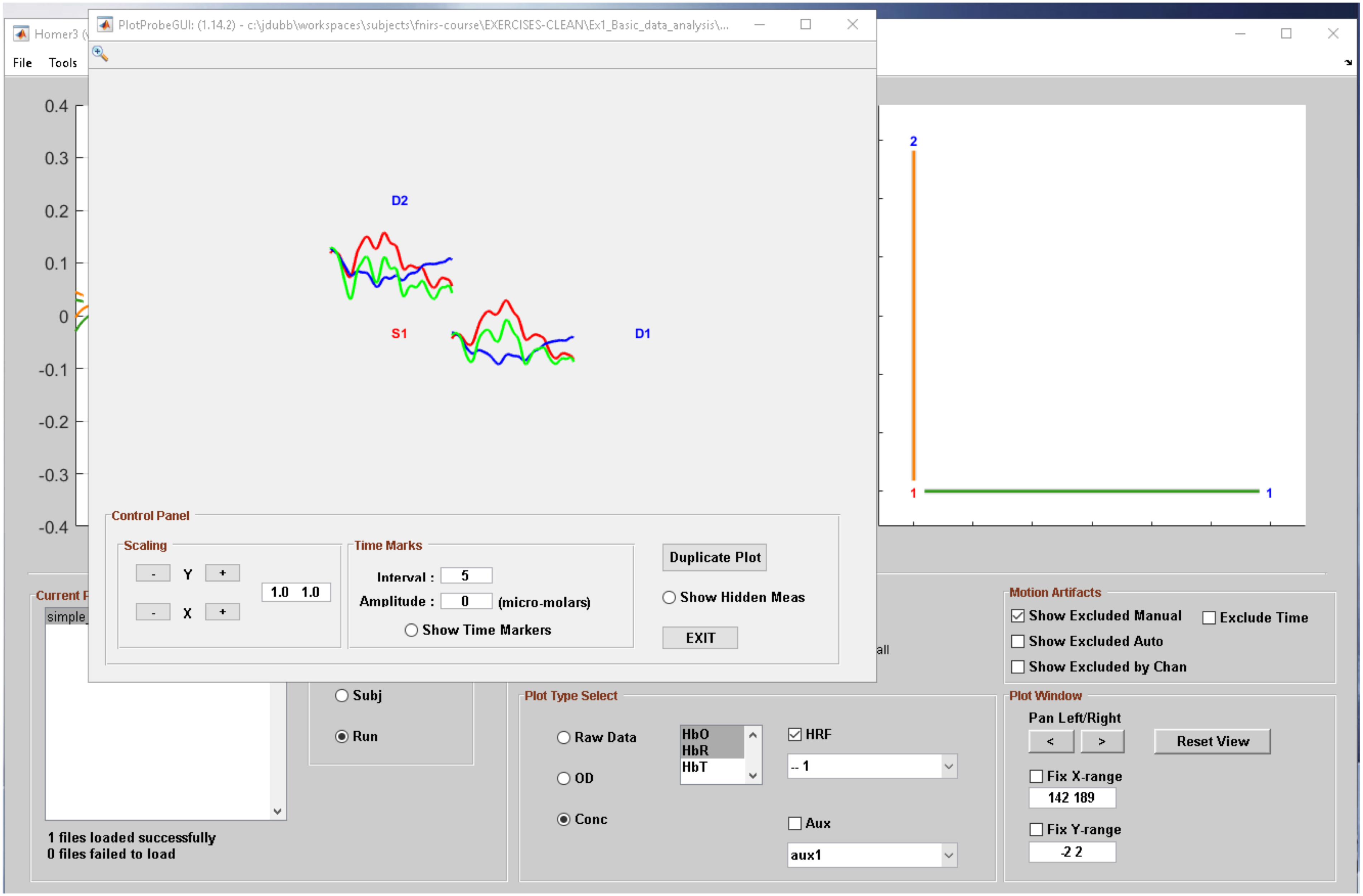
☑ Apply to all

Plot Type Select: ● Conc; HbO, HbR selected; ☑ HRF: -- 1; ☐ Aux: aux1

Motion Artifacts: ☑ Show Excluded Manual; ☐ Exclude Time; ☐ Show Excluded Auto; ☐ Show Excluded by Chan

Plot Window: ☐ Fix X-range: 142 189; ☐ Fix Y-range: -2 2

Visualize all HRFs: the Plot Probe feature



PlotProbeGUI: (1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\...

Scaling: - Y + / - X + 1.0 1.0

Interval : 5

Amplitude : 0 (micro-molars)

○ Show Time Markers

○ Show Hidden Meas

1 files loaded successfully
0 files failed to load

○ Subj
● Run

○ Raw Data
○ OD
● Conc

☑ HRF -- 1

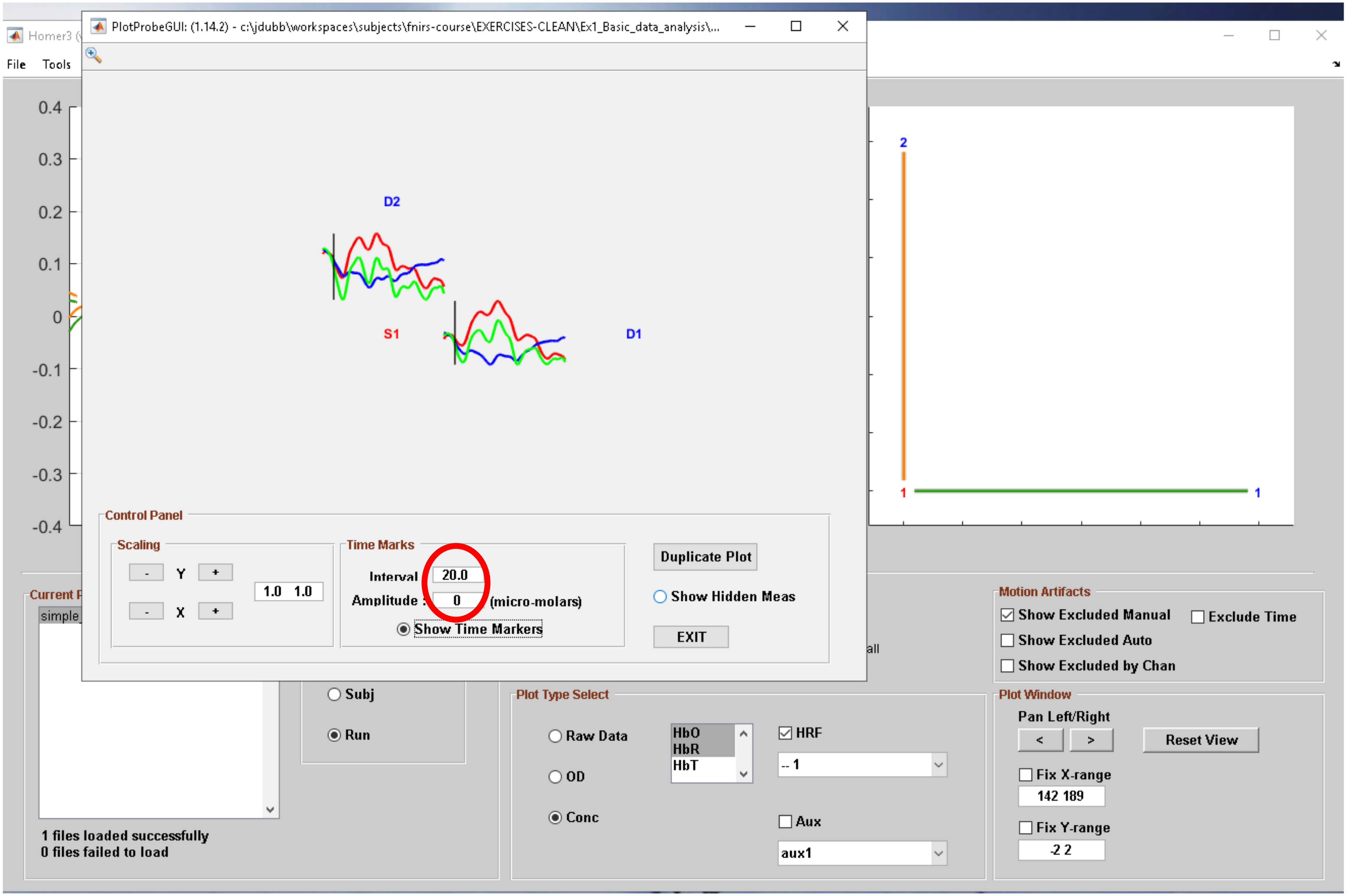
☐ Aux aux1

☑ Show Excluded Manual
☐ Exclude Time
☐ Show Excluded Auto
☐ Show Excluded by Chan

☐ Fix X-range 142 189

☐ Fix Y-range -2 2

Visualize all HRFs: the Plot Probe feature



PlotProbeGUI: (1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\...

Control Panel

Scaling: Y 1.0 X 1.0

Time Marks

Interval 20.0

Amplitude : 0 (micro-molars)

● Show Time Markers

○ Show Hidden Meas

Motion Artifacts

☑ Show Excluded Manual

☐ Exclude Time

☐ Show Excluded Auto

☐ Show Excluded by Chan

Plot Type Select

○ Raw Data

○ OD

● Conc

HbO, HbR, HbT

☑ HRF

-- 1

☐ Aux

aux1

Plot Window

☐ Fix X-range 142 189

☐ Fix Y-range -2 2

○ Subj

● Run

1 files loaded successfully

0 files failed to load

Group average: file names

Any directory that contains one or more files with the .nirs extension is considered by Homer3 to be a **group**, organized into sub-groups called **sessions** (or subjects).

You can compute the HRF:

SubjectName1_run01.nirs
SubjectName1_run02.nirs
. . . .
SubjectName1_run*n1*.nirs

SubjectName2_run01.nirs
SubjectName2_run02.nirs
. . . .
SubjectName2_run*n2*.nirs

. . . .

SubjectName*m*_run01.nirs
SubjectName*m*_run02.nirs
. . . .
SubjectName*m*_run*nm*.nirs

- at the run level
- at the session (or subject) level
- at the group level

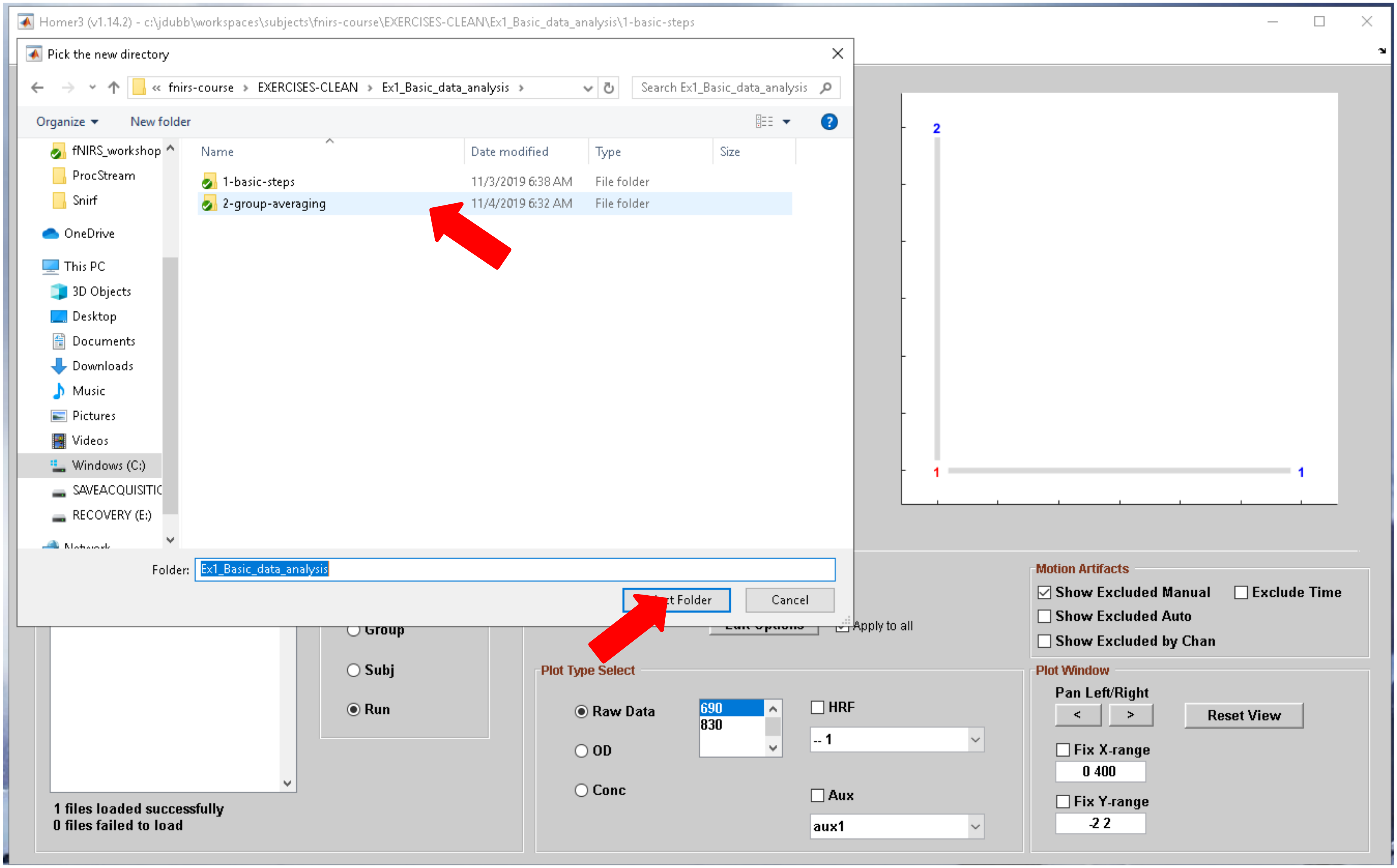
Data processed in Homer3 is saved automatically to disk:

- Run data is saved in the corresponding **.nirs** file
- Subject and group processing results are saved to **groupResults.mat**

To go back to the state before any processing was done to the dataset, go to **File > Reset File**

Group average: example

File > Change directory to **Exercises / Ex1_Basic_data_analysis / 2-group-averaging**



Homer3 (v1.14.2) - c:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\1-basic-steps

Pick the new directory

« fnirs-course › EXERCISES-CLEAN › Ex1_Basic_data_analysis ›

Name	Date modified	Type	Size
1-basic-steps	11/3/2019 6:38 AM	File folder	
2-group-averaging	11/4/2019 6:32 AM	File folder	

Folder: Ex1_Basic_data_analysis

1 files loaded successfully
0 files failed to load

Motion Artifacts: ☑ Show Excluded Manual ☐ Exclude Time ☐ Show Excluded Auto ☐ Show Excluded by Chan

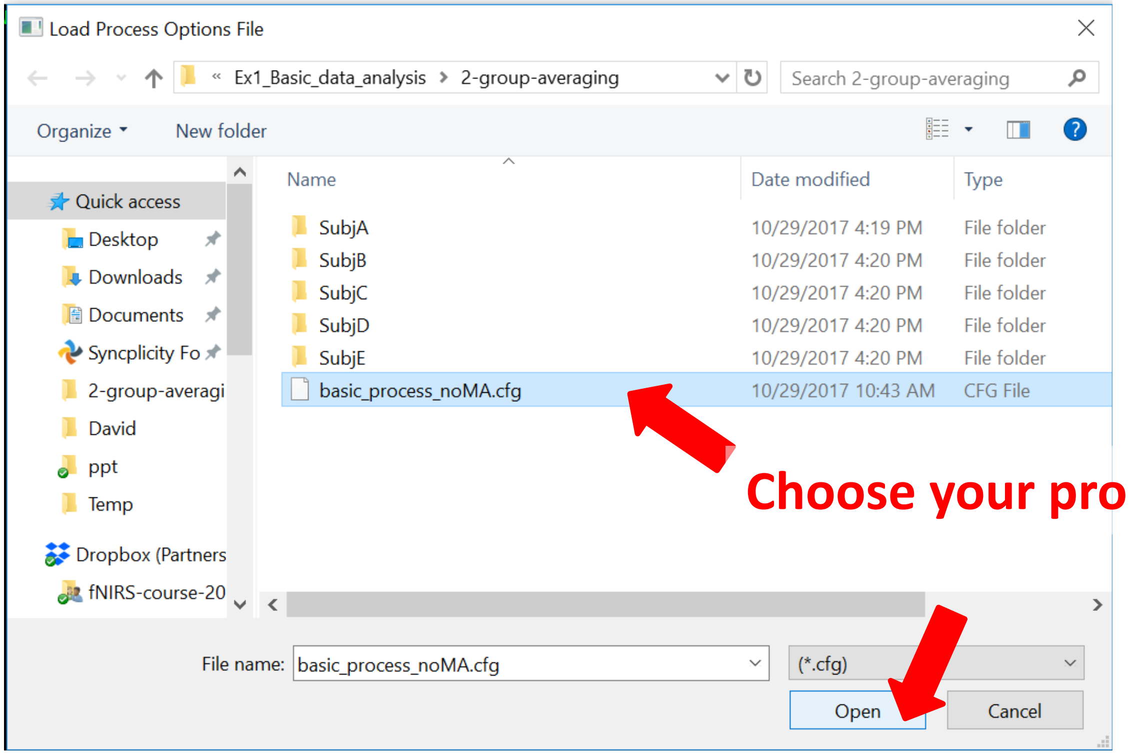
○ Group ○ Subj ● Run

Plot Type Select: ● Raw Data ○ OD ○ Conc; 690 selected; ☐ HRF: -- 1; ☐ Aux: aux1

Plot Window: ☐ Fix X-range 0 400; ☐ Fix Y-range -2 2

Group average: example

File > Load Process Options (*.cfg)



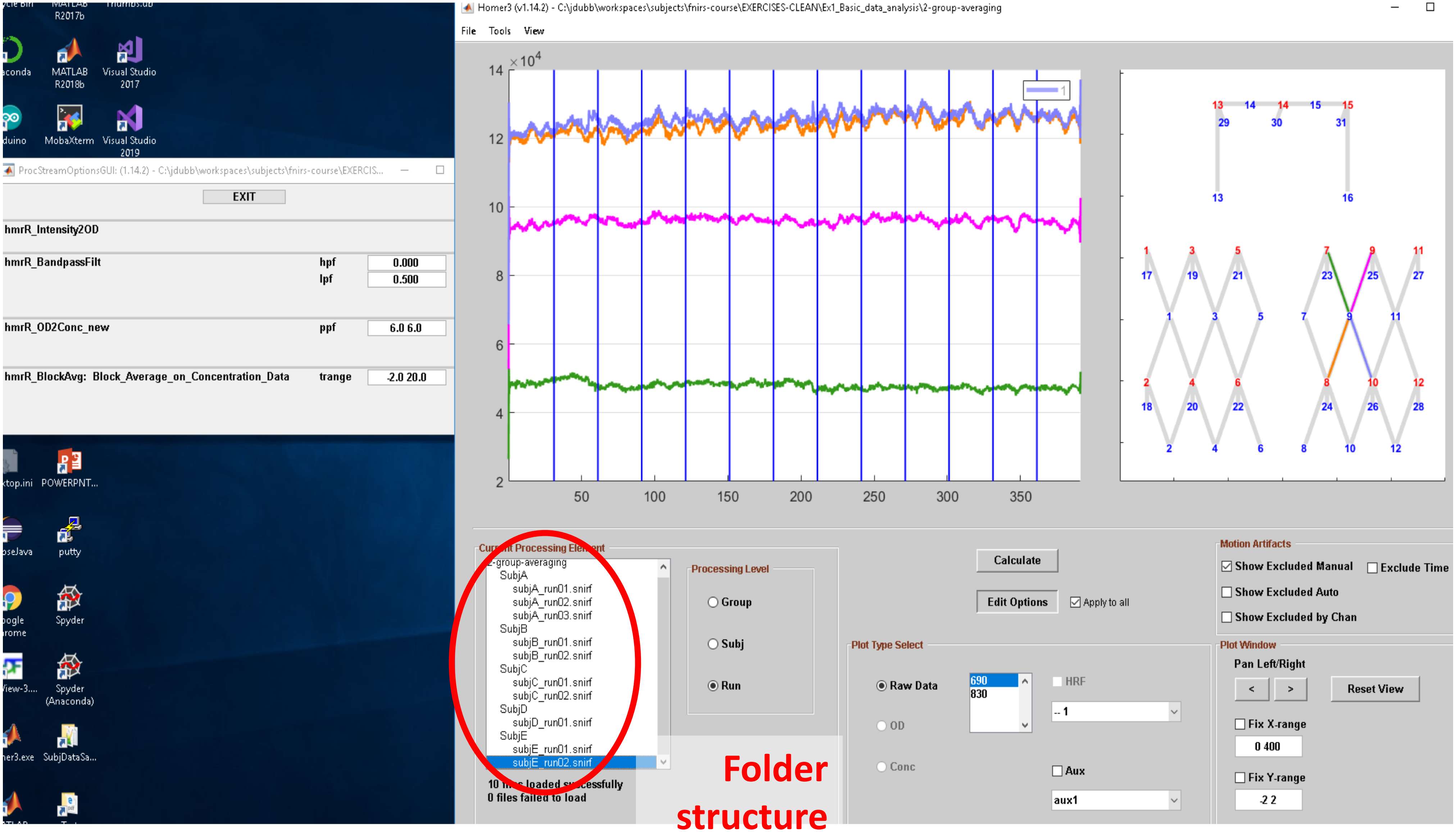
Name	Date modified	Type
SubjA	10/29/2017 4:19 PM	File folder
SubjB	10/29/2017 4:20 PM	File folder
SubjC	10/29/2017 4:20 PM	File folder
SubjD	10/29/2017 4:20 PM	File folder
SubjE	10/29/2017 4:20 PM	File folder
basic_process_noMA.cfg	10/29/2017 10:43 AM	CFG File

File name: basic_process_noMA.cfg

(*.cfg)

Choose your processing stream *.cfg

Group average: example



ProcStreamOptionsGUI: (1.14.2) - C:\jdubb\workspaces\subjects\fnirs-course\EXERCIS...

hmrR_Intensity2OD

hmrR_BandpassFilt hpf 0.000
lpf 0.500

hmrR_OD2Conc_new ppf 6.0 6.0

hmrR_BlockAvg: Block_Average_on_Concentration_Data trange -2.0 20.0

Homer3 (v1.14.2) - C:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\2-group-averaging

Current Processing Element

- 2-group-averaging
  - SubjA
    - subjA_run01.snirf
    - subjA_run02.snirf
    - subjA_run03.snirf
  - SubjB
    - subjB_run01.snirf
    - subjB_run02.snirf
  - SubjC
    - subjC_run01.snirf
    - subjC_run02.snirf
  - SubjD
    - subjD_run01.snirf
  - SubjE
    - subjE_run01.snirf
    - subjE_run02.snirf

10 files loaded successfully
0 files failed to load

Processing Level
○ Group
○ Subj
● Run

☑ Apply to all

Plot Type Select
● Raw Data
○ OD
○ Conc

690
830

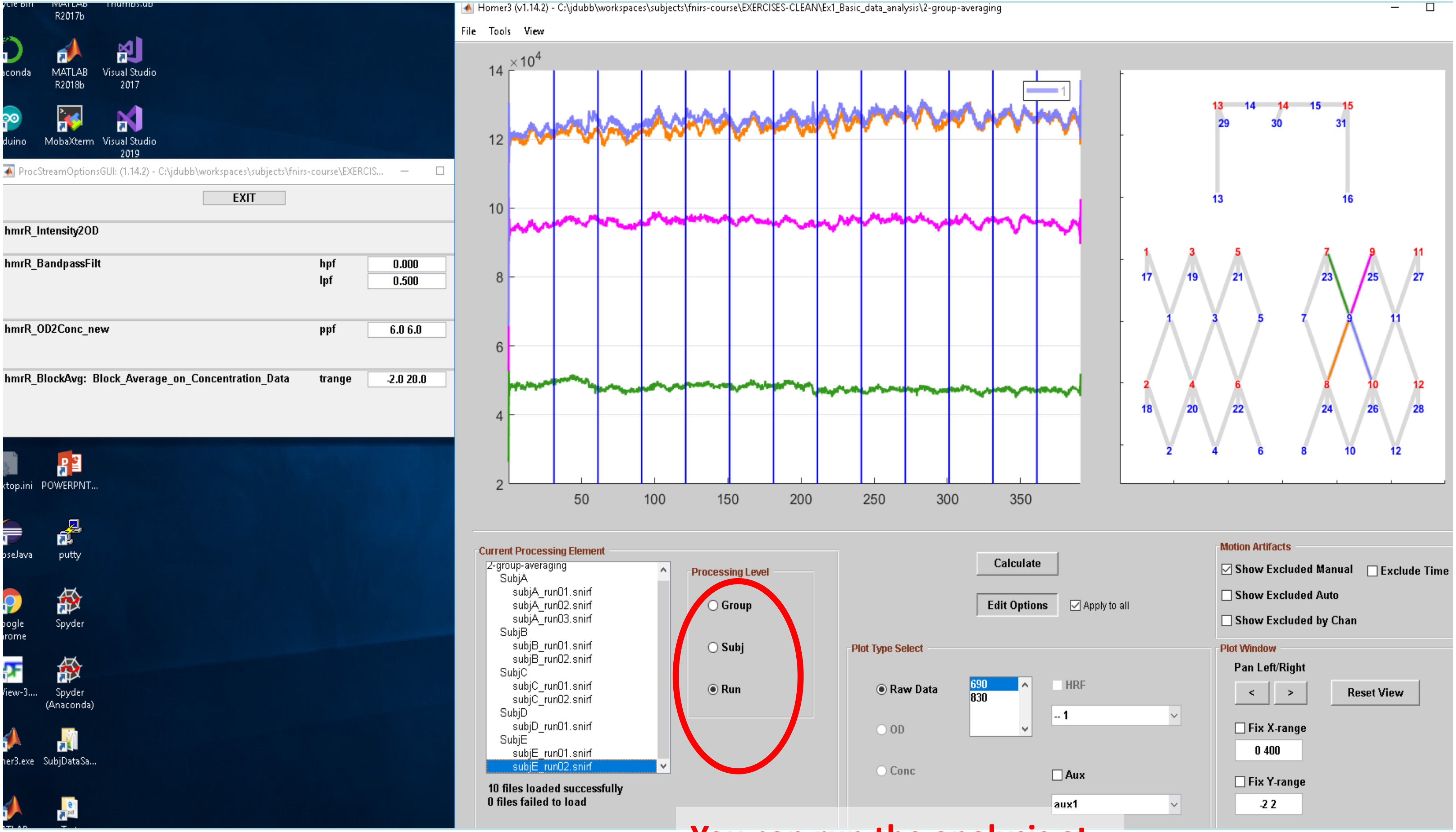
☐ HRF
-- 1
☐ Aux
aux1

Motion Artifacts
☑ Show Excluded Manual ☐ Exclude Time
☐ Show Excluded Auto
☐ Show Excluded by Chan

Plot Window
☐ Fix X-range
0 400
☐ Fix Y-range
-2 2

Folder structure

Group average: example



ProcStreamOptionsGUI: (1.14.2) - C:\jdubb\workspaces\subjects\fnirs-course\EXERCIS...

EXIT

hmrR_Intensity2OD

hmrR_BandpassFilt hpf 0.000 lpf 0.500

hmrR_OD2Conc_new ppf 6.0 6.0

hmrR_BlockAvg: Block_Average_on_Concentration_Data trange -2.0 20.0

Homer3 (v1.14.2) - C:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\2-group-averaging

Current Processing Element

- 2-group-averaging
  - SubjA
    - subjA_run01.snirf
    - subjA_run02.snirf
    - subjA_run03.snirf
  - SubjB
    - subjB_run01.snirf
    - subjB_run02.snirf
  - SubjC
    - subjC_run01.snirf
    - subjC_run02.snirf
  - SubjD
    - subjD_run01.snirf
  - SubjE
    - subjE_run01.snirf
    - subjE_run02.snirf

10 files loaded successfully
0 files failed to load

Processing Level: ○ Group ○ Subj ● Run

Motion Artifacts: ☑ Show Excluded Manual ☐ Exclude Time ☐ Show Excluded Auto ☐ Show Excluded by Chan

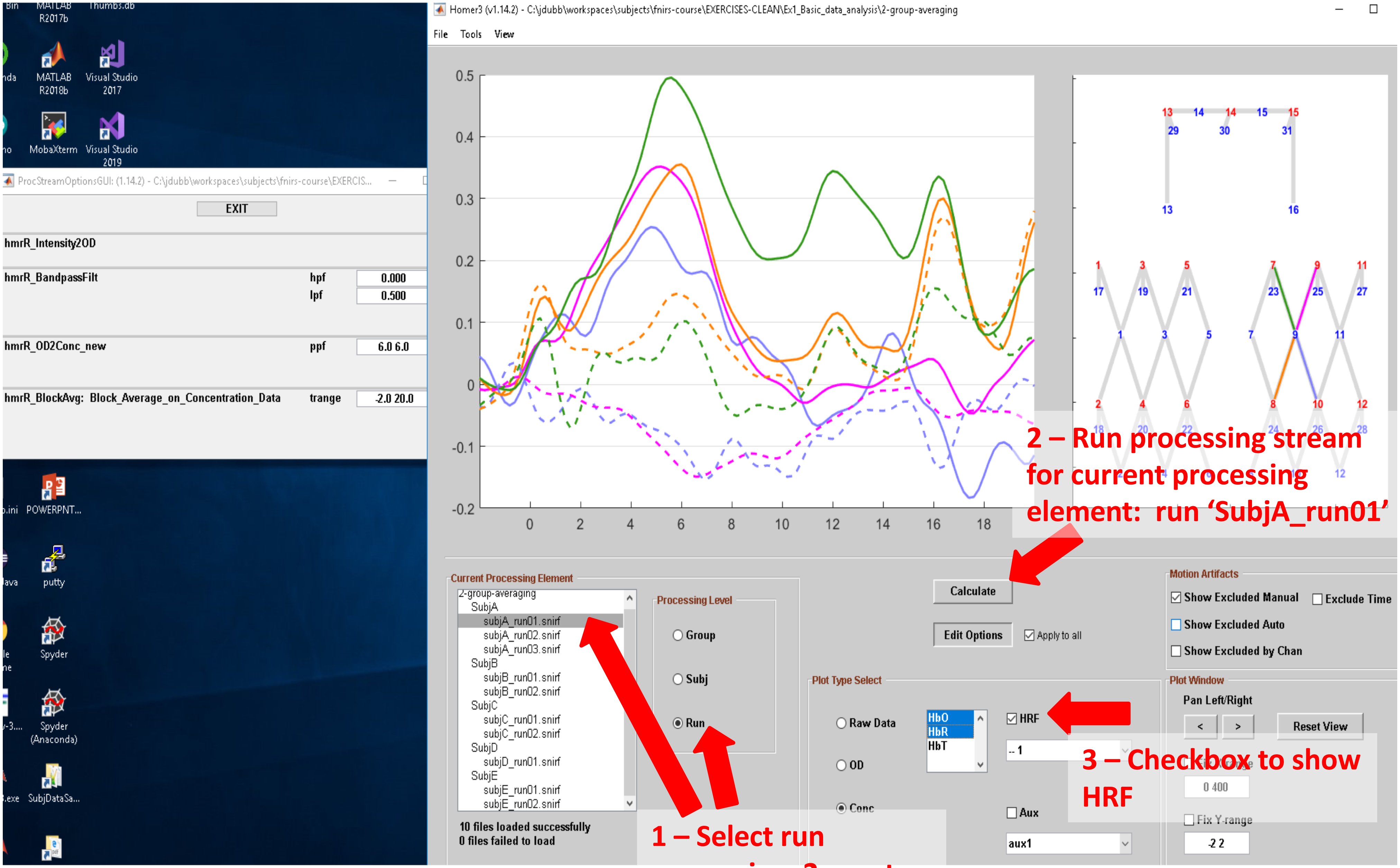
☑ Apply to all

Plot Type Select: ● Raw Data ○ OD ○ Conc; 690 830; ☐ HRF; -- 1; ☐ Aux; aux1

Plot Window: ☐ Fix X-range 0 400; ☐ Fix Y-range -2 2

You can run the analysis at the run level, session level, or group level

Run average: example



ProcStreamOptionsGUI: (1.14.2) - C:\jdubb\workspaces\subjects\fnirs-course\EXERCIS...

hmrR_Intensity2OD

hmrR_BandpassFilt hpf 0.000 lpf 0.500

hmrR_OD2Conc_new ppf 6.0 6.0

hmrR_BlockAvg: Block_Average_on_Concentration_Data trange -2.0 20.0

Homer3 (v1.14.2) - C:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\2-group-averaging

Current Processing Element

- 2-group-averaging
  - SubjA
    - subjA_run01.snirf
    - subjA_run02.snirf
    - subjA_run03.snirf
  - SubjB
    - subjB_run01.snirf
    - subjB_run02.snirf
  - SubjC
    - subjC_run01.snirf
    - subjC_run02.snirf
  - SubjD
    - subjD_run01.snirf
  - SubjE
    - subjE_run01.snirf
    - subjE_run02.snirf

10 files loaded successfully
0 files failed to load

Processing Level: ○ Group ○ Subj ● Run

Plot Type Select: ○ Raw Data ○ OD ● Conc

☑ HRF

☐ Aux

Motion Artifacts: ☑ Show Excluded Manual ☐ Exclude Time ☐ Show Excluded Auto ☐ Show Excluded by Chan

☑ Apply to all

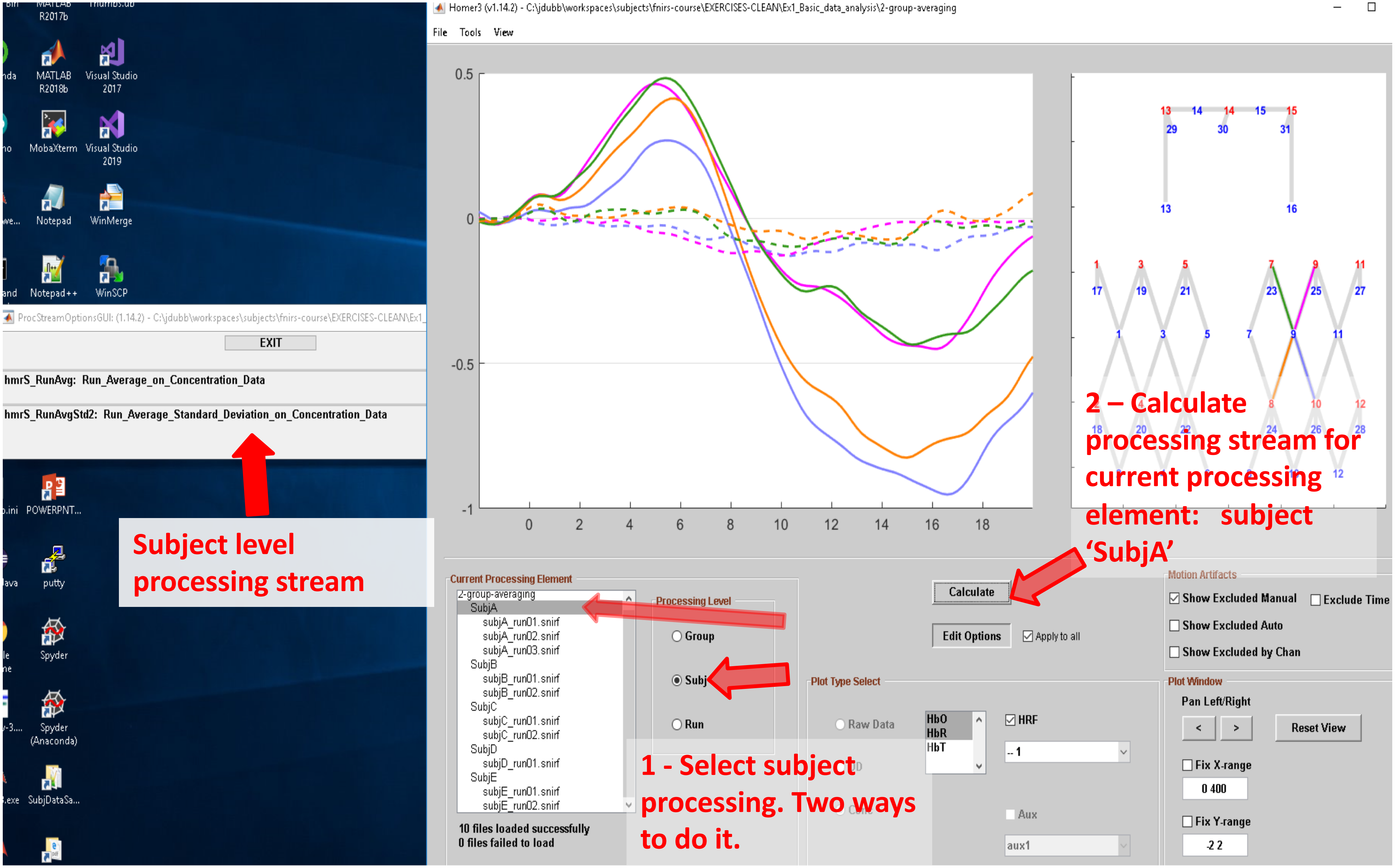
☐ Fix Y-range -2 2

2 – Run processing stream for current processing element: run ‘SubjA_run01’

3 – Checkbox to show HRF

1 – Select run processing: 2 way to

Subject average: example



Homer3 (v1.14.2) - C:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\2-group-averaging

ProcStreamOptionsGUI: (1.14.2) - C:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_

EXIT

hmrS_RunAvg: Run_Average_on_Concentration_Data

hmrS_RunAvgStd2: Run_Average_Standard_Deviation_on_Concentration_Data

Subject level processing stream

Current Processing Element

- 2-group-averaging
  - SubjA
    - subjA_run01.snirf
    - subjA_run02.snirf
    - subjA_run03.snirf
  - SubjB
    - subjB_run01.snirf
    - subjB_run02.snirf
  - SubjC
    - subjC_run01.snirf
    - subjC_run02.snirf
  - SubjD
    - subjD_run01.snirf
  - SubjE
    - subjE_run01.snirf
    - subjE_run02.snirf

10 files loaded successfully
0 files failed to load

Processing Level

○ Group
● Subj
○ Run

1 - Select subject processing. Two ways to do it.

Calculate

Edit Options ☑ Apply to all

2 – Calculate processing stream for current processing element: subject 'SubjA'

Motion Artifacts

☑ Show Excluded Manual ☐ Exclude Time
☐ Show Excluded Auto
☐ Show Excluded by Chan

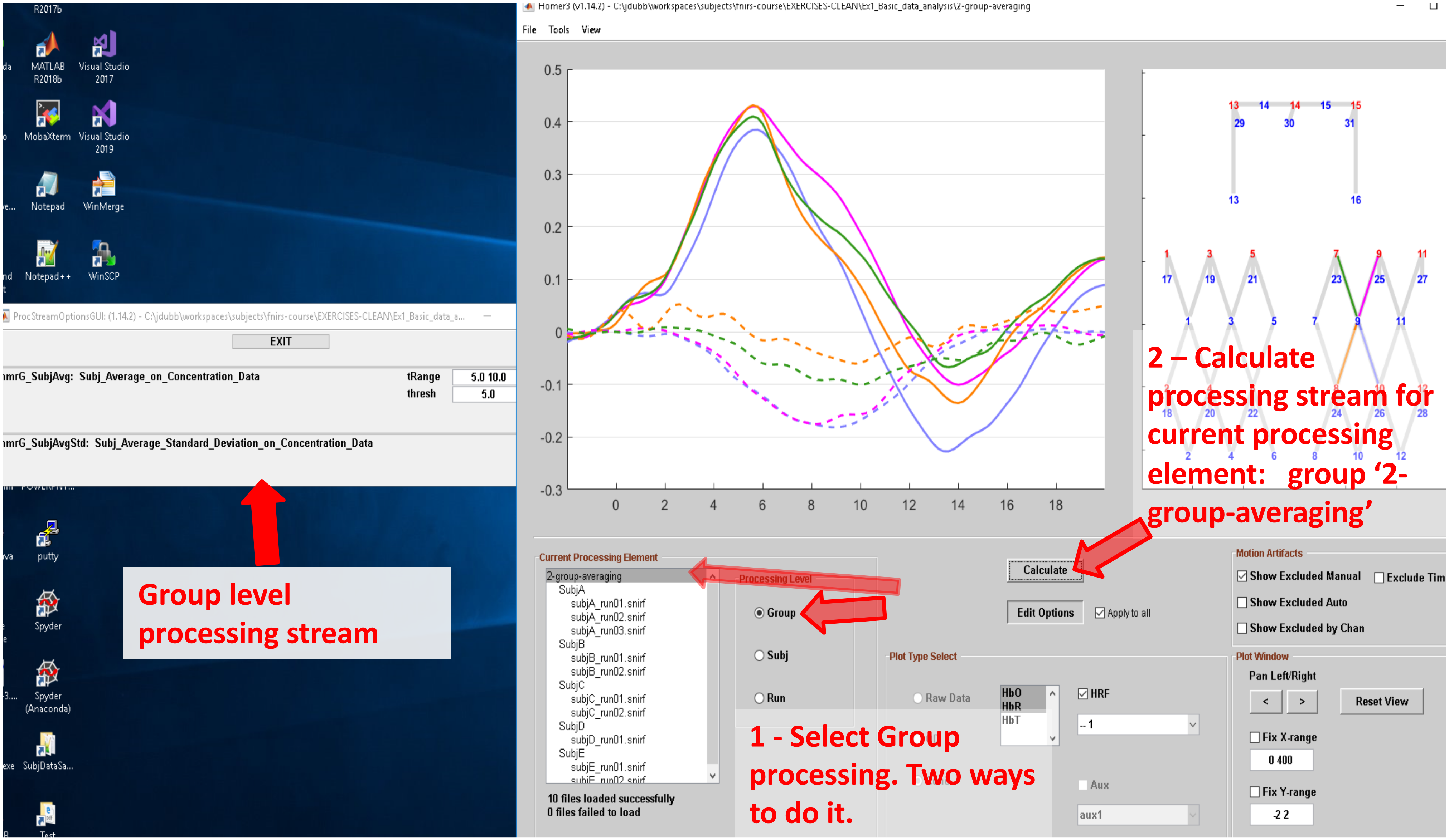
Plot Type Select

○ Raw Data
HbO
HbR
HbT
☑ HRF
-- 1
☐ Aux
aux1

Plot Window

Pan Left/Right
< >
Reset View
☐ Fix X-range
0 400
☐ Fix Y-range
-2 2

Group average: example



Homer3 (v1.14.2) - C:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\2-group-averaging

ProcStreamOptionsGUI: (1.14.2) - C:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_a...

hmrG_SubjAvg: Subj_Average_on_Concentration_Data — tRange 5.0 10.0, thresh 5.0

hmrG_SubjAvgStd: Subj_Average_Standard_Deviation_on_Concentration_Data

Current Processing Element

2-group-averaging
  SubjA
    subjA_run01.snirf
    subjA_run02.snirf
    subjA_run03.snirf
  SubjB
    subjB_run01.snirf
    subjB_run02.snirf
  SubjC
    subjC_run01.snirf
    subjC_run02.snirf
  SubjD
    subjD_run01.snirf
  SubjE
    subjE_run01.snirf
    subjE_run02.snirf

10 files loaded successfully
0 files failed to load

Processing Level: ● Group ○ Subj ○ Run

☑ Apply to all

Plot Type Select: ○ Raw Data; HbO, HbR, HbT; ☑ HRF; -- 1; ☐ Aux; aux1

Motion Artifacts: ☑ Show Excluded Manual ☐ Exclude Tim; ☐ Show Excluded Auto; ☐ Show Excluded by Chan

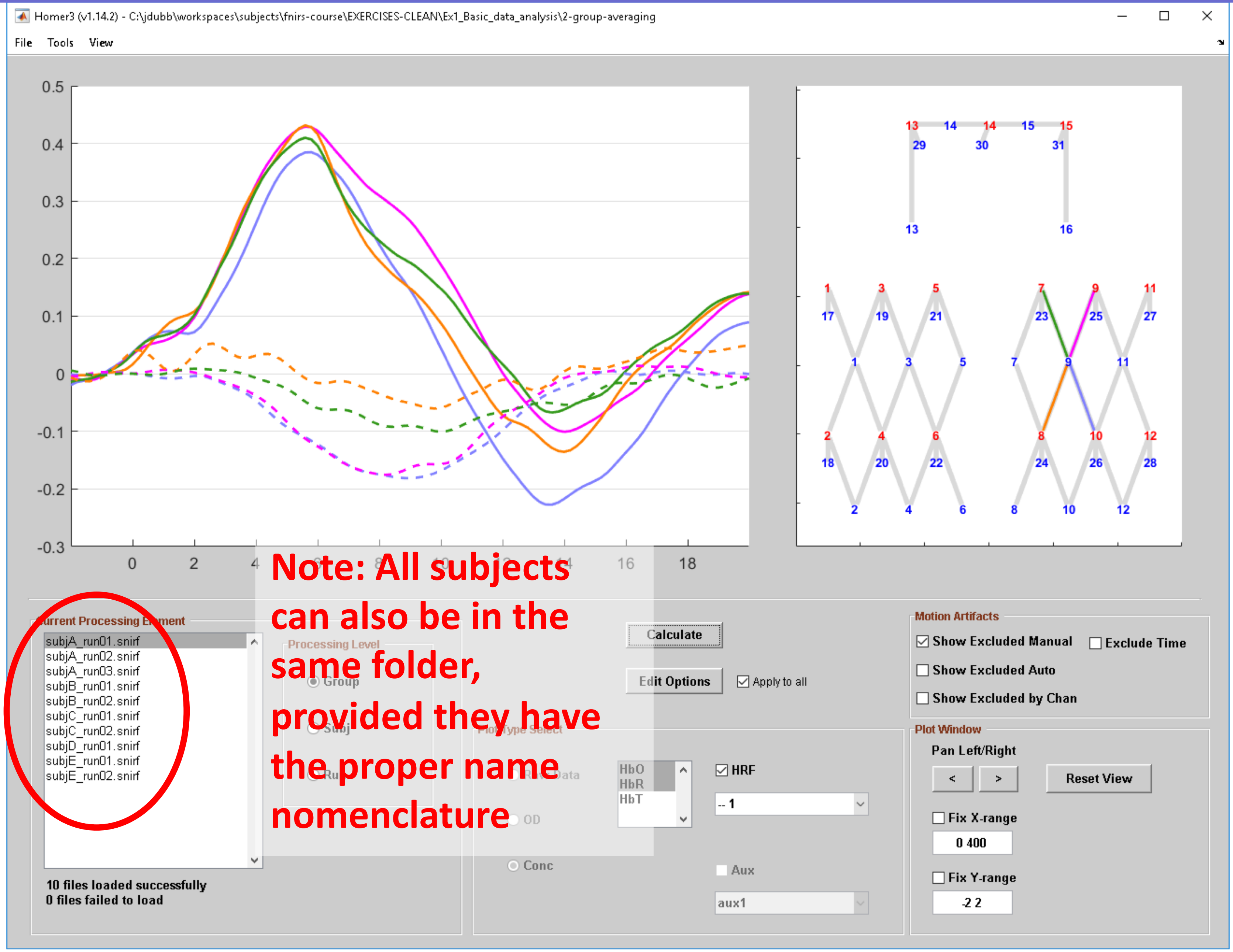
Plot Window: ☐ Fix X-range 0 400; ☐ Fix Y-range -2 2

Group level processing stream

2 – Calculate processing stream for current processing element: group '2-group-averaging'

1 - Select Group processing. Two ways to do it.

Group average: example


Homer3 (v1.14.2) - C:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\2-group-averaging

Current Processing Element

- subjA_run01.snirf
- subjA_run02.snirf
- subjA_run03.snirf
- subjB_run01.snirf
- subjB_run02.snirf
- subjC_run01.snirf
- subjC_run02.snirf
- subjD_run01.snirf
- subjE_run01.snirf
- subjE_run02.snirf

10 files loaded successfully
0 files failed to load

Processing Level: ● Group ○ Subj ○ Run

Plot Type Select: ○ Raw Data ○ OD ○ Conc

HbO / HbR / HbT

☑ HRF: -- 1

☐ Aux: aux1

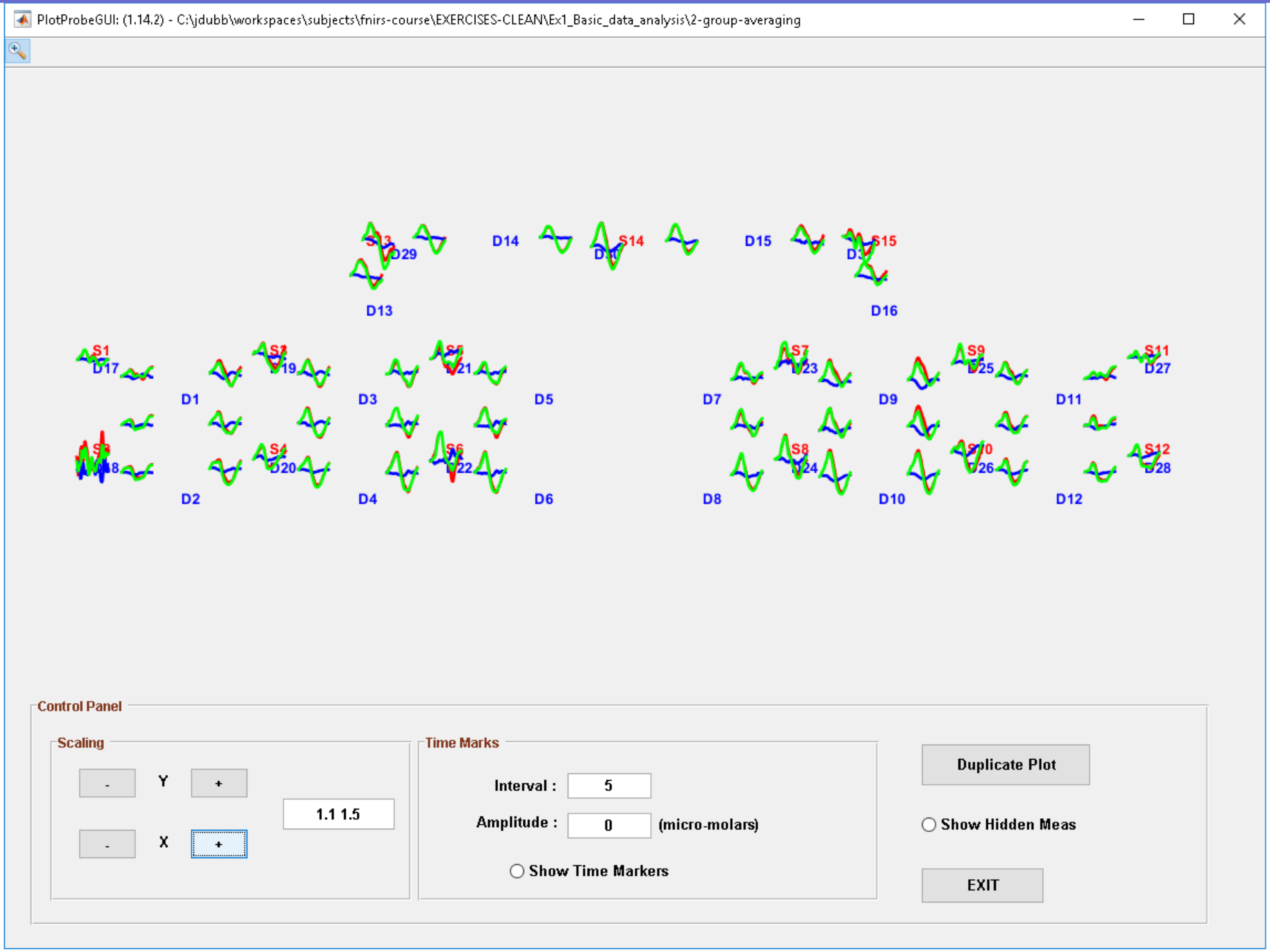
☑ Apply to all

Motion Artifacts: ☑ Show Excluded Manual ☐ Exclude Time ☐ Show Excluded Auto ☐ Show Excluded by Chan

Plot Window: ☐ Fix X-range 0 400 ☐ Fix Y-range -2 2

Note: All subjects can also be in the same folder, provided they have the proper name nomenclature

Group average: example



PlotProbeGUI: (1.14.2) - C:\jdubb\workspaces\subjects\fnirs-course\EXERCISES-CLEAN\Ex1_Basic_data_analysis\2-group-averaging

Control Panel

Scaling

Y
X
1.1 1.5

Time Marks

Interval : 5

Amplitude : 0 (micro-molars)

○ Show Time Markers

○ Show Hidden Meas

We will get back to this dataset tomorrow and perform more advanced data analysis