ElectroMap Basic Analysis and Mapping Work Flow

- Open file “ElectroMap.m”,
- This will open up MATLAB software and load the “ElectroMap.m” in the Editor tab
- Click on the Run button at the top of the MATLAB (see Figure 1)

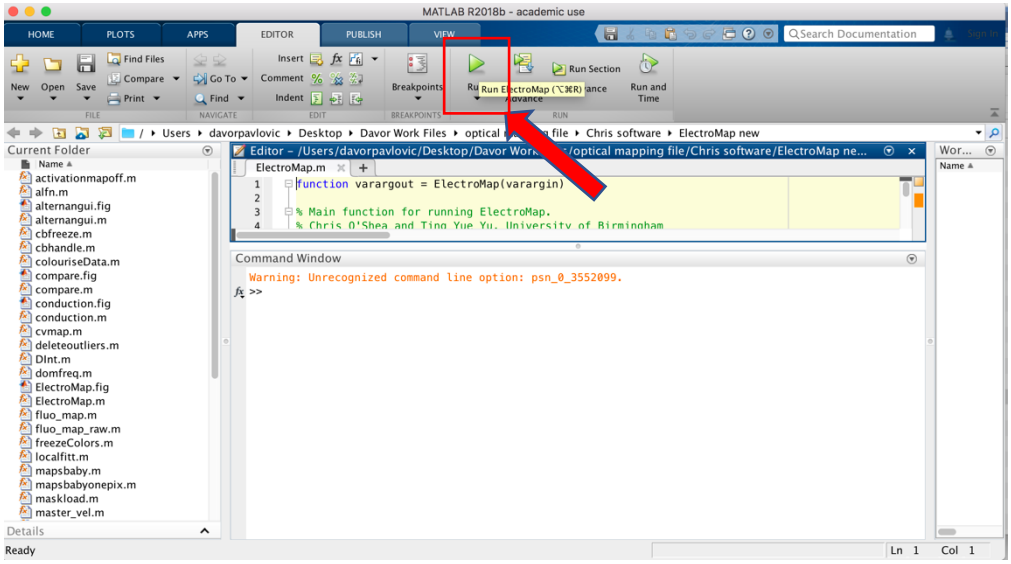

Figure 1. MATLAB graphical user interface with the ElectroMap.m file loaded. Run button highlighted.

- ElectroMap will open up.
- Click on the “Select Folder” in the top right-hand side to select the folder where the data files are located (See Figure 2).

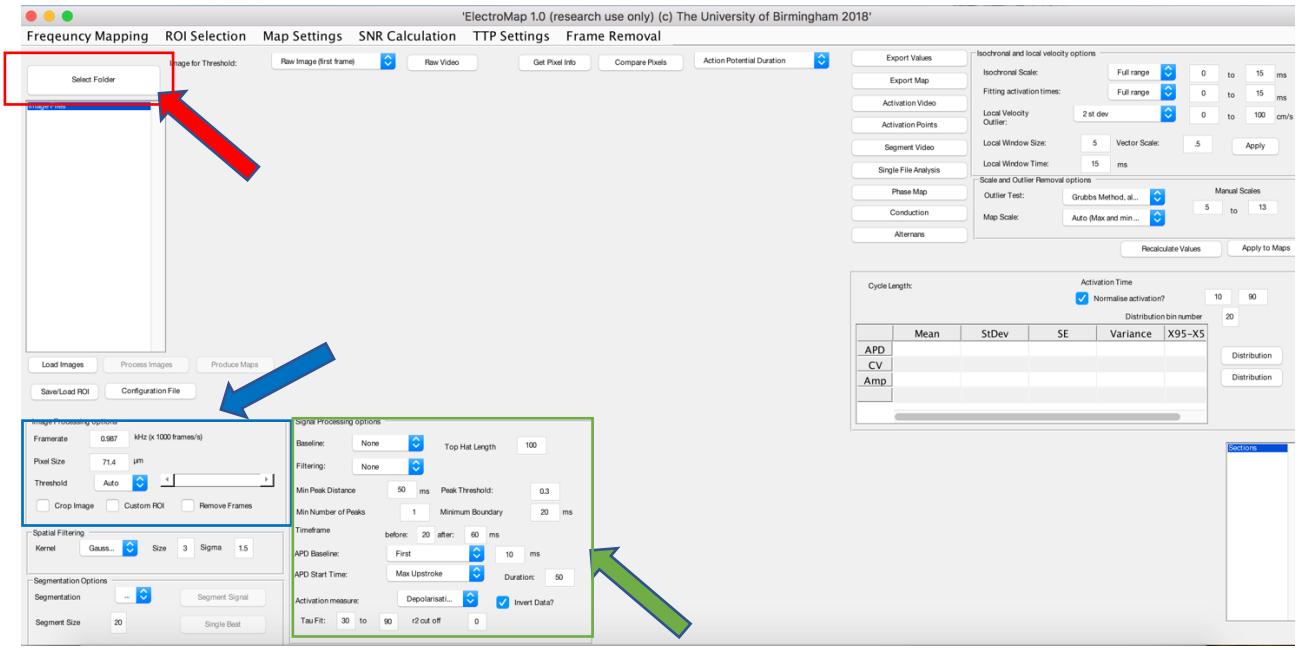

Figure 2. ElectroMap graphical user interface. “Select Folder” button highlighted in red. Image processing options highlighted in blue. Signal processing options highlighted in green.

- The data files (tiff stacks) present in the folder will load up in the box below.
- Select the data file (file will highlight in grey) and press “Load Images” button, this will load the image into the ElectroMap, see Figure 3.

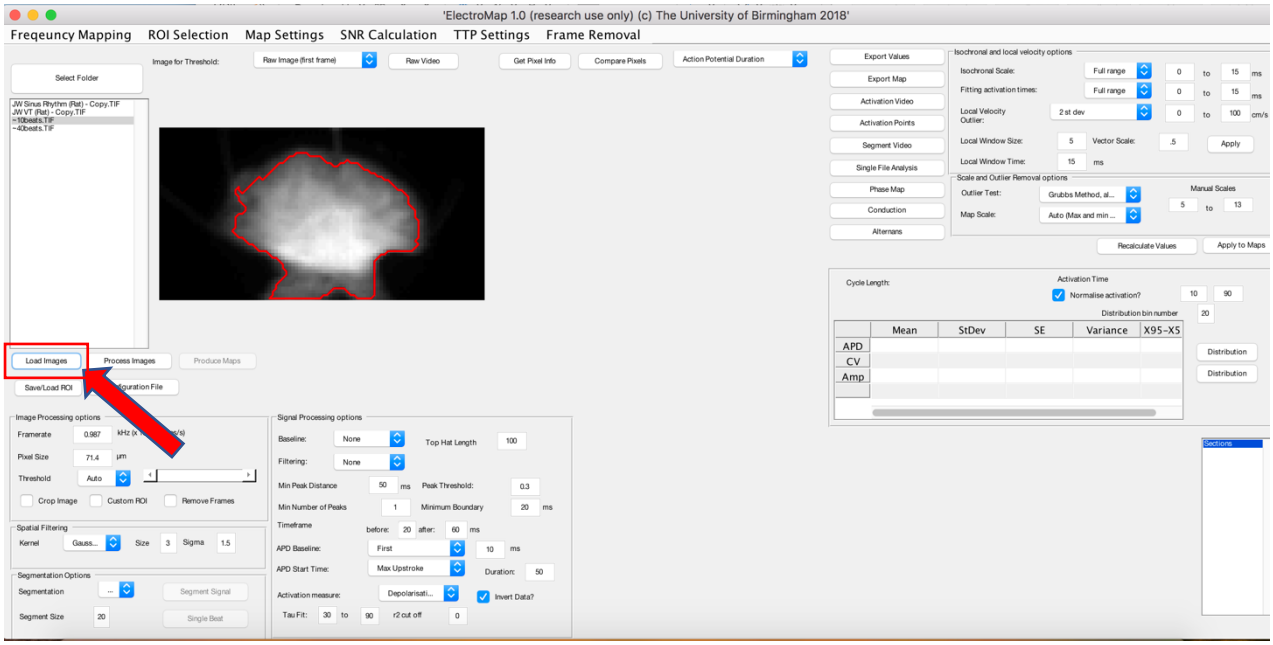

Figure 3. “Load Images” button highlighted in red.

- **IMPORTANT** - Change the image processing options accordingly.
  - If the data was acquired at a frame rate of 1000Hz and pixel size is 71 microns, add these measurements into the boxes highlighted in blue.
  - Selection of a region of the image to be analysed can be set to:
    - Threshold (Auto) but can be changed to “Manual”, see slider to the right
    - Crop, Custom Region of Interest (ROI) and Frame Removal options can also be selected.

- Select the signal processing options including:
  - Baseline – normalises baseline drift
  - Filtering – filters the data
  - Min peak distance – sets distance between peaks
  - Timeframe- sets the duration of the AP or Ca transient
  - APD baseline - sets where to search for baseline in relation to peak
  - APD start time – sets the APD/CaT start time
  - Duration – type in the APD/CaT value (10-90%)
  - Activation measure – sets the activation time
  - Invert data box – signals can be inverted by ticking the box
  - Tau fit – sets the fitting time and r^2 values for the decay function
- Click on the “Process Images” button and the software will display the mean voltage/calcium signal from all the pixels selected.
- Click on the “Produce Maps” button (Figure 4 highlighted in red) to map the data from every pixel.

- Data are displayed in the GUI both as a map and as mean APD/CaT duration, conduction velocity (CV), amplitude (amp) and signal to noise ratio (SNR), see Figure 4, highlighted in blue.
- **Optional** – Users can segment the signal in any segment size or by single beat by using the segmentation options in Figure 4, highlighted in green.
- **Optional** – Users can choose to map different parameters (see foldout options in Figure 4 highlighted in yellow) by selecting:
    - APD/CaTD
    - Isochronal map
    - Isochronal map with vectors
    - Frequency Map
    - Diastolic Interval
    - Time to peak
    - Relaxation constant (tau)
    - Signal level
    - Signal to noise ratio
- **Optional** – Users can choose to export maps or data by pressing the Export Map or Export Values buttons.
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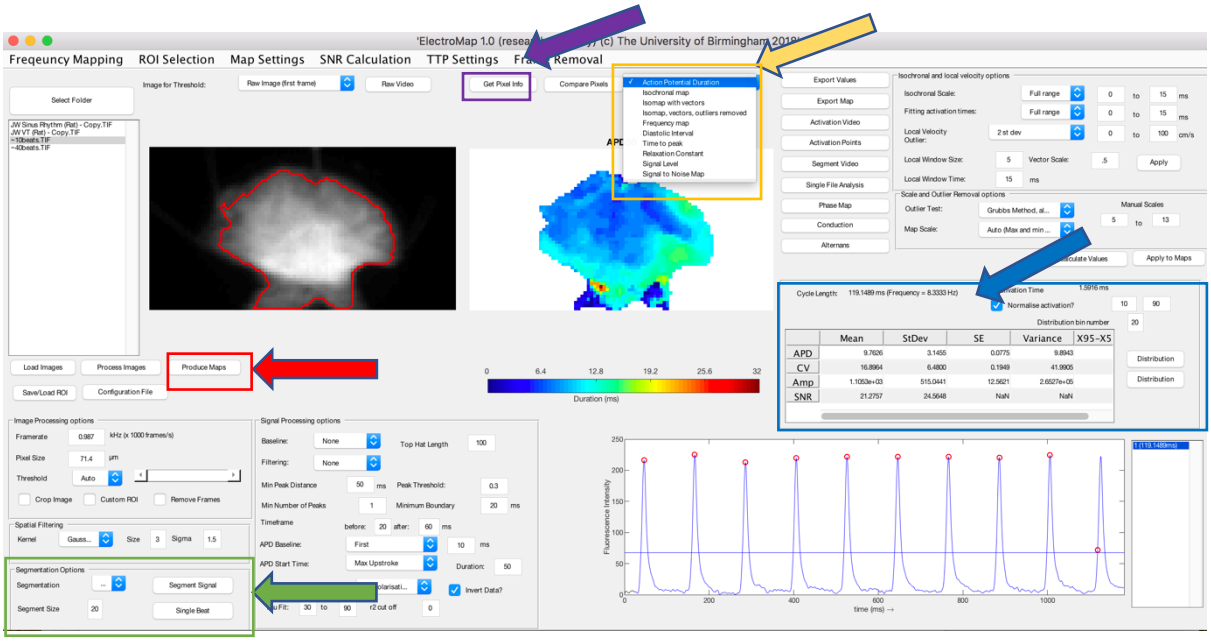

Figure 4. Graphical User interface of ElectroMap with: "Process Images" button, highlighted in red, Segmentation options highlighted in green, Mean values displayed in the table highlighted in blue, different mapping options highlighted in yellow. "Get Pixel Info" button highlighted in purple.

- Optional – To plot waveforms and get single pixel APD/CaTD data click on "Get Pixel Info" button (Figure 4, highlighted in purple). Pop up window will open up, see Figure 5. Click anywhere on the image to display waveform and APD/CaTD and decay (tau) values.

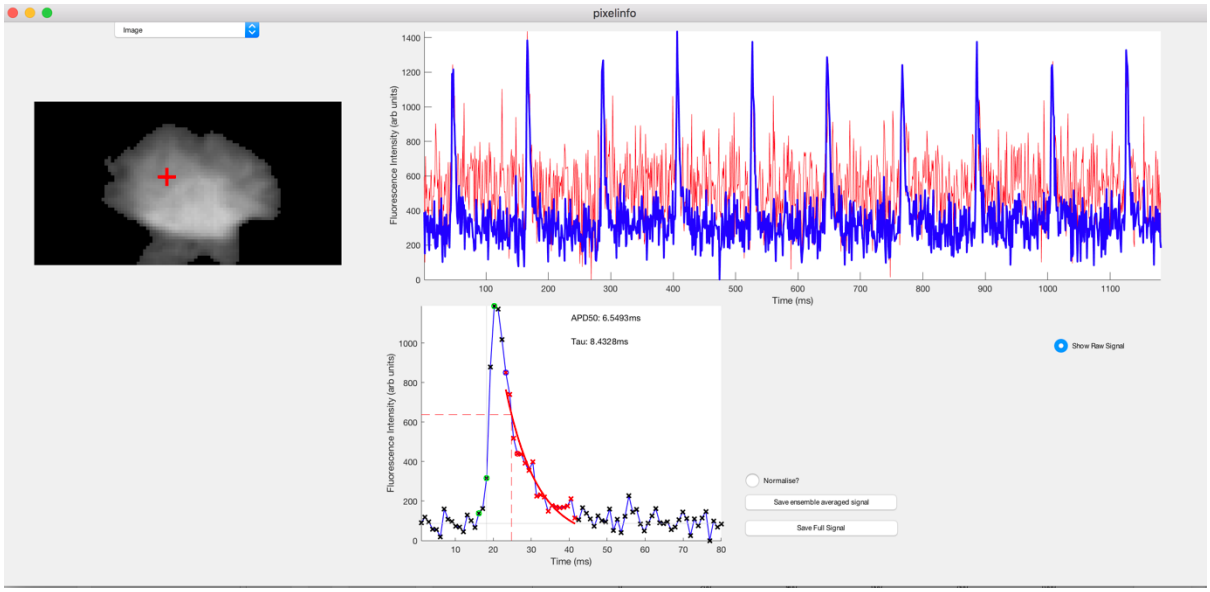

Figure 5. Graphical User interface of “Get Pixel Info” analysis pop up, displaying waveform and APD/CaTD and decay (tau) values from the selected pixel (red cross shown on the image).