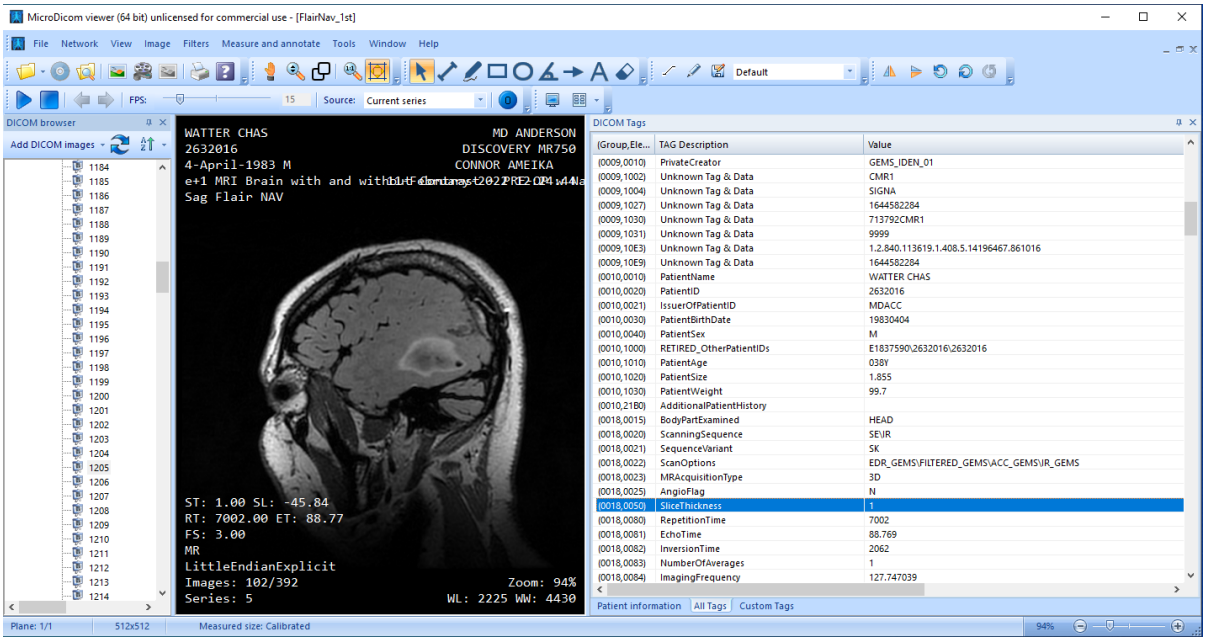
SPM

1- Use **MICRODICOM** viewer to observe and determine the slice thickness of the DICOM file. Download and install at https://www.microdicom.com/

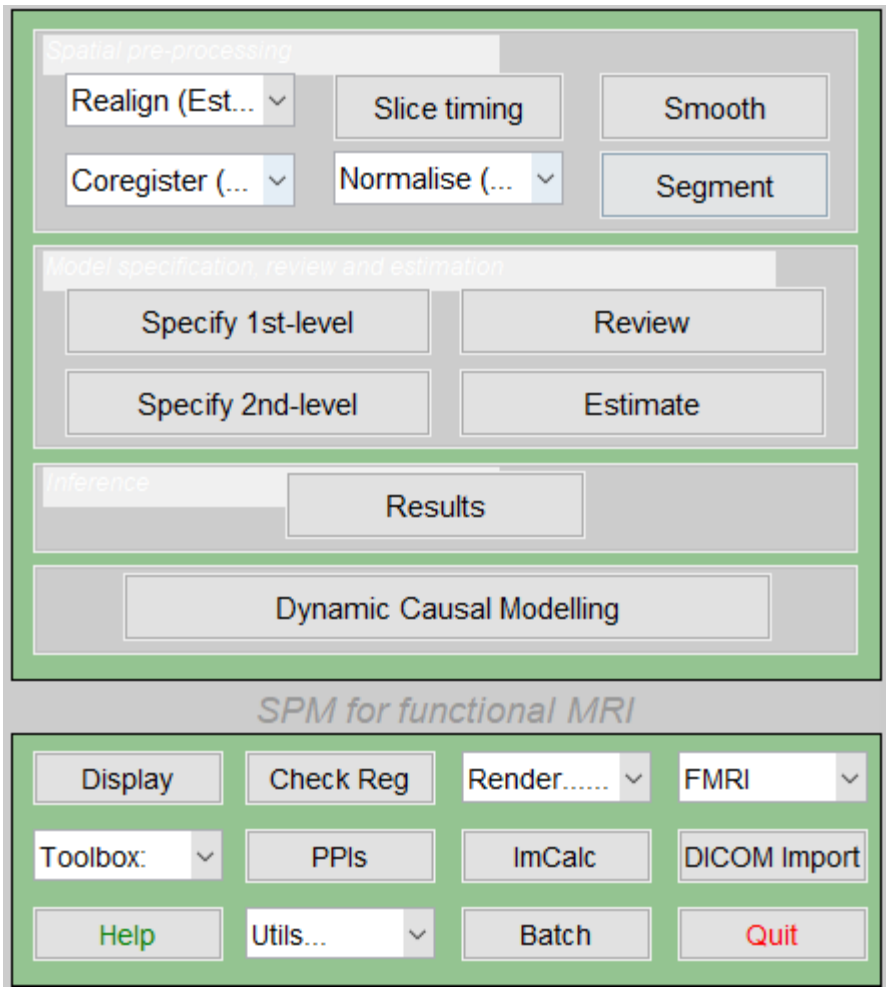


2- Use **SPM 12** to create the 3D rendering. Download and install at https://www.fil.ion.ucl.ac.uk/spm/software/spm12/

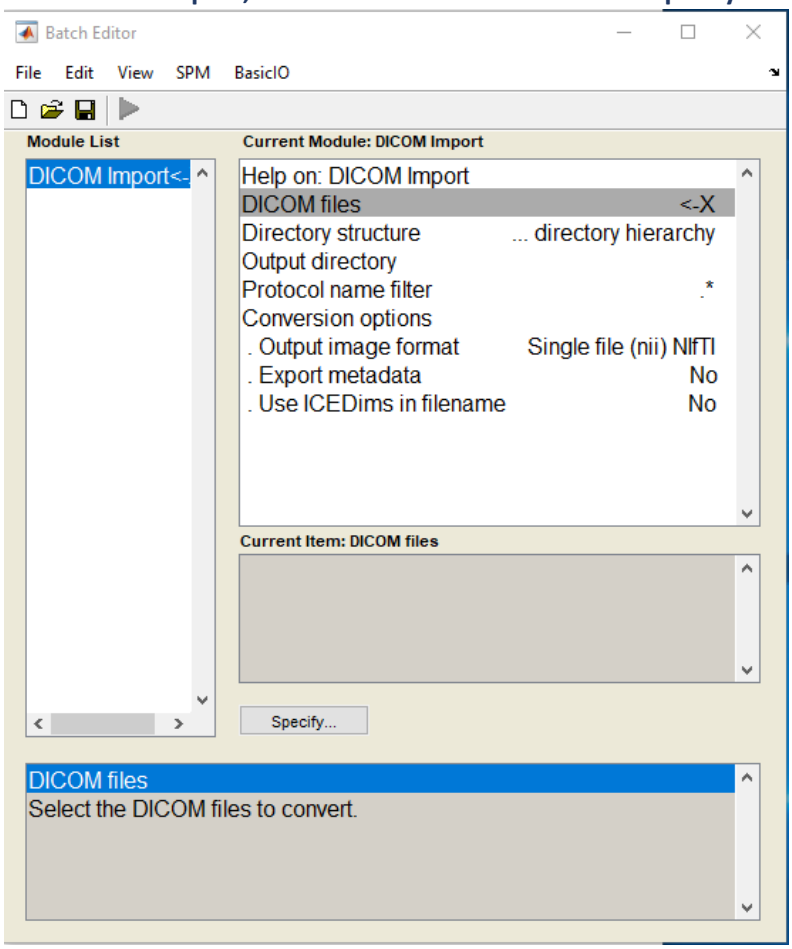
3- Make sure MATLAB has correct data directory containing the DICOM files

4- Type ***spm*** in command window of Matlab

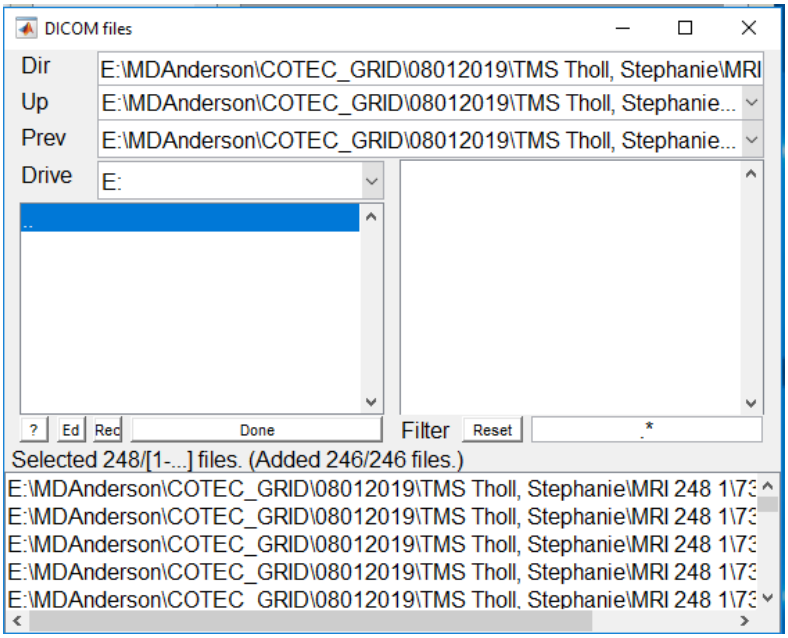
5- Choose **fmri**


Spatial pre-processing
Realign (Est...
Slice timing
Smooth
Coregister (...
Normalise (...
Segment
Model specification, review and estimation
Specify 1st-level
Review
Specify 2nd-level
Estimate
Inference
Results
Dynamic Causal Modelling
SPM for functional MRI
Display
Check Reg
Render.....
FMRI
Toolbox:
PPIs
ImCalc
DICOM Import
Help
Utils...
Batch
Quit

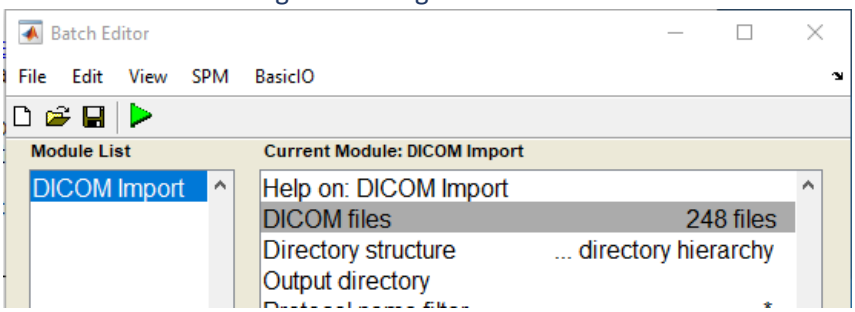
6- Click **DICOM import,** select DICOM files and then click **specify**.



7- Chose desired DICOM data from the Left Column, click *enter*, and hit the '**Done'** button.



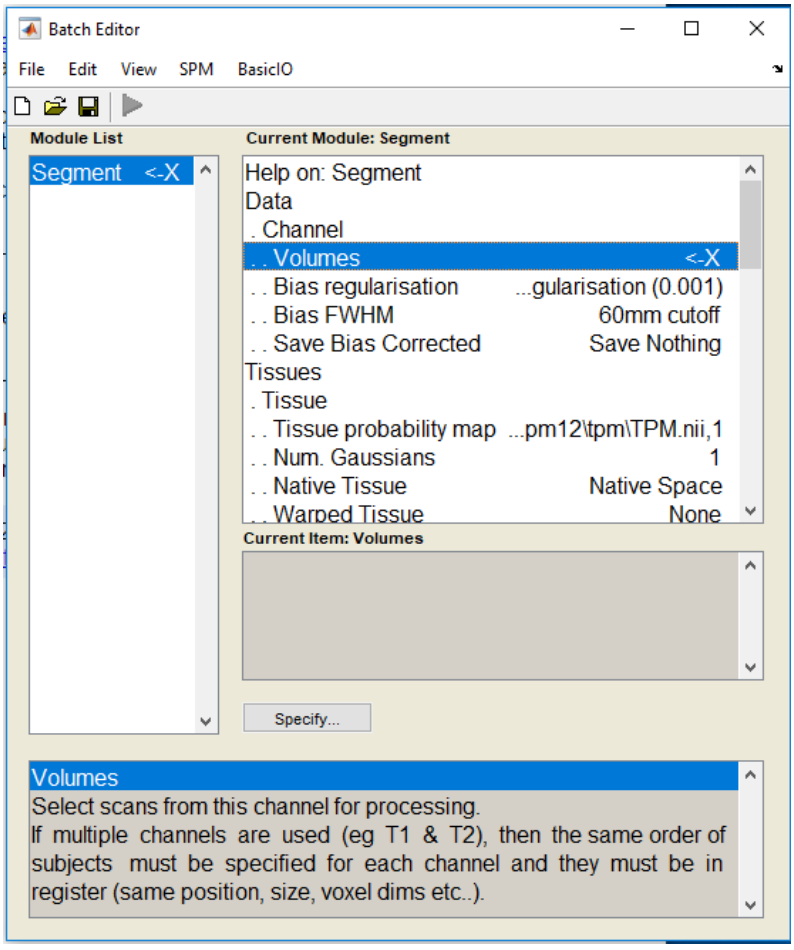
8- Press PLAY to generate segment in .nii



9- Click **Segment**

10- Specify volume (usually click the largest volume)

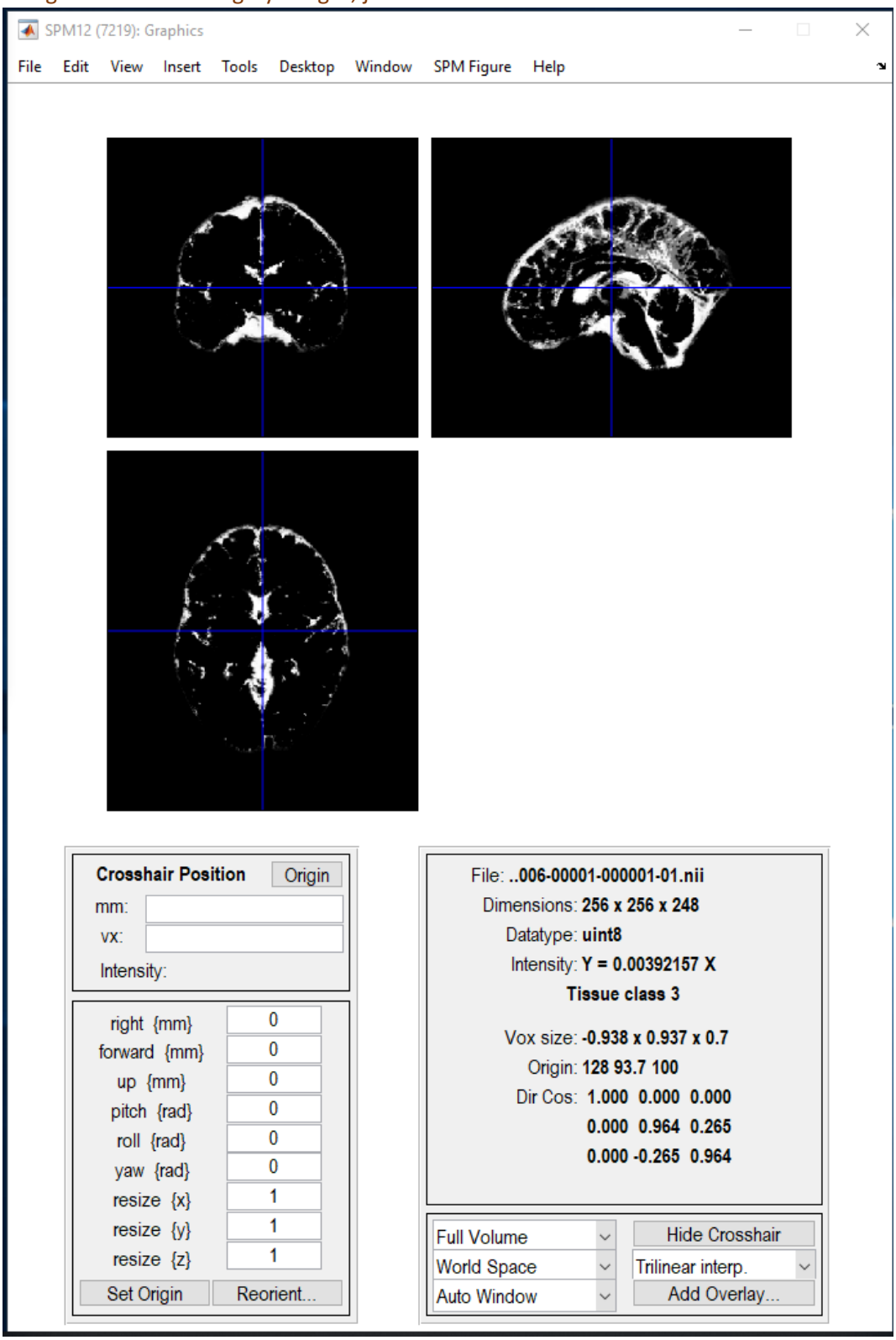
Note: there are different kinds of sequences; usually pick the largest one



11- Chose desired S.nii data from the Left Column, click *enter*, and hit the '**Done'** button.

12- Press PLAY to run the segment to generate new files from **C_1 to C_n**

13- Click display, chose desired C_n data from the Left Column, click *enter*, and hit the '**Done'** button, to show any of the C_1 to C_n files. Usually only the first 3 files are needed. Image generated are not gray images, just 0 and 1 mask used to reconstruct the brain

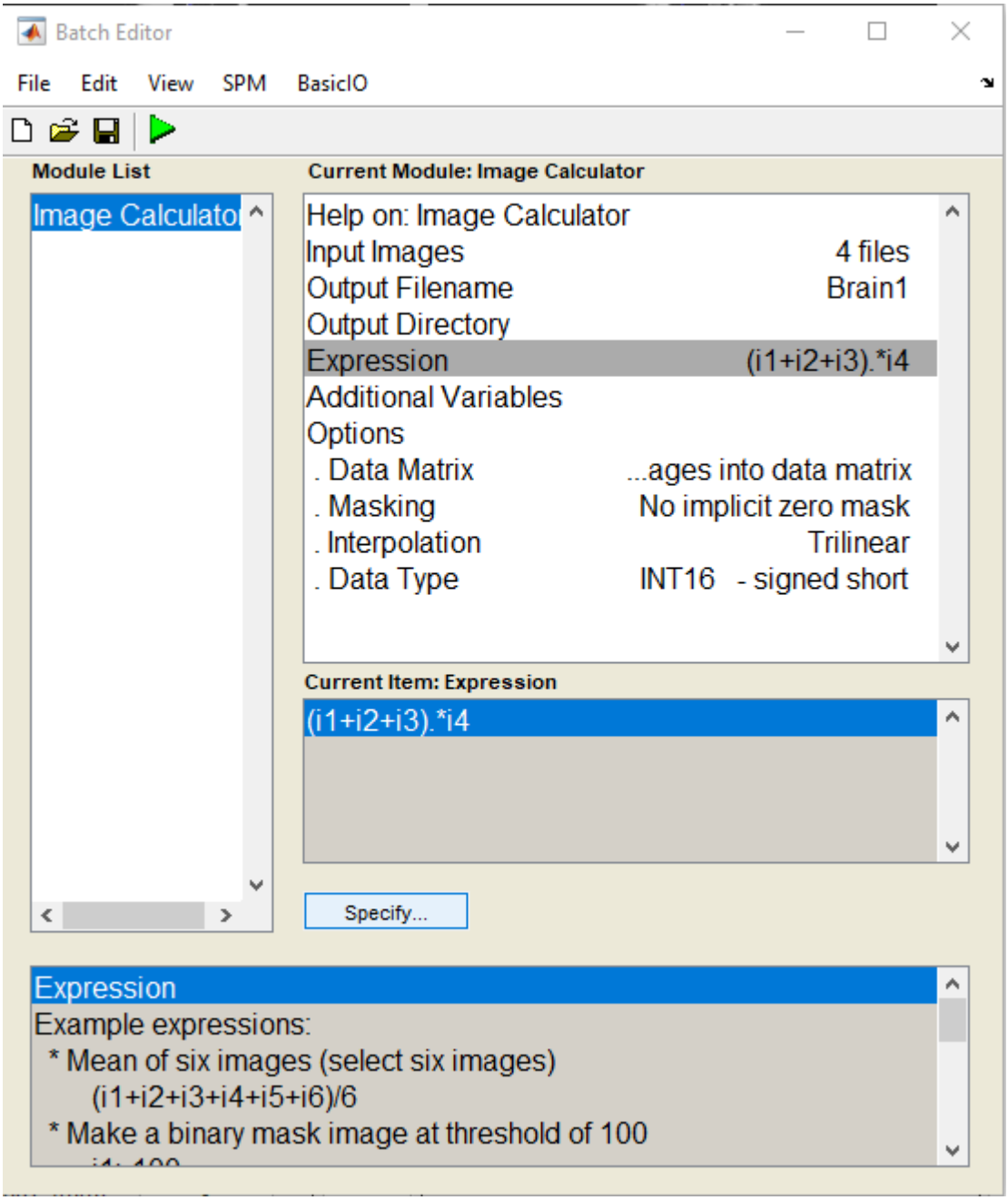


14- Click '**ImCalc'** and choose Input Image, then click specify.

15- Specify Images (C1, C2, C3 and Original image (s###.nii file) from the Left Column, click *enter*, and hit the '**Done'** button.

16- Chose output file name and specify to desired file name

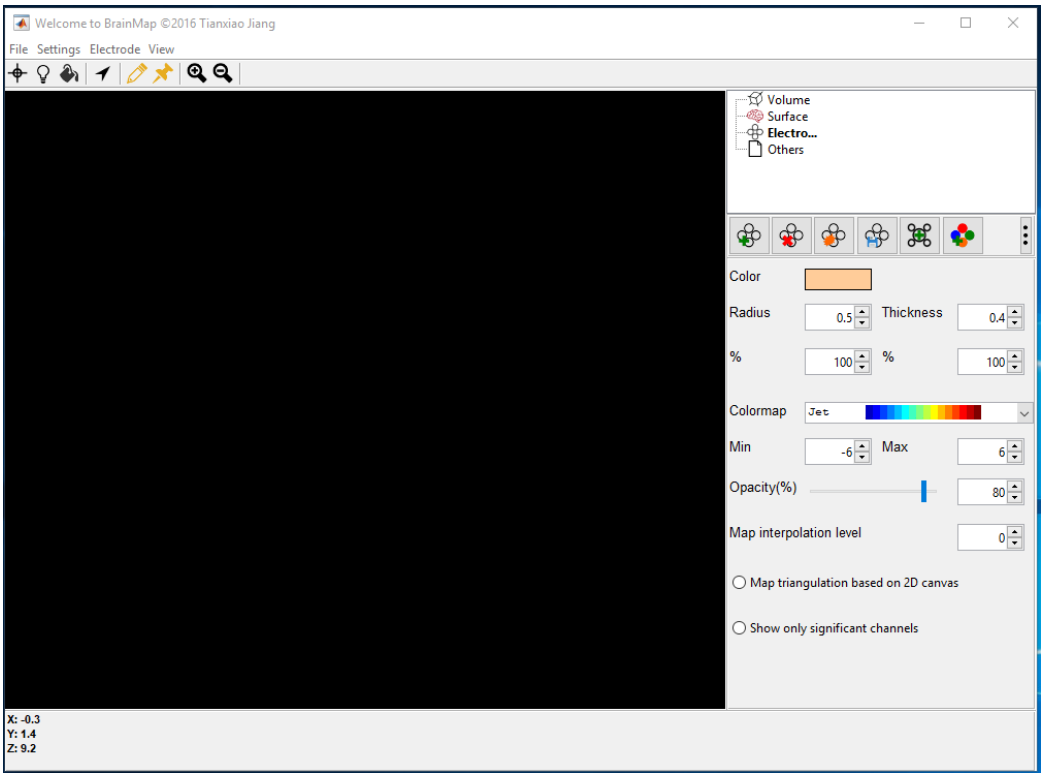
17- Specify expression **(i1+i2+i3).*i4**



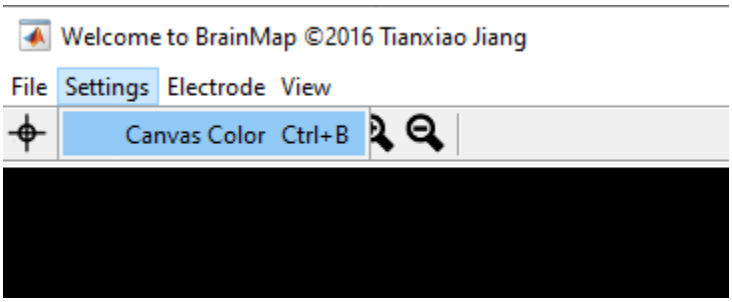
18- Click the **Play** button to generate the output.nii file

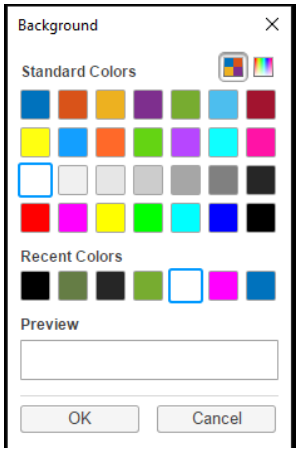
BRAINMAP

1- Have the Brainmap folder in the current folder of MATLAB.
2- Type ***setup*** in the command line. This will install the Brainmap GUI in MATLAB.
3- Type ***brainmap*** to command window of Matlab to open the Brainmap GUI.



4- You can change the canvas color by going to **Settings->Canvas Color**

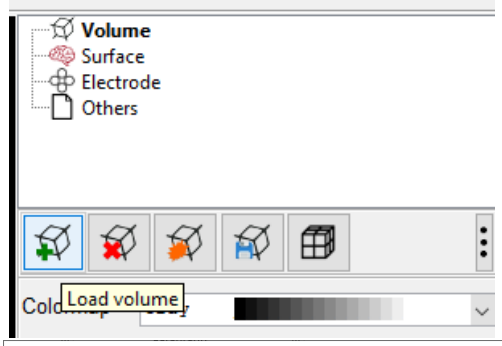


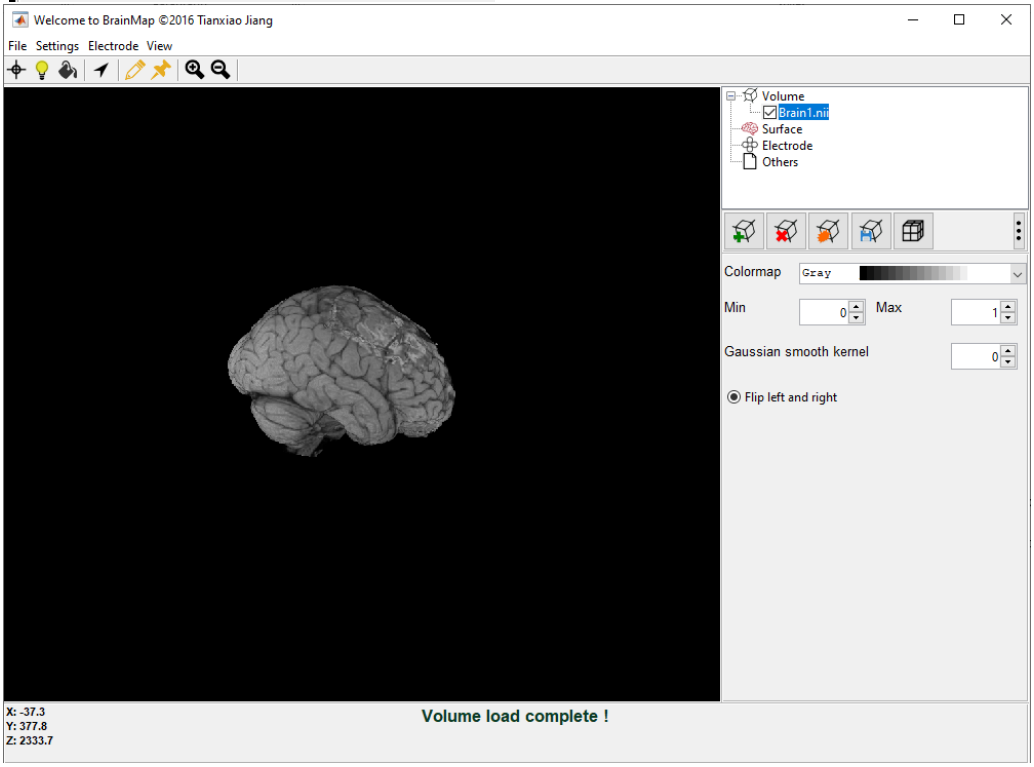


Loading the 3D rendering of the brain:

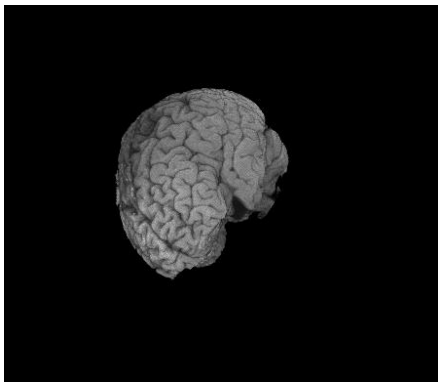
5- Click volume on the right tab

6- Click load volume (image with **green plus + sign**) and upload the Brain1.nii file.



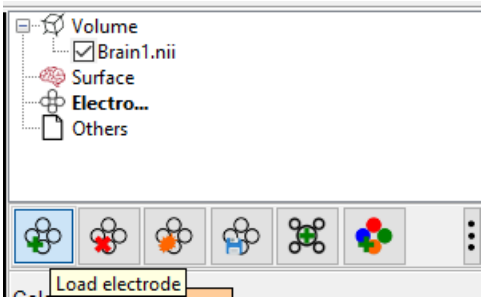


7- Using the mouse, you can rotate the brain at any direction
8- Use the scroll in the mouse to the brain in and out

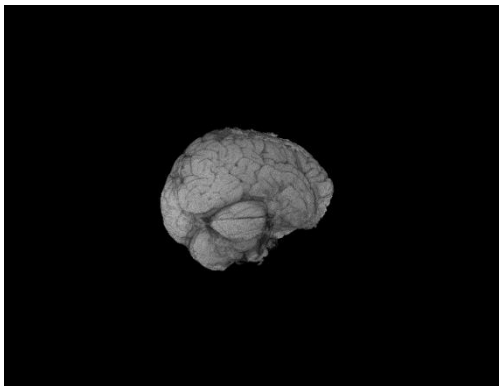


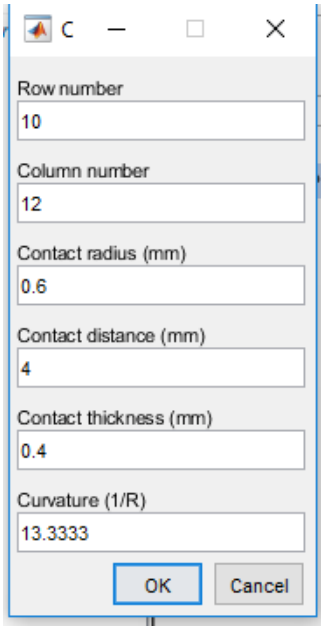
Adding electrode to the 3D rendering.

9- Upload electrode by clicking 'Electrode' and then the image with green plus + sign. Electrode is the .txt file used for grid real time mapping and CNEL position.

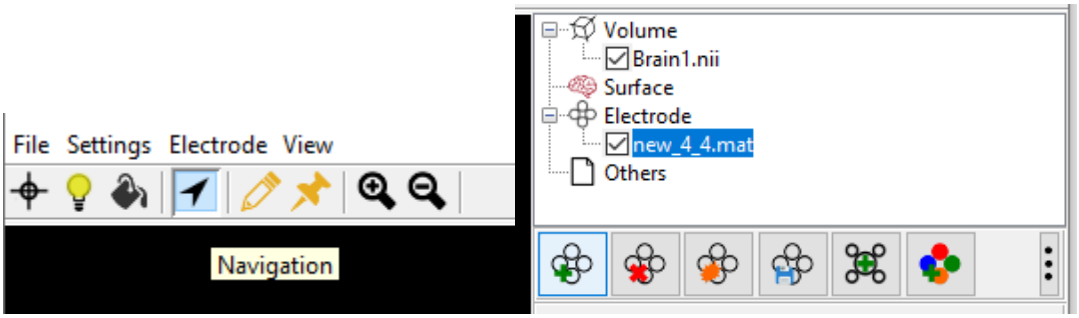


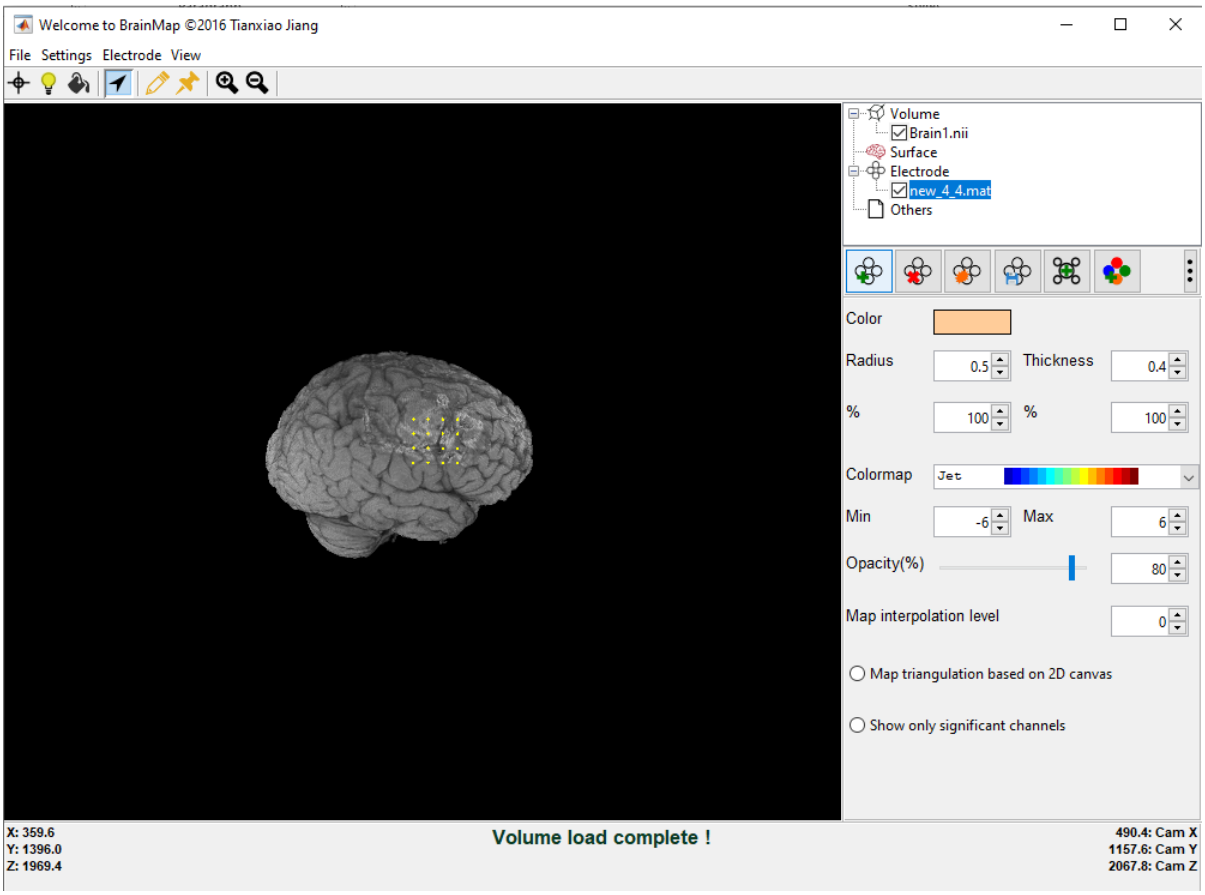
10- Create and add electrode by clicking 'Electrode' and then the image with green star * sign. Specify row number and other specifications as shown in image.



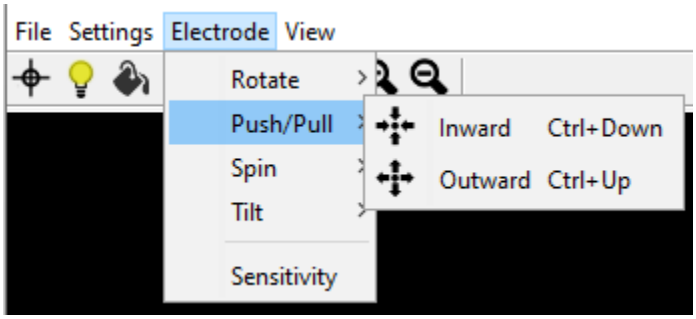


11- To move the electrode to desired location, select the navigation button and the electrode from the right column

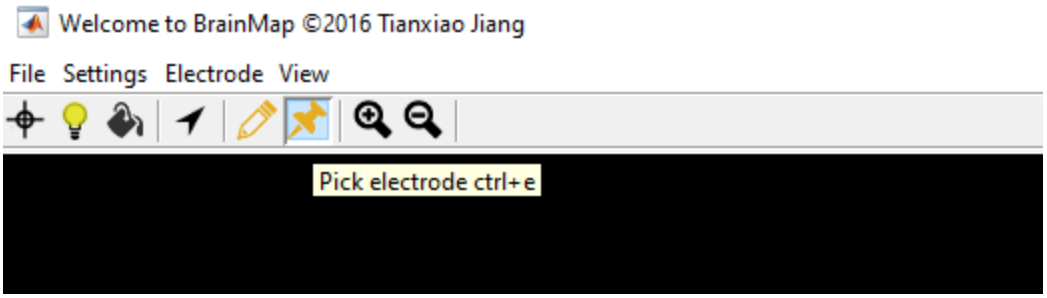




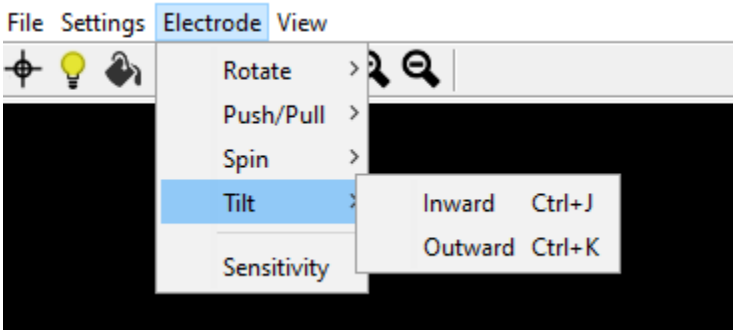
Use the arrow keys on the key board to move the electrode grid in any direction.
Use Ctrl+ left/right keys to rotate the electrode
Use Ctrl+ up/down keys to move in and out of the brain
More key instructions can be found in the Electrode menu



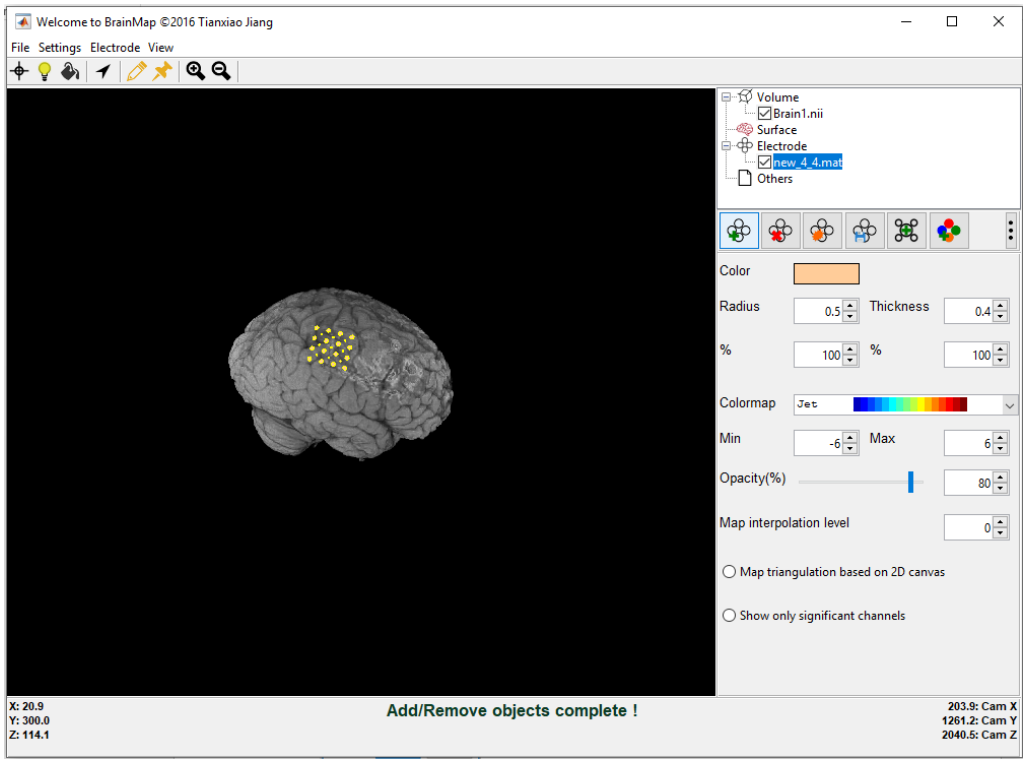
12- To tilt the electrode grid in any direction, first pick one electrode using the pick electrode icon



Then navigate to the electrode menu and click the tile based on the desired direction.



13- Select the interpolate to create an electrode in between 4 electrode



14- To view the electrode details, click the three dots (***more***) at the end of the row 

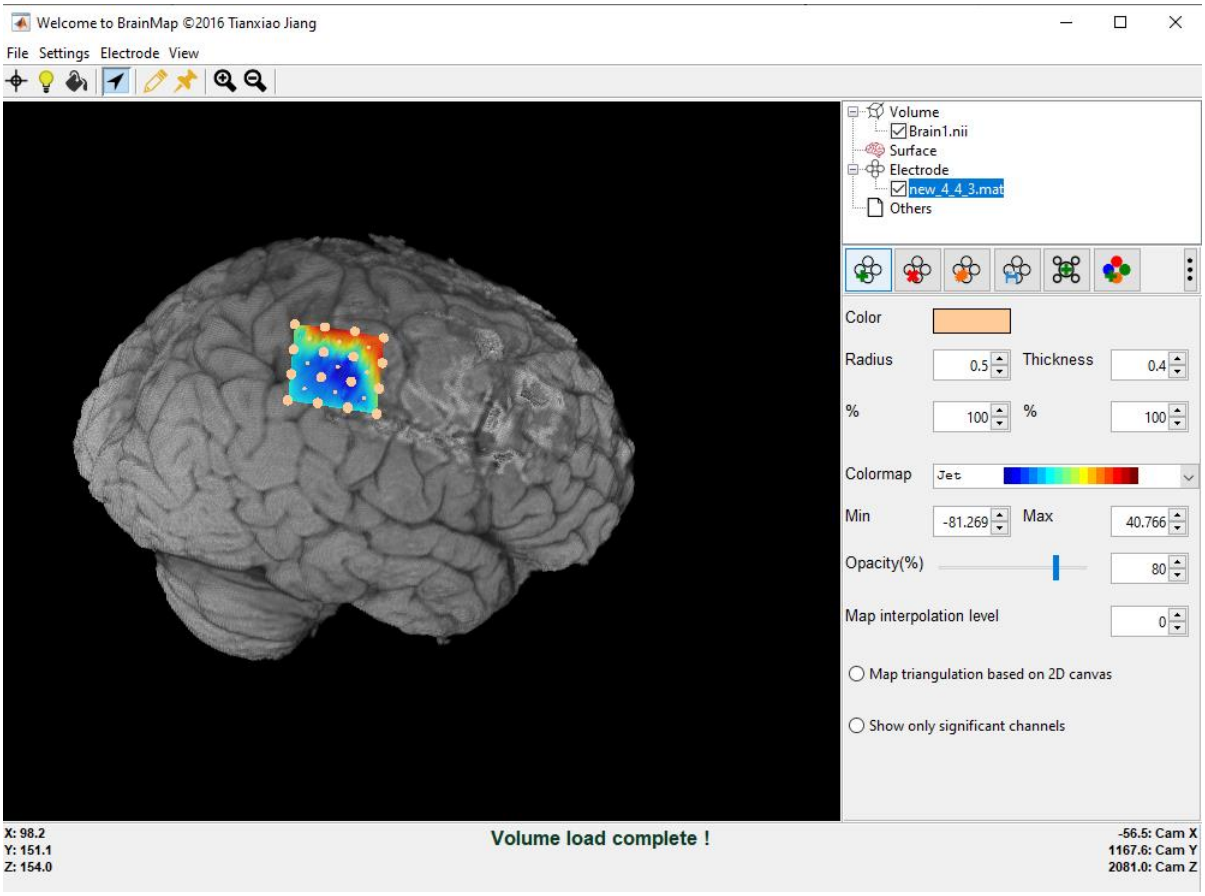
15- To add the heat map to the electrode grid, upload the saved heat map from CNEL Viewer using this icon. 

Electrode Settings

	Select	Name	Position			Norm			Radius	Thickness	Color	Value	Sig
1	☑	C1	171.4402	170.9885	145.3234	21.4402	20.9885	68.3234	0.6000	0.4000		NaN	0
2	☑	C2	162.1353	174.3546	146.7165	12.1353	24.3546	69.7165	0.6000	0.4000		NaN	0
3	☑	C3	152.5422	177.1424	146.9456	2.5422	27.1424	69.9456	0.6000	0.4000		NaN	0
4	☑	C4	142.8312	179.3027	146.0063	-7.16877	29.3027	69.0063	0.6000	0.4000		NaN	0
5	☑	C5	173.8532	179.6316	141.185	23.8532	29.6316	64.185	0.6000	0.4000		NaN	0
6	☑	C6	164.5483	182.9976	142.5781	14.5483	32.9976	65.5781	0.6000	0.4000		NaN	0
7	☑	C7	154.9552	185.7855	142.8071	4.95522	35.7855	65.8071	0.6000	0.4000		NaN	0
8	☑	C8	145.2442	187.9458	141.8679	-4.75575	37.9458	64.8679	0.6000	0.4000		NaN	0
9	☑	C9	176.065	187.6772	135.8908	26.065	37.6772	58.8908	0.6000	0.4000		NaN	0
10	☑	C10	166.7601	191.0432	137.2839	16.7601	41.0432	60.2839	0.6000	0.4000		NaN	0
11	☑	C11	157.167	193.8311	137.5129	7.167	43.8311	60.5129	0.6000	0.4000		NaN	0
12	☑	C12	147.456	195.9914	136.5737	-2.54397	45.9914	59.5737	0.6000	0.4000		NaN	0
13	☑	C13	178.0363	194.9824	129.5347	28.0363	44.9824	52.5347	0.6000	0.4000		NaN	0
14	☑	C14	168.7314	198.3484	130.9278	18.7314	48.3484	53.9278	0.6000	0.4000		NaN	0
15	☑	C15	159.1383	201.1363	131.1568	9.13828	51.1363	54.1568	0.6000	0.4000		NaN	0
16	☑	C16	149.4273	203.2966	130.2176	-0.572693	53.2966	53.2176	0.6000	0.4000		NaN	0

new unselect delete

The file is usually a text or excel file.



You can control the opacity and the interpolation level of the heat map.
You can choose which channels are significant from the Electrode details and show only those channels.