Plotting Calcium and Contractility in Excel

The following technical note describes a method for plotting calcium and contractility on the same time axis in Excel. In this example, I've exported and plotted both sarcomere length and fura ratio. In order to convert this trace data into a representative graph, we'll need to select and export the data in IonWizard and then interpolate one data stream and plot it in Excel.

Exporting

Begin by selecting the appropriate data traces over the appropriate time frame. Average the data transients to minimize noisy data. Averaging is a useful tool to reduce trace noise, but it must be used sensibly. Averaging is appropriate only when the variation between transients is not physiological or significant to the process being observed or measured. Detailed instructions for averaging can be found in the transient analysis tutor located on our website. Make sure that the second trace viewer shows the faster recording (the macro in Excel has been written to interpolate the first data series). In the example below, the sarcomere length data was recorded at 240Hz and the fura ratio data at 500Hz. The sarcomere data is shown on top.
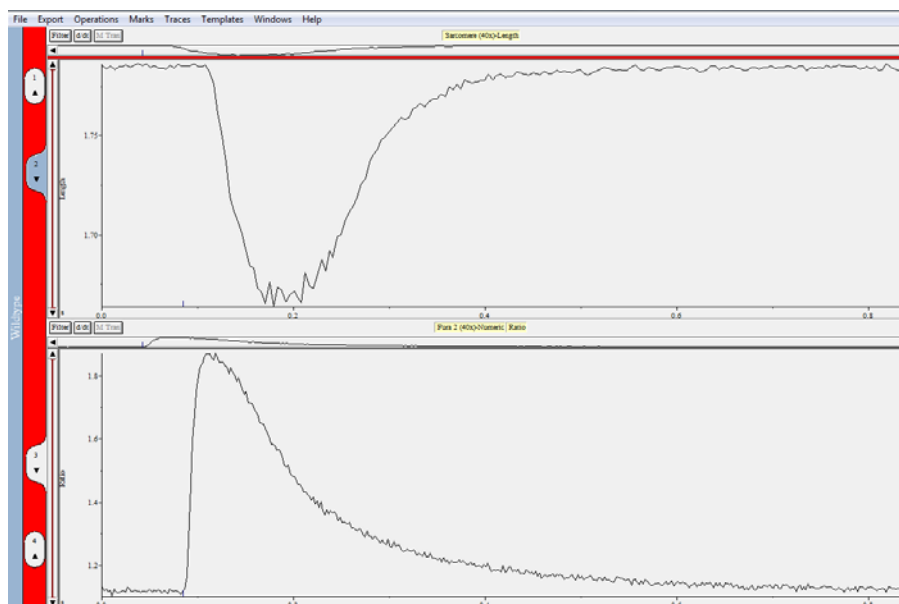

Figure 1. Averaged Data.

Once the appropriate data has been averaged, choose Export>Current Traces. Choose the clipboard as the destination and select OK. Make sure that you've chosen to display at least 3 decimal places (you can select the decimal places from "Options" in the bottom right of the "Export Current Traces" window).

Graphing in Excel

A difficulty that arises when plotting two data traces sampled at different rates because each data trace has a different number of data points over the same period. One of the data traces must be interpolated so that both data series contain the same number of data points. In other words, new data

must be constructed such that data points exist at the same time points for both data traces. We're going to interpolate the slower data series to the faster one. This is done so that we don't lose data from the faster recording. In this example, we're going to interpolate the sarcomere length data.

Download and open the macro located in [Plotting Hysteresis Loops](#) on our website. Make sure to enable macros. Paste the data exported from IonWizard into cell A1 of the spreadsheet and select the top leftmost data cell.
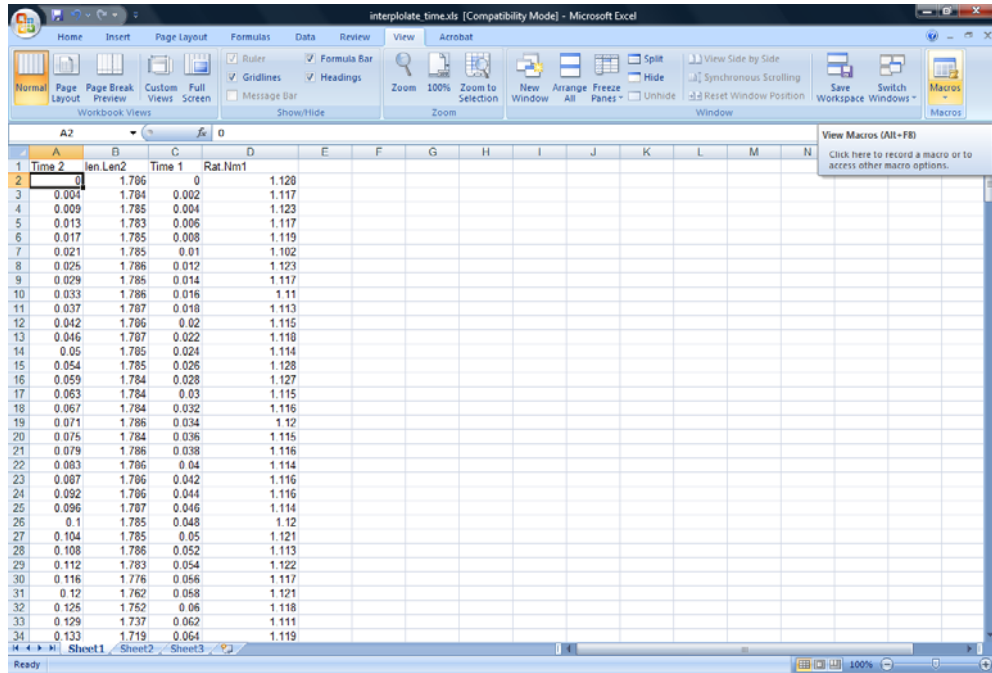

Figure 2. Data pasted into Excel spreadsheet, top leftmost data cell selected.

To run the macro in Office 2007: select Macros>View Macros from the View tab. In older versions of Excel: Select Tools>Macros. Under the "Macros" submenu and then select the "Macros…" item.)
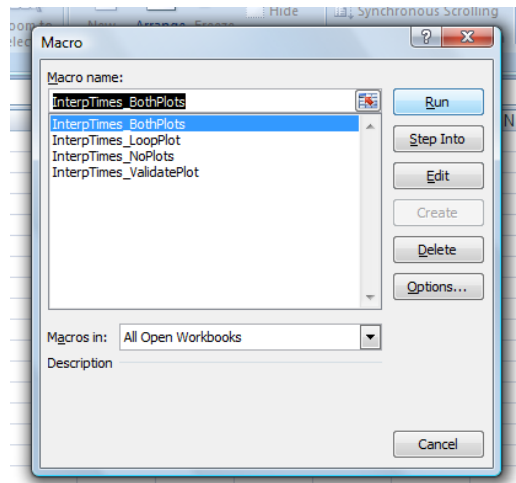

Figure 3. Macro dialogue in Excel.

Choose InterpTimes_BothPlots and select Run. A new dialogue window will appear (fig. 4). Click yes.
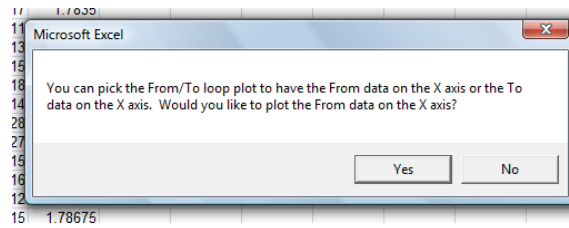

Figure 4.

This will create two plots. The topmost plot will show the interpolated sarcomere length and fura data plotted against time. The bottom plot will show sarcomere length plotted against fura ratio. Unless you're interested in contractility *versus* calcium response, you can ignore the hysteresis plot.
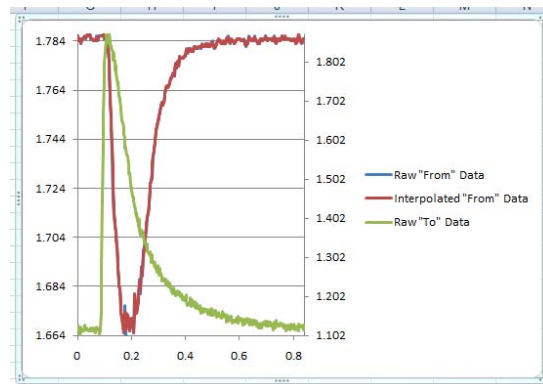

Figure 5. Calcium and contractility versus time.

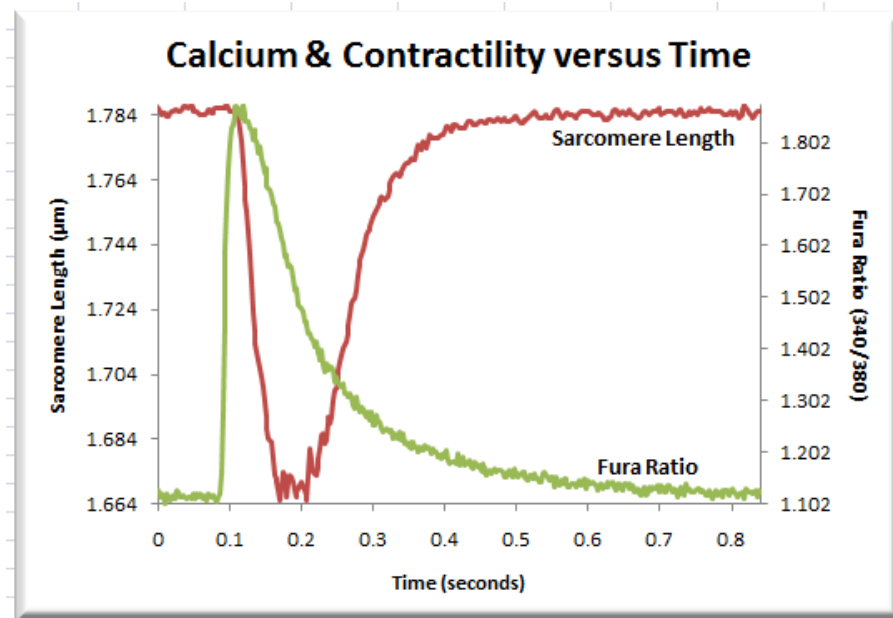Once the data has been plotted, you can modify it to suit your aesthetics.

Figure 6. Final graph.