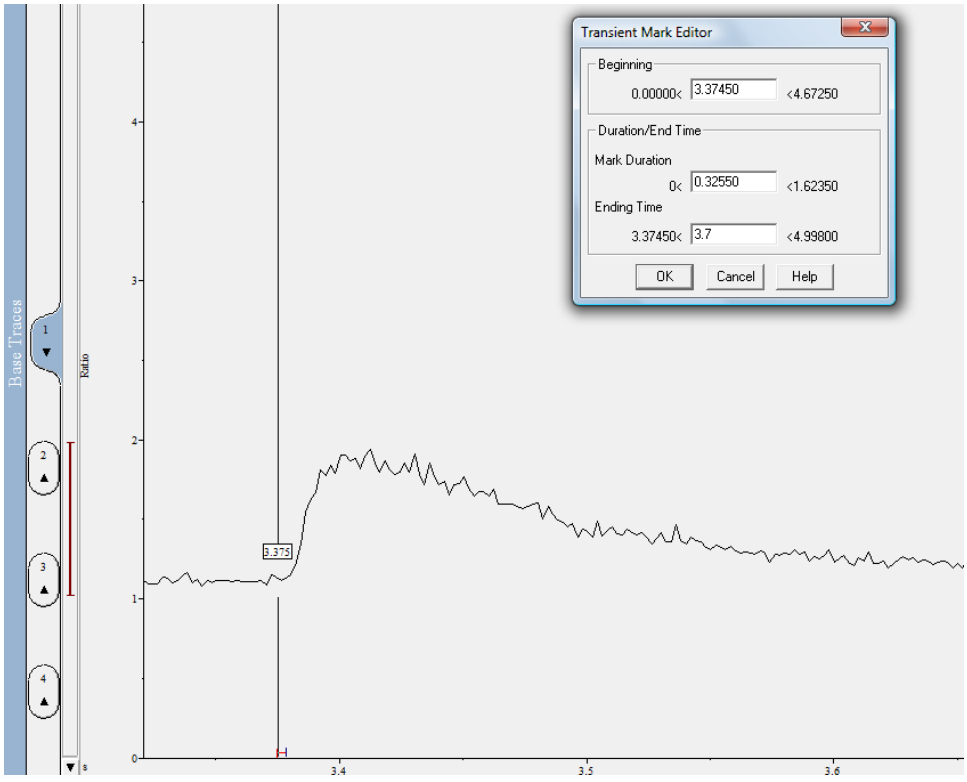
Analyzing Spontaneous, Untriggered or Otherwise Unmarked Events

In order for IonWizard to fit untriggered events (transients that are not preceded by a field stimulator synchronization mark), you'll need to tell the software where the event begins or, alternately, tell the software to look for the events for you. Typically, the former choice will yield more predictable results while the latter facilitates the analysis of larger sets of results. The following describes how to accomplish both of these…

Manual Determination of Transients

1. Manually insert your beginning transient mark where you believe the event begins. To do this, hold the shift key and right-click on the mouse along the x-axis corresponding to your best approximation of the beginning of the event.



2. Choose an appropriate duration or end time and click OK. The end mark should appear after the event is over (the data has returned to baseline).

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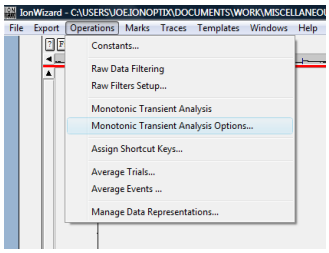
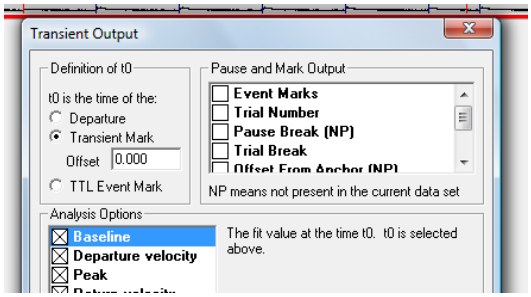
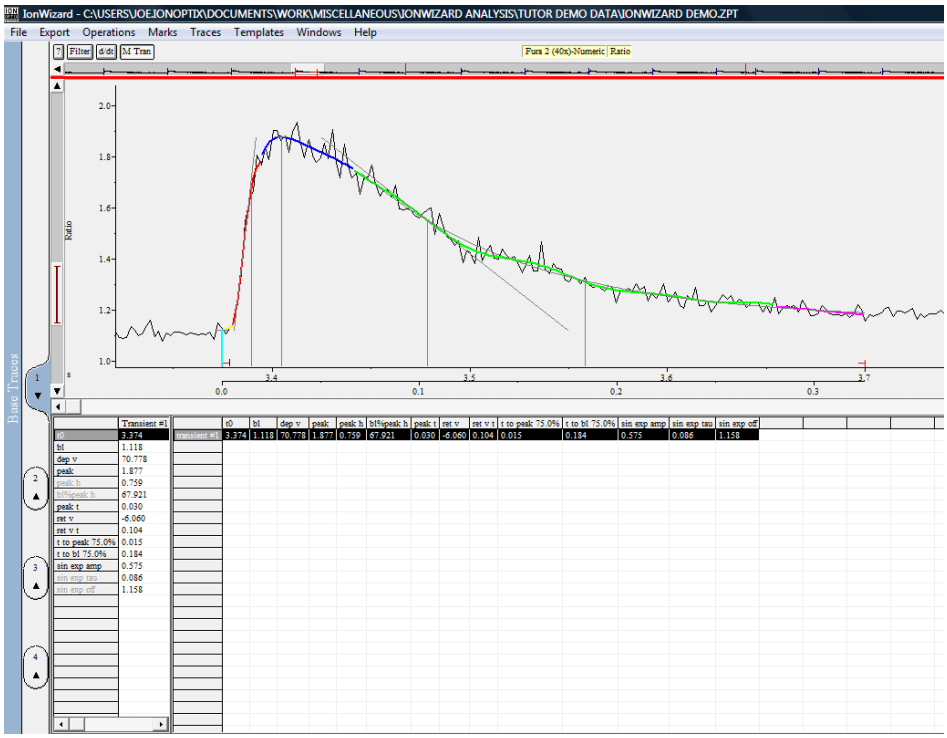
3. Under Operations, select Monotonic Transient Analysis Options…



4. In the upper left of the dialog window, choose Transient Mark (leave the offset at 0.000).



5. Click OK and run the analysis. Time 0 (t0) will be user-defined rather than based on the stimulator mark. Everything else will be the same as a typical analysis.



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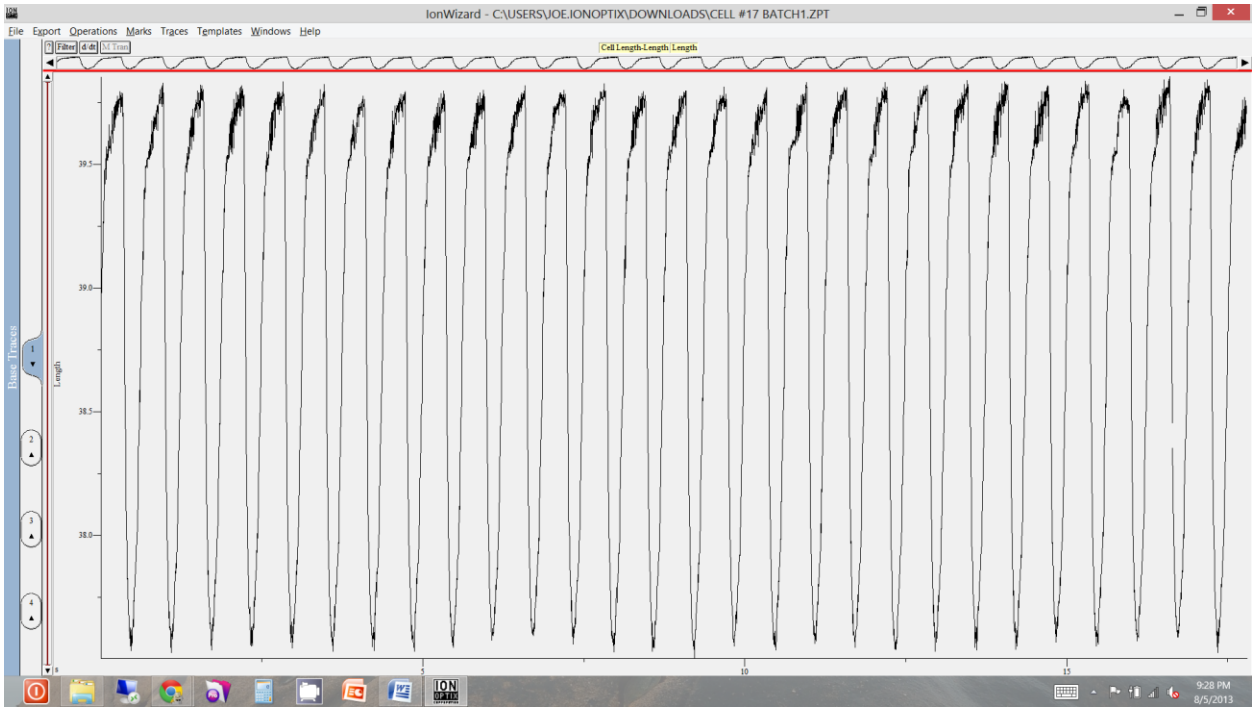
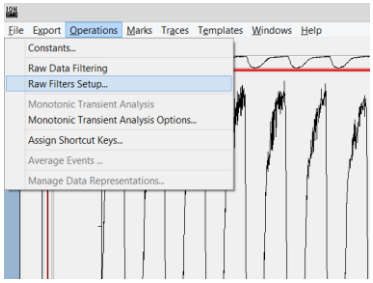
Software Determination of Transients

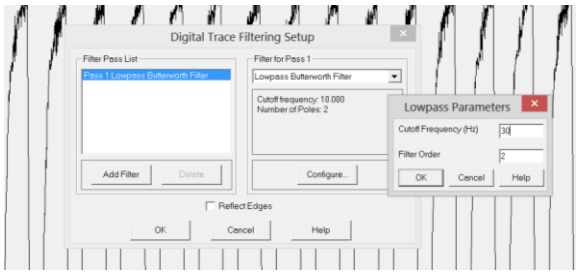
1. Open your data file and select only your trace(s) of interest (cell length for the following example).



2. Open Operations>Raw Filters Setup...



3. The default filtering is commonly too aggressive and will over-filter the data, resulting in artifacts. Choose a higher frequency cutoff. I typically use the Lowpass Butterworth at 30Hz.



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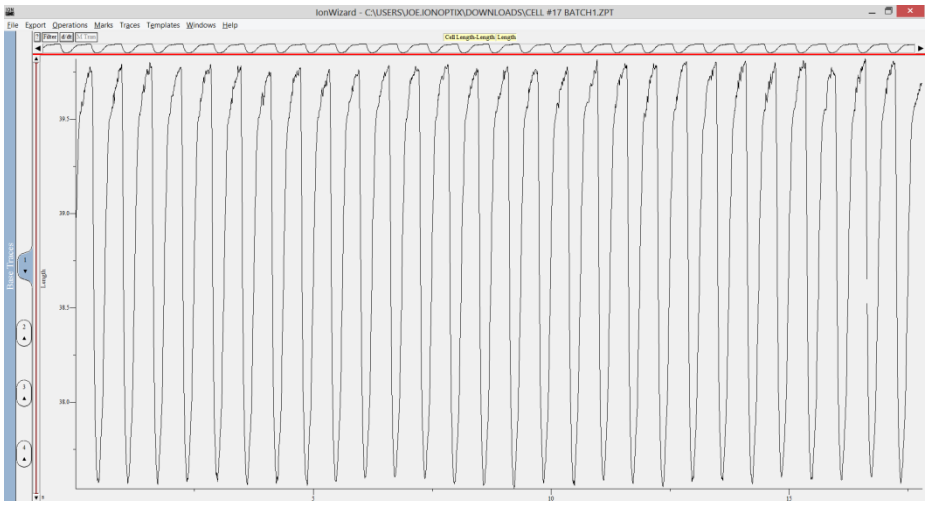
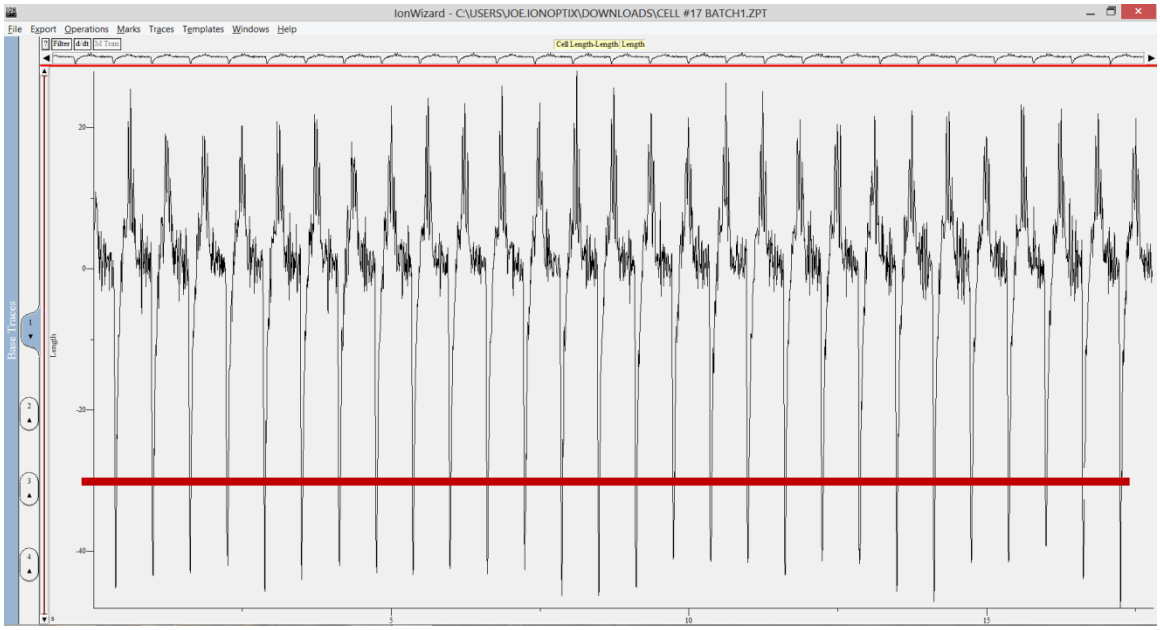
4. Select the Filter button and visually inspect the data to make sure that the data hasn't shifted significantly in either the y- or x-axes. (Filtering allows the software to generate a cleaner derivative, which we will need in the following step to determine the presence of departures from the baseline.)



5. If you see a significant deviation in the data in either magnitude or time, redo step 4 and choose a less aggressive filtering option. Try a higher frequency or another filtering algorithm. In the example above, I do not see any significant deviation, so I will proceed to the next step: Select the d/dt button and note the magnitude of the responses. We will use this to help the software determine where to place the transient marks. In the following example, a safe threshold would be -30 as noted by the red line that I've added.



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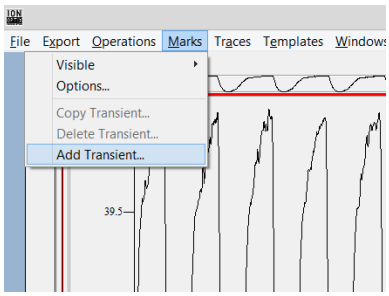
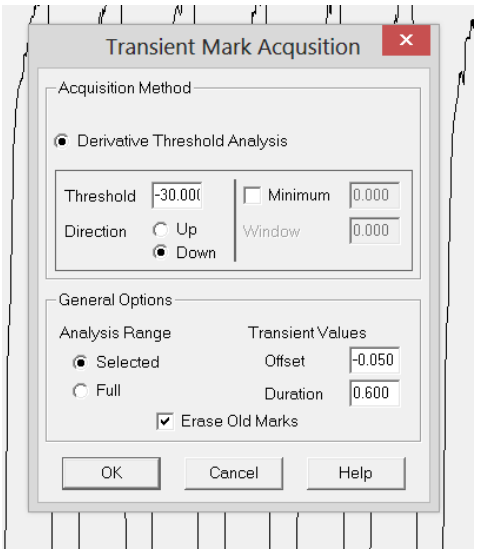
6. Deselect the derivative fxn ("d/dt"). Now select Marks>Add Transient...



7. Select the "Derivative Threshold Analysis" radio button. Choose the appropriate value from step 5 above for the threshold (-30) and down as the direction. Also, make note of the average duration of the transient events. In the example that I'm working with, there are approximately 16 events over 10 seconds which yields an average duration of about 625 milliseconds. The software will not allow the same data to be analyzed twice, so the analysis periods cannot overlap. I am choosing the longest duration that I can without overlapping the marks, so just under 0.625 sec (I've chosen Duration: 0.600). There needs to be sufficient offset for the software to establish a baseline. 50 milliseconds is a safe bet and should be more than enough. You don't want this value to be excessive either as it will start to back into the return phase of the previous event. Select OK.



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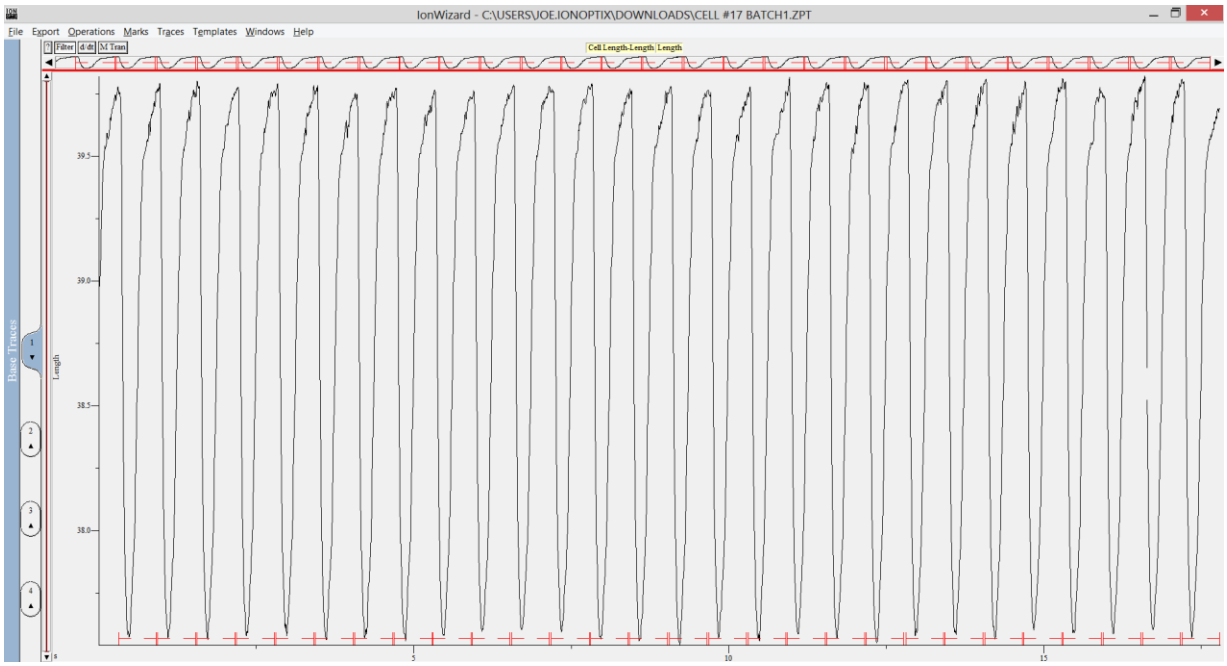
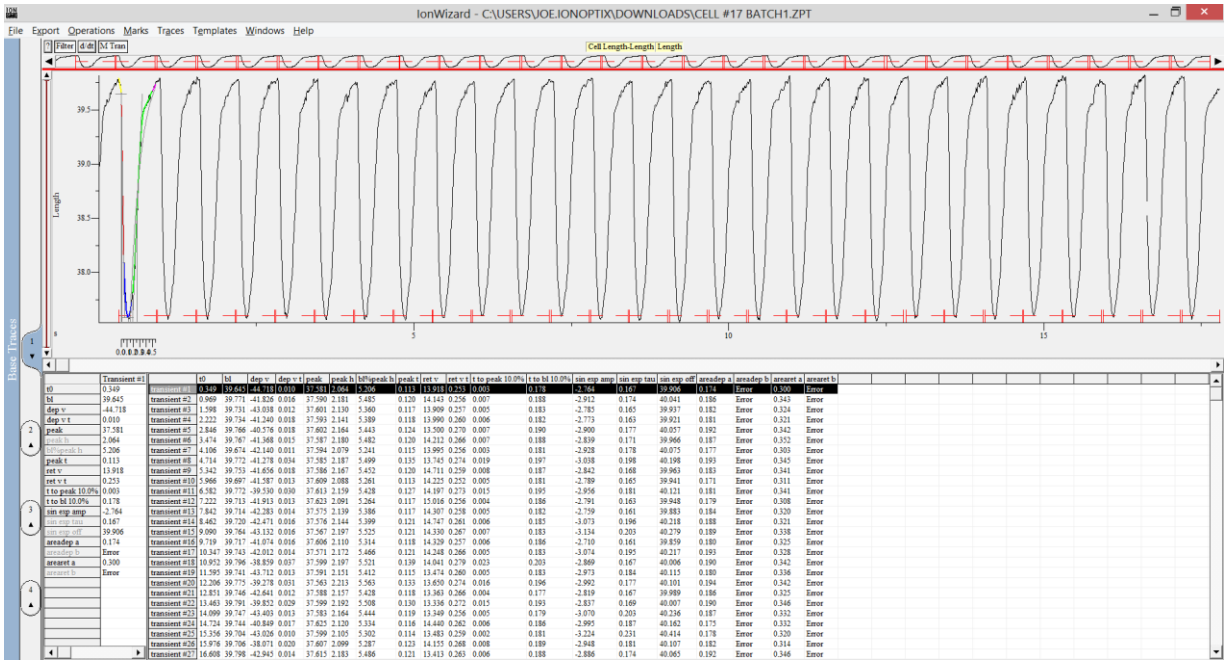
8. Note that the red transient marks appear. They should bracket each event, with the beginning mark appearing on the x-axis before the data begins to depart from the baseline and the ending mark appearing after the data has returned to the baseline. Sometimes a concession must be made if the data does not return completely until just before the next departure phase.



9. Select the M Tran button.



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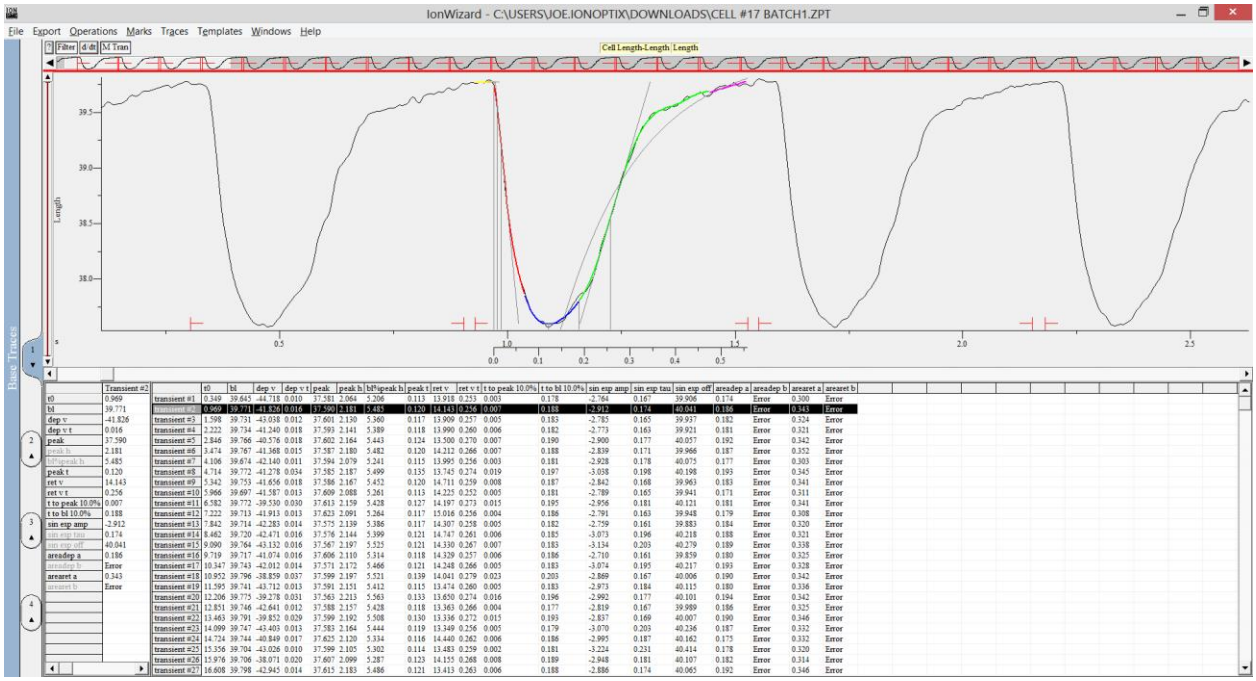
10. Each transient event should be analyzed successfully. You can inspect them by zooming in on a few seconds worth of data (hold the right mouse button down and drag over a few seconds worth of data in the time bar above the trace; make sure to release the button while it is still within the time bar).



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