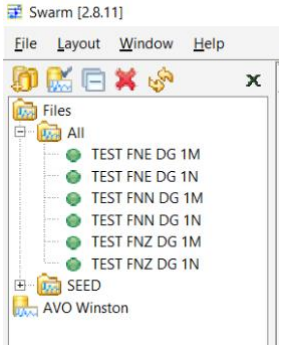
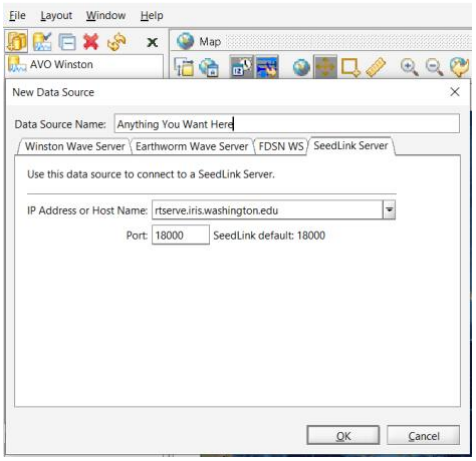
Swarm Tutorial

At this point, it will be assumed that the modified version of Swarm is now downloaded onto your machine. This will be a walkthrough on what to do next in order to use swarm and all of its native features as well as features we have implemented in.

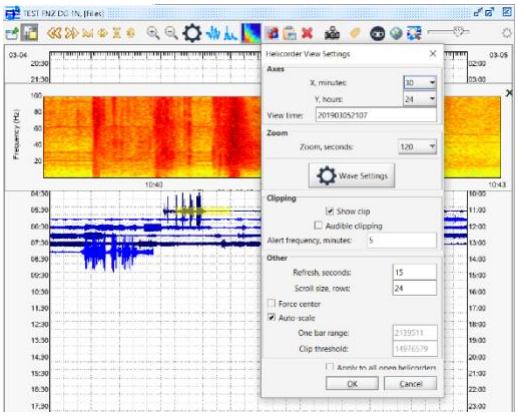
First go to the top right, select file, and open file. Browse for the MiniSeed data you'd like to import, select one or multiple files, and click open. All sensor data should now appear on the left-hand column for you to select.



If you would like to add a real time data stream from IRIS, select the left most button with the cylinders and plus icon. Once a new window appears, select the right most tab named "SeedLink Server", click the drop-down menu for "IP Address or Host Name" and select the "rtserve.iris.washington.edu" option. Keep the port at 18000 and name the data source in the top box. This name can be anything you'd like.



Now, double click on the channel you'd like to view, either one that was imported via MiniSeed or one from a live server. You should be prompted with a helicorder view, with your mouse pointer as a crosshair. You can now select a portion of the seismic data to view in a pop-up window, which should automatically default to a spectrogram view.



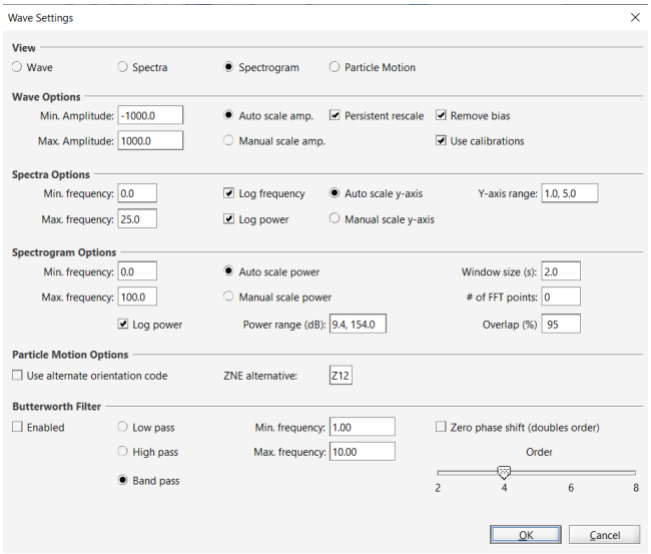
Notice the yellow box where you clicked, this is what portion is being zoomed in on the spectrogram. You can change how much you want to see by selecting the magnifier icon on the top tray, using the "–" to expand the zoom window and show a larger range of time, and the "+" to do the opposite.

You can also change the amount of time being zoomed in by clicking on the top left icon as seen below. You can then

At this point you can go in and change the wave view settings by selecting the icon you see on the right. You should now be greeted with a window that shows the settings and what is able to be changed. Of main importance are the Max/Min spectrogram frequency views, the log power function, the auto scale function, and the Butterworth filter at the bottom.

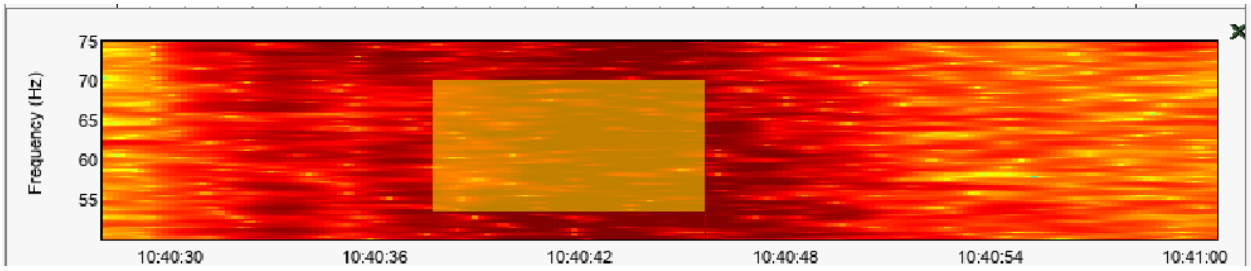
Be sure you are changing the settings for the spectrogram, as this window will allow you to change all the view settings, but they don't carry over. Make sure log power is checked, and that power is auto scaled. Also make sure the overlap % is set to 95 (it's highest setting), this is simply the quality of the spectrogram view. All of this should be done by default when you load our custom version of Swarm.

At the bottom you can also enable a filter to only show selected ranges if you are targeting a certain frequency.

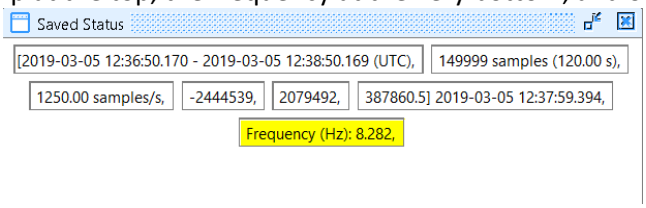


If at any time, you want to see a different view rather than a spectrogram, you can simply use the buttons along the top to change view, or right click within the spectrogram window to switch between wave, spectra, spectrogram, and particle motion.

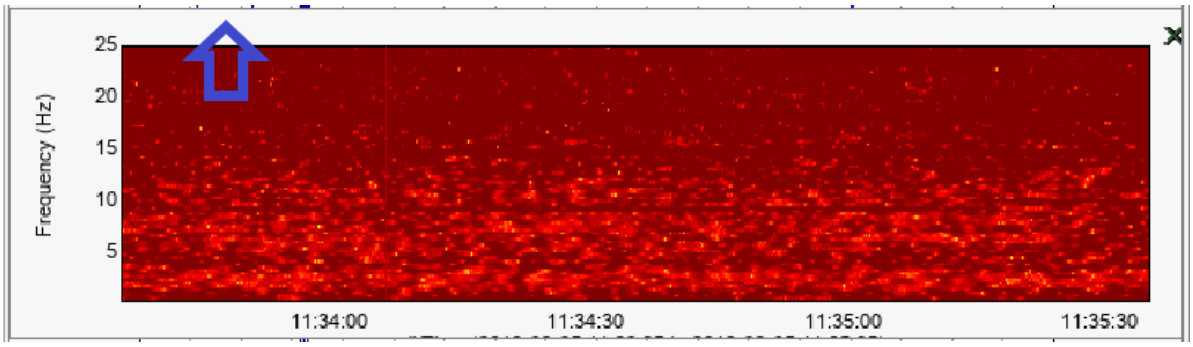
While in the spectrogram view, you can use your mouse to click and drag, creating a window within the spectrogram to zoom in on. In our updated version, this supports both X and Y zooming, being able to narrow down both frequency ranges and time ranges. To leave this zoomed in view, simply press the small “X” in the corner of the spectrogram view, and it will open back up to the normal wave view settings upon reopening. If you want to un-do this zoom, hit the Backspace key on your keyboard.



Also, while in this spectrogram or spectra view, you can have a separate box appear with a saved frequency, channel name, and time (or power, channel name, and frequency for spectra) “screenshot” for reference. To do this, simply hover your mouse over the section of the spectrogram/spectra you want, and then hit the space bar on your computer. This will bring up a separate smaller window which shows the date/time stamp at the top, the frequency at the very bottom, and other data in the middle.



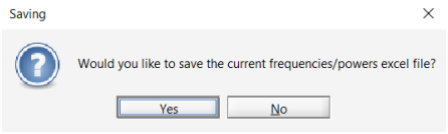
To open more pop-up windows, you must go and re-select the spectrogram/spectra window. To do this, do not click on the spectrogram/spectra itself! This will zoom in the view on the clicked point. Instead, click in the white space just above the spectrogram view, as seen below dictated by the blue arrow.



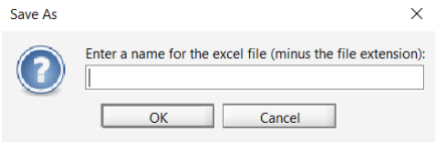
This also works for the Spectra view (power vs frequency). Just follow the same steps.

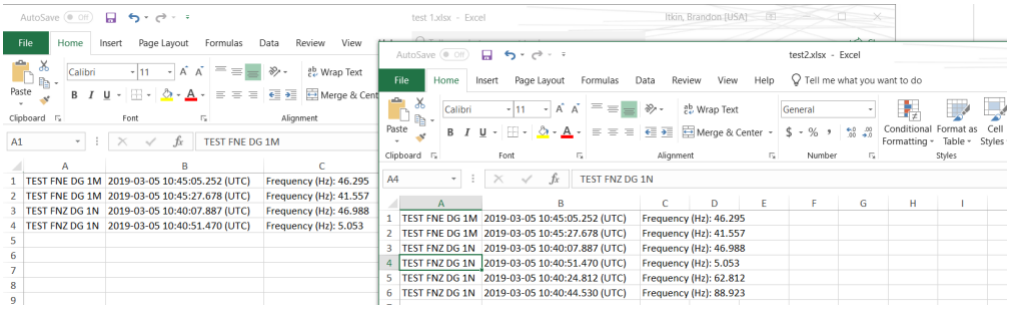
Every time you hit the space bar, the frequency, channel name, as well as time stamp will be exported to an excel document. This document will be saved to your swarm directory. It can be found by going to where Swarm is installed on your computer, typically in C:\Users*YOUR NAME*\git\2Swarm\bahswarm . The name of this file will be inputed by you via a prompt within the application.

You can extract data from multiple different channels/miniSeed files, all into the same document. Once you close one of the helicorder views, the application will prompt you to save or not save, and then to name the file. Click “yes”, then type the name of your file, then “okay”. For an example, we will call this file “Test1”.

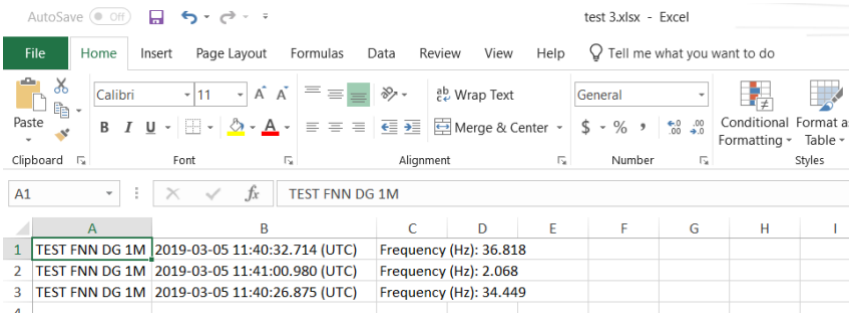


If you had multiple helicorders open, you can now continue to add inputs from the still open helicorders. These will go into a new file, keeping the data from the first saved file as well. When this helicorder is closed, you will again be prompted to save and name the file. This file, we will call “Test2” will now have all the data from Test1 as well as any additional space bar inputs you made after closing the Test1 helicorder.





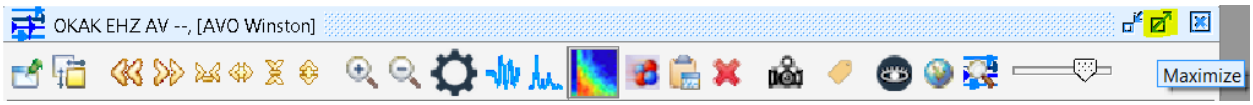
If you would like a new spread sheet with only the data after your Test1 data, simply close out of both helicorders, and open up the one you would like to input data to. Once all helicorders are closed, you will now be starting from scratch, with no previous data in your spreadsheet, as seen below.



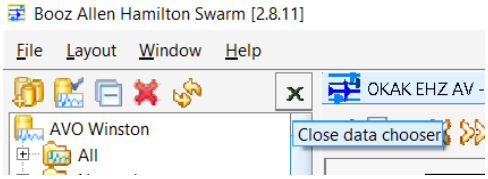
Please note, the excel file must be closed when you are trying to add new events. You can however delete entries from the excel document.

While doing all of this, at any time if you would like to go into full screen (kiosk) mode, simply press F11 on your keyboard. To exit this view, press F11 again.

If you do not want to go into kiosk mode but would like to see the spectrogram on a bigger scale, press the maximize button at the top left of the window, as seen below.



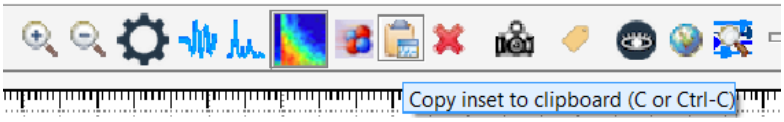
Then the "X" near the top left of the entire screen, as seen below.



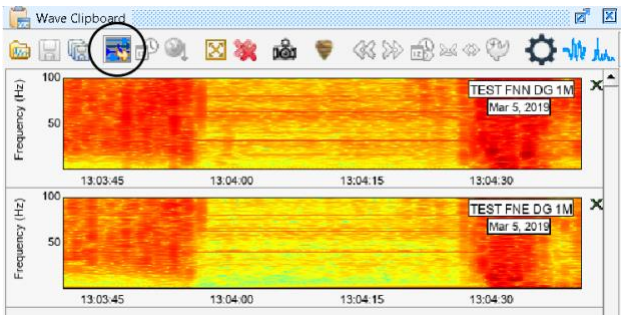
You should now have the largest spectrogram possible. To get the Data Chooser back that you just closed out of, go to the Window tab at the top of your program, and select Data Chooser.

At this point you can add this wave to a clipboard for further analysis, or comparison of multiple different files.

Once you have a spectrogram showing, select the clipboard icon at the top of the window, and a new window should appear.

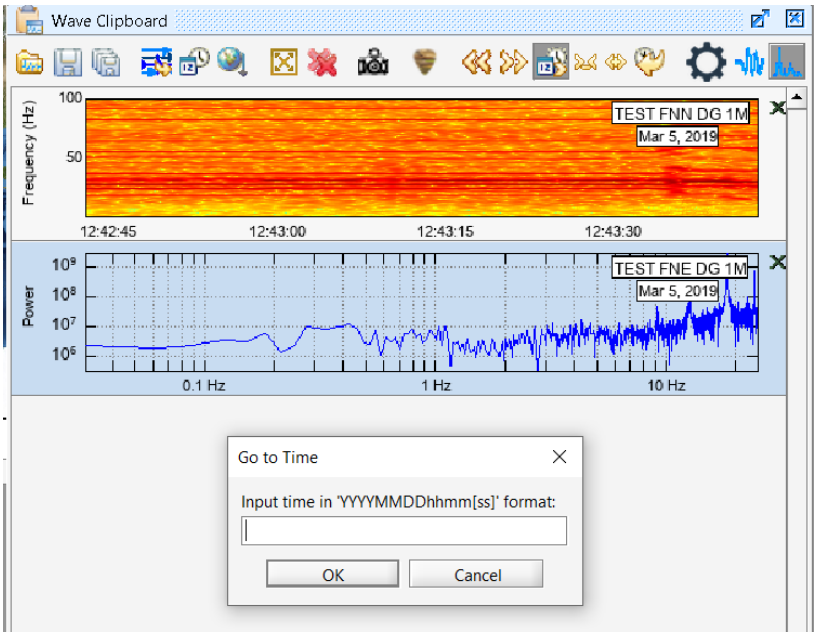


This wave clipboard will allow you to view multiple waves at once, either from the same file or from different mSeed files/sensors. You can have the waves synced together at the same time, meaning that whatever time portion you select in the helicorder view, is going to show for both waves in the clipboard. This is auto-enabled, but to turn off and on this function, press the following button, which will make the waves independent of the helicorder and of eachother.

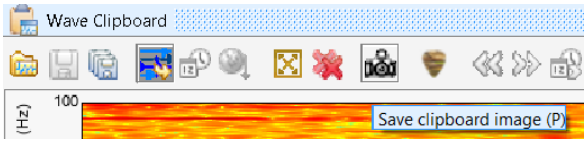


You can also change the view of the wave, if you'd like to see an event at the same time, but one view of a spectrogram and the other as a power band. Right click on one of the views, and it will cycle through the available options. This can be seen in the picture below.

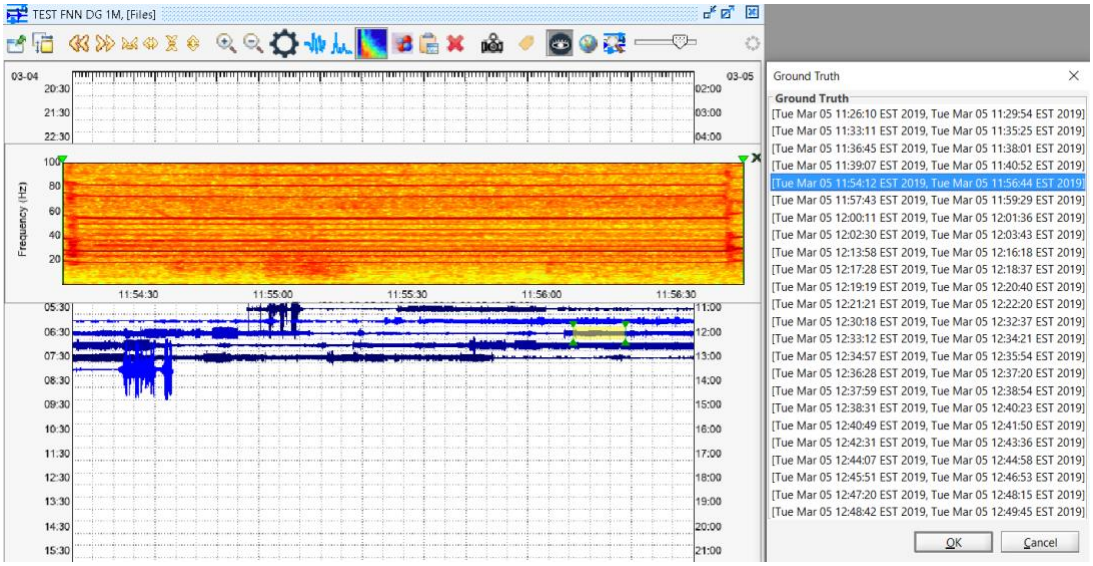
Along with using your right and left key arrows to scroll through the time, you can also select the clock/calendar/arrow icon at the top as seen below. This will allow you to input a certain time you'd like to fast forward to.



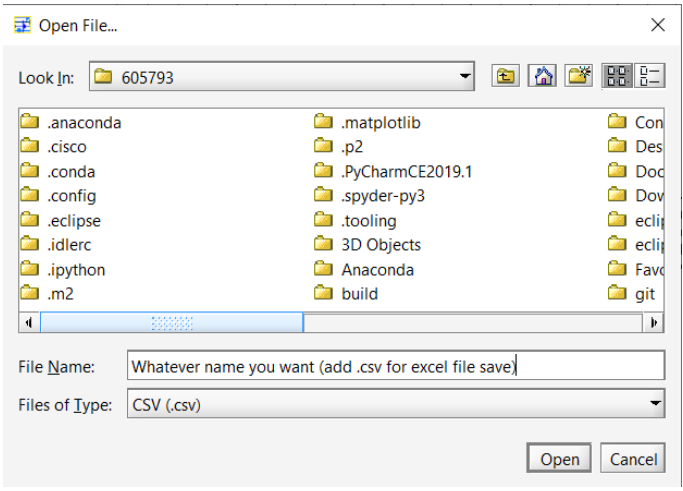
If you would like to export what you are seeing in .png format, select the camera icon from the window tray, and choose where you would like to save the file.



A great feature this program has specific to Booz Allen is the ability to mark and view ground truth files. It is as easy as opening the MiniSeed File that corresponds to the Ground Truth. Once open, select the Black Eye icon, which will prompt you to load in the ground truth Excel file. You will then see a screen like below. Once the dialog box is open, you will see all the separate events as dictated within the ground truth file. You can then click on each event, which will highlight that selected time on the Helicorder, also opening a spectrogram. You can use this feature to add multiple events to the clipboard, just make sure to turn off the "Synchronize Time with Helicorder" as shown before.

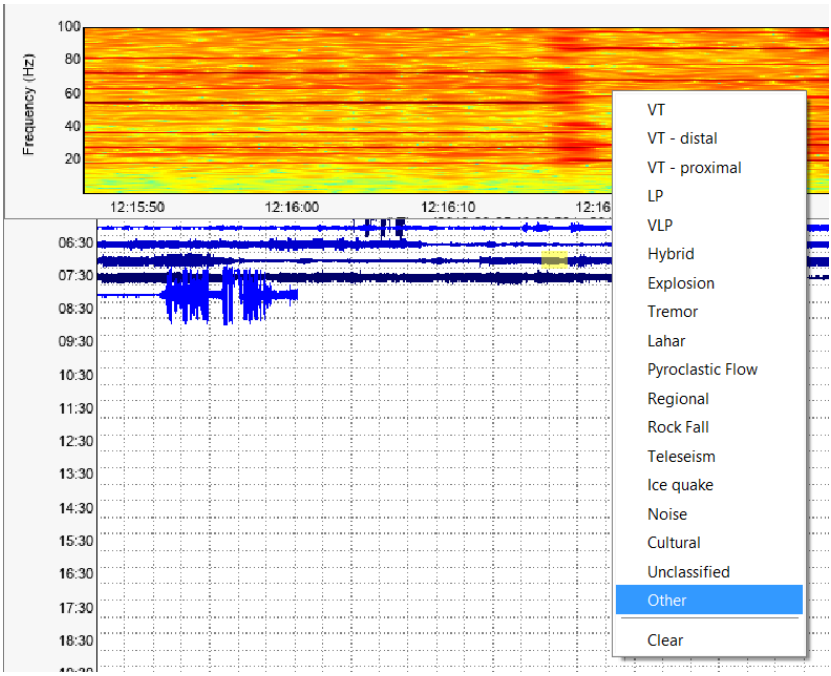


Another major feature is the ability to mark and classify certain events within a time series. This can be used to pick out abnormal frequencies or simply add in a note for you to come back to that exact time within a file. In order to do this, with the helicorder open, select the tag icon on the top bar of the window. This will prompt a window asking you to open a file. If you already have a file you created earlier, and want to load in your marked events, you can click on a file and open it. If you are starting new, go down into the name section at the bottom and type in what you would like your file to be called, then click "open". It will default to a text file, but if you add ".csv" at the end of your file name, it will now export as an excel document.



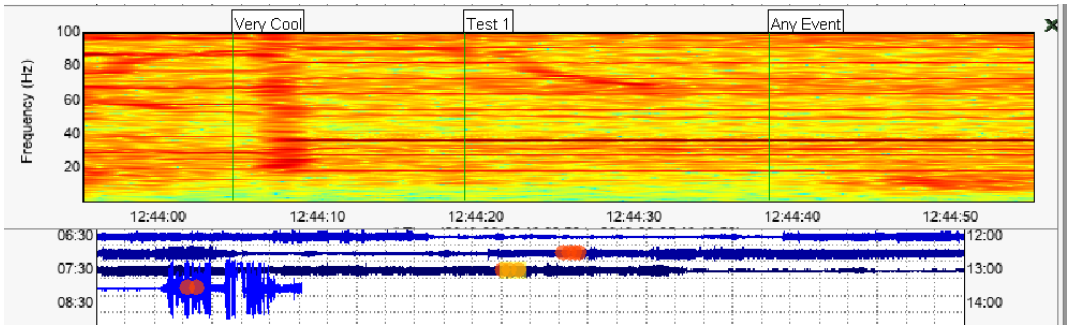
Once you have started a new file by naming it and clicking open, you will see the helicorder back on your screen, and the tag icon will appear with a shadow behind it.

You can now go into the helicorder, or the spectrogram view, and right click on the point in time you would like to mark. Note, when the tag feature is enabled, right clicking will no longer cycle through the different view options and will now be used to mark events until turned off. Once you right click, you will see a pop-up menu like below, where you can either choose a pre-listed option or choose Other to name it yourself.

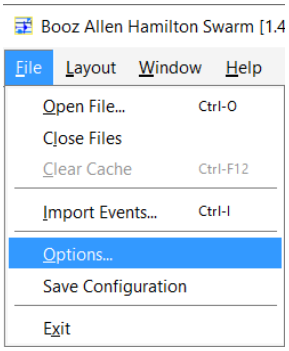


Once you select other, you will see a new window pop up where you can type the name of your event, whatever that might be. Once you click okay, there will now be a green line on your spectrogram that shows the event marking, as well as a red dot on your helicorder to easily find different events.

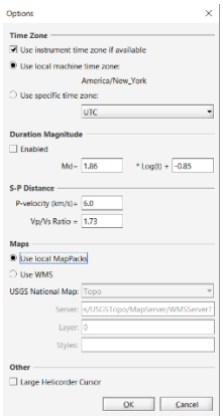
You can now continue to add events or click on the tag icon again to close out of this feature. If you would like to go back and add more tags to that same excel or text file, you can. Just click the tag and select the file you saved previously. If you do not see it, make sure your files type drop down menu shows all files, as it will default to csv and will not show a text file if you saved it as such.



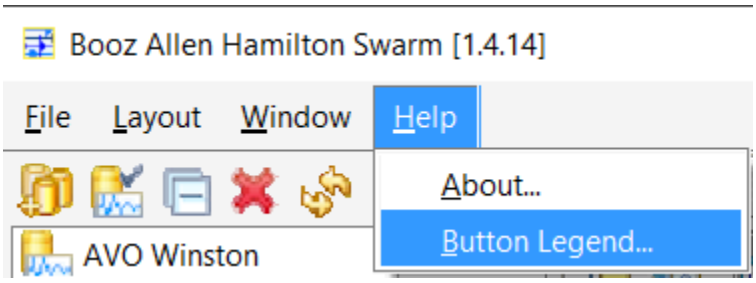
To change general options of this application, simply go to File, then Options from this drop-down menu.



You will then see this window, where you can change the time zone, map packs, P-S wave distances, and other options.



If at any time you don't know what buttons do, or just need a general overview of this application, here's what to do. Click on the help tab at the very top of the window, and select between the Button Legend, Tutorial, or Manual. The Tutorial will take you to this document you are reading currently. The Manual will take you to the pre-loaded tutorial that was released with the original version of Swarm. This will not include any Booz Allen features added in, so keep that in mind. The Button Legend will open a window that shows all the buttons and their descriptions.



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