

WaveDisplay 12 User' Guide

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Radial Suite Release 8 employs a new wave outlier removal tool, which filters outlier data points and averages the remaining data over time and across range cells to reduce the noise and interference. The resulting filtered wave data are written into weekly wave files that appear in WaveDisplay as a single time series representing conditions across range cells in the radar coverage area selected for wave analysis.

Ranged wave data processed from previous Radial Suite Release 7 appears in WaveDisplay in two modes. Single Range mode displays up to four wave parameters across a single range selection, and Multi Range mode compares one wave parameter across up to four range cell selections.

WaveDisplay's expanded suite of toolbar buttons, dropdown menus, and keyboard short cuts allow the user to interrogate and scroll through wave data with ease. New PDF output generates infinite resolution, vector graphics for enhanced report augmentation.

WaveDisplay Features

- Plot wave height, wave period, wave from direction, wind from direction, predictive max wave height, wave height valid points, and wave height standard deviation

- View wave outlier removal tool's filtered wave data

- Export to PDF format for high quality report and scientific study figures

- Navigate data with multiple keyboard short cut options

- View time-specific wave output with new marker tool

- Open several windows at the same time for viewing of multiple parameters or comparison of datasets

- View range-specific wave data and compare wave parameters across up to four range cells in main window

Basics

Open a wave file by:

Drag and drop the wave file on the WaveDisplay icon

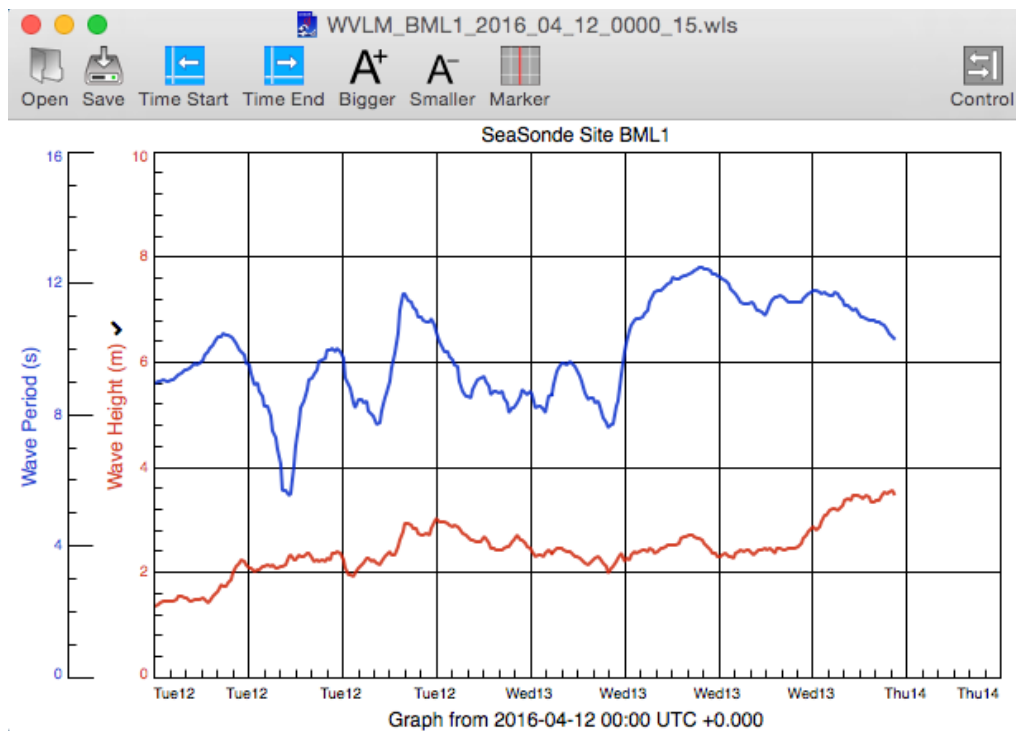
Drag and drop the wave file into the WaveDisplay window

Open WaveDisplay, select main menu **File->Open** and locate wave file

Click the “Open” button on the toolbar and locate wave file

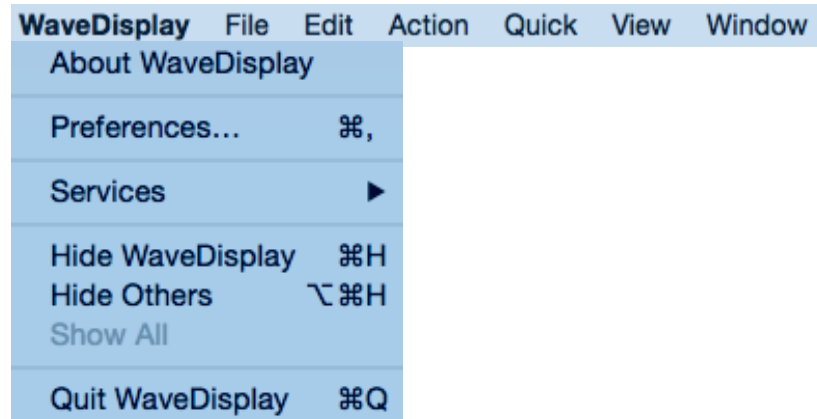
Once a WaveDisplay session has been initiated, double click wave file to launch it into WaveDisplay

Wave data will appear in the main window of WaveDisplay. The data in this example are filtered:

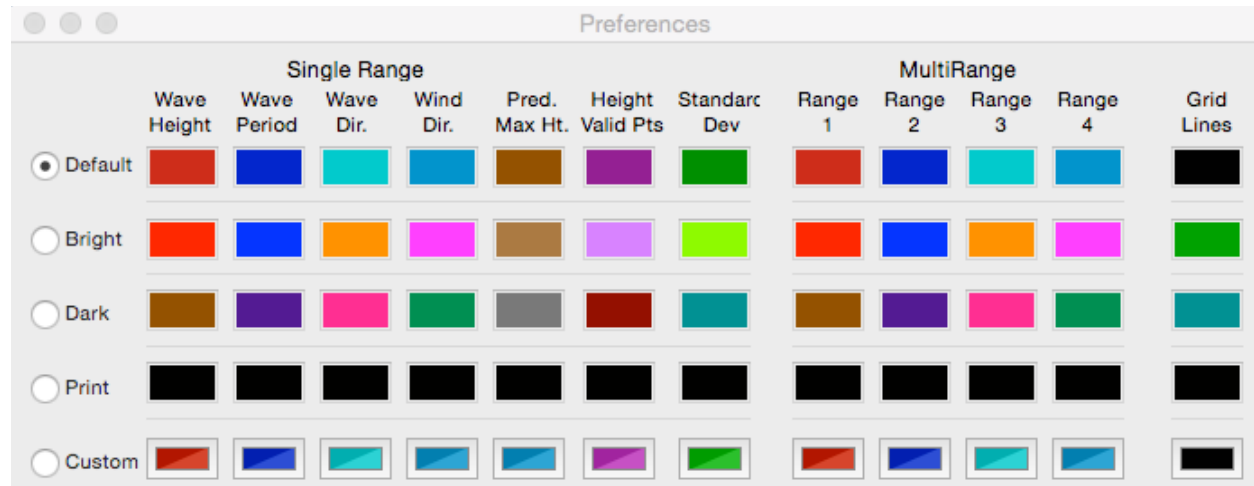


WaveDisplay Menu

The WaveDisplay Menu manages the layout of wave data. Find version information about WaveDisplay under **WaveDisplay->About WaveDisplay**.



Adjust the color scheme of graphics under the Preferences menu, shown below, by selecting from four pre-defined options or by creating your own color scheme under Custom. This feature allows tailoring of graphics for report purposes and includes a black and white option for printing proofs.



Hide WaveDisplay will remove WaveDisplay from view, Hide Others hides all other open applications, and Show All brings them back into view. Quit WaveDisplay closes the application.

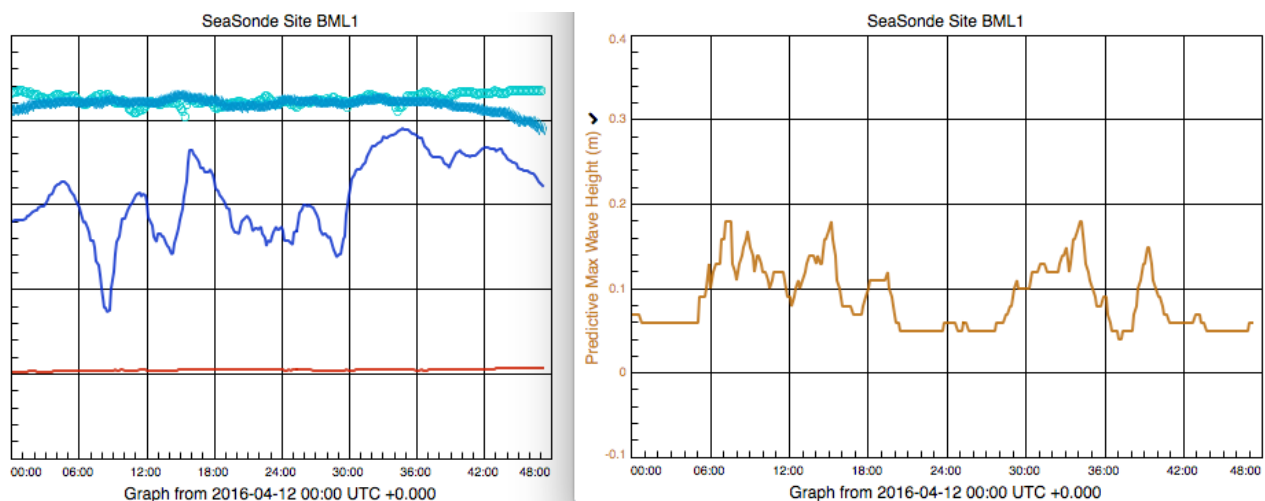
Main Menu

Examples shown for the Main Menu are for filtered wave data, however, features are the same for ranged data except where noted. The main menu has six pulldown menus: File, Edit, Action, Quick, View, and Window. Keyboard shortcuts are shown to the right of each item, for example, “⌘O” is the shortcut to open a file.

WaveDisplay	File	Edit	Action	Quick	View	Window
	Open...			⌘O		
	New Window			⌘N		
	Copy Window			⇧⌘N		
	Close			⌘W		
	Save Graph Image...			⌘J		
	Page Setup...			⇧⌘P		
	Print...			⌘P		

Main Menu, File

Files and windows are managed under the File menu. Wave files can be opened from the main menu under **File→Open**. **File→New Window** creates a separate window for viewing of additional parameters, as shown in this



File→Copy Window copies the active window so that a new session with the same settings as the active session is opened. **File→Close** closes the active window. **File→Save Graph Image** saves the main window image as a PDF or PNG file. The infinite resolution PDF format provides figures for scientific studies and reports of publishable quality. For smaller sized figures, the PNG format is an option. **File→Page Setup** provides a dialog with printer settings. **File→Print** opens a Print dialog with multiple options, including sending the

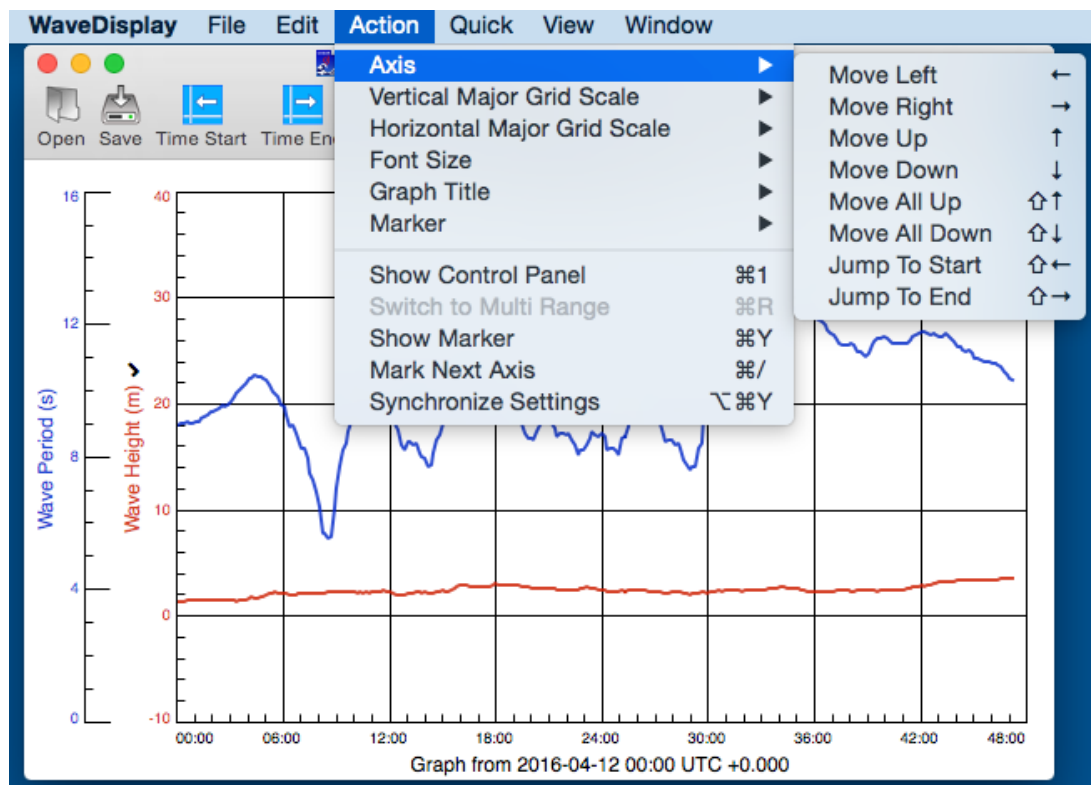
main window image to a printer, a PDF file, or to the body of an email.

Main Menu, Action

The appearance of the main window is managed under the Action menu and its six dropdown menus. Note that pressing the option key allows most actions to be applied to all open WaveDisplay windows which means scrolling through wave data is synchronized. Also, keyboards shortcuts are indicated.



The position of data, controlled under **Action**→**Axis** and keyboard shortcuts greatly simplify navigation. Use the arrow keys for shifting data left ←, right →, up ↑, or down ↓ for the active parameter in the active window. The active

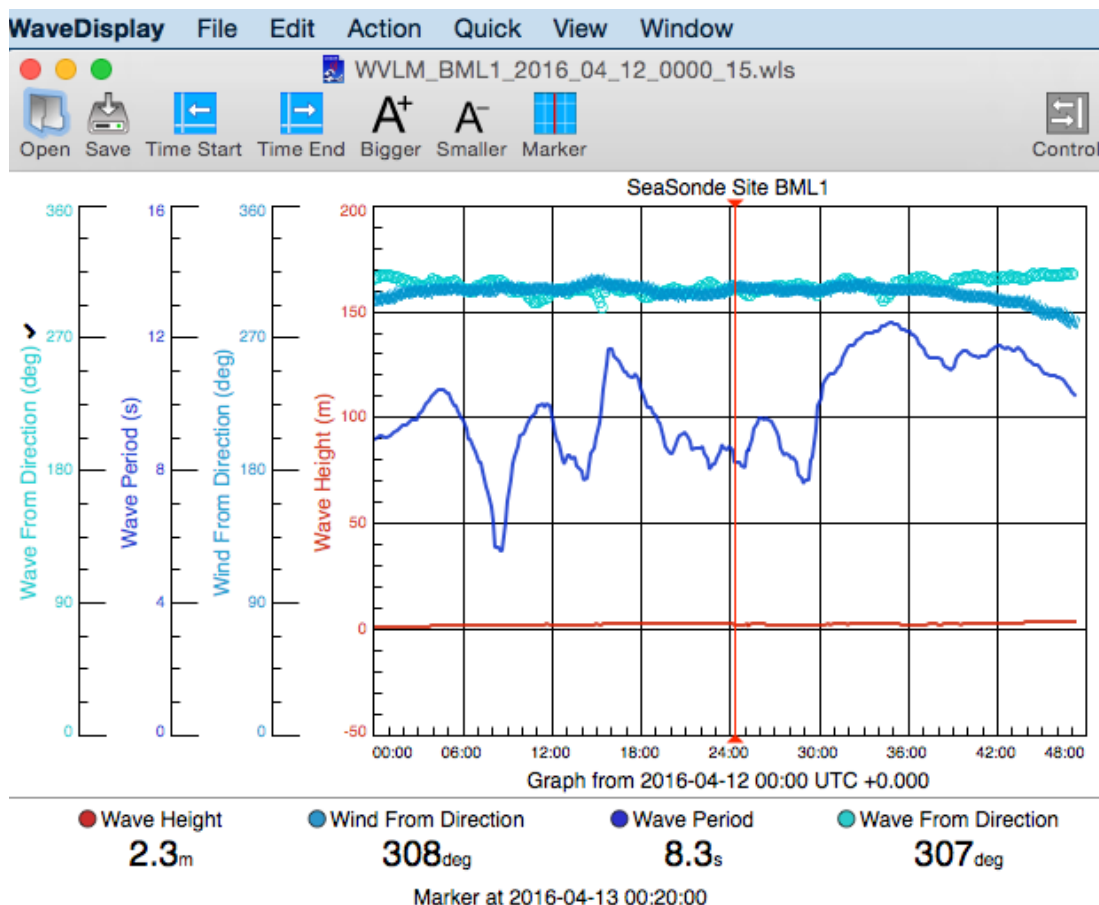


Use option with the arrow keys to shift data for the active parameter in all open windows (left $\backslash\leftarrow$, right $\backslash\rightarrow$, up $\backslash\uparrow$, or down $\backslash\downarrow$). Use shift with the arrow keys to shift all parameters for the active window (left **shift** \leftarrow , right **shift** \rightarrow , up **shift** \uparrow , or down **shift** \downarrow). Use option shift arrow keys to shift all parameters for all open windows (left \backslash **shift** \leftarrow , right \backslash **shift** \rightarrow , up \backslash **shift** \uparrow , or down \backslash **shift** \downarrow). Use of the option key as described here with other Action menu commands and keyboard shortcuts.

The scale of data are adjusted under **Action->Vertical Major Grid Scale** (keyboard shortcuts $\mathbb{H}\uparrow$ and $\mathbb{H}\downarrow$) and **Action->Horizontal Major Grid Scale** (keyboard shortcuts $\mathbb{H}\rightarrow$ and $\mathbb{H}\leftarrow$). Font size can be increased or decreased via **Action->Font Size**.

Action->Graph Title allows selection of graph title using the filename or the site code or none.

Action-> Show Marker shows the marker, while **Action-> Hide Marker** removes it. The marker is a vertical red line as shown at 2016-04-13 00:20:00 in this example. Marker features can be accessed under **Action->Marker**. Instantaneous wave parameters for this time step are displayed in the radio



dials at the bottom of the main window. For example, the wave height is 2.3 meters at the selected timestep. Four **Action->Marker** options – Next, Previous, Next 10 Indices, Previous 10 Indices – push the marker ahead one timestep, behind one timestep, ahead 10 timesteps, or behind 10 timesteps, respectively. The user can use the marker to step through the data and get precise computations of wave parameters.

Action->Show Control Panel activates the Control Panel, and **Action->Hide Control Panel** removes it. The Control Panel is addressed separately in the “Control Panel” section.

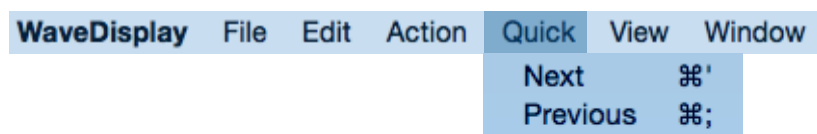
Action->Switch to Multi Range and **Action->Switch to Single Range** toggles between Multi Range and Single Range modes for ranged data. These options are greyed out for filtered data.

Action->Mark Next Axis flags and activates the next vertical axis so that data for that parameter can be shifted using the commands and shortcuts of the **Action->Axis** menu described above.

Action->Synchronize Settings will apply the settings of the active window to the other open windows, so if you get the data displayed exactly as desired in one window, the view is replicated in the others.

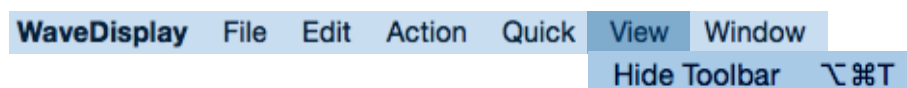
Main Menu, Quick

The Quick menu allows the user to scroll through multiple wave files stored in a single directory using Next and Previous and associated keyboard shortcuts. Like the Action menu, pressing the options key allows the command to be applied to all open windows.



Main Menu, View

The View menu allows the user to hide or display the toolbar.

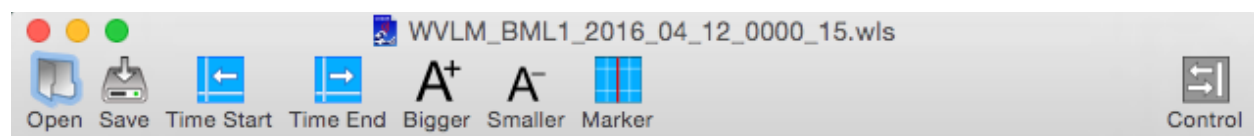


Main Menu, Window

The Window menu executes minimize, zoom, bring to front, or individual window selection commands. Pressing the options key allows the command to be applied to all open windows.



Toolbar



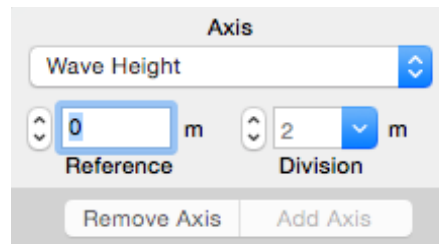
The WaveDisplay toolbar provides quick access to key file management and data display options that are available under the Main Menu. The “Open” button provides a shortcut to access wave files. The “Save” button opens a dialog for saving the image of the main window in pdf or png file format for reports.

The “Time Start” button scrolls to the beginning of the time series, and the “Time End” button scrolls to its end. “Bigger” and “Smaller” font buttons allow data label size manipulation. The “Marker” button inserts the marker into the main window and shows wave parameter values in radio dials.

Horizontal Axis

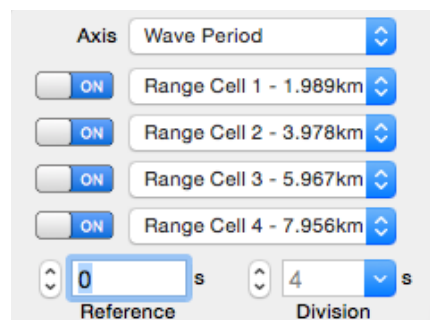
Right clicking the horizontal axis/axes in the main window provides an additional alternate method to edit parameters.

In Single Range mode, wave parameters will appear in the dropdown menu. Click “Remove Axis” to delete the selected axis and “Add Axis” to display it. Edit data position and scale with “Reference” and “Division” menus.



The image shows a dialog box titled "Axis". At the top, there is a dropdown menu with "Wave Height" selected. Below this, there are two input fields: "Reference" with the value "0" and "Division" with the value "2". Both fields have up and down arrows on their left sides. To the right of the "Reference" field is a unit indicator "m", and to the right of the "Division" field is a unit indicator "m". At the bottom of the dialog, there are two buttons: "Remove Axis" and "Add Axis".

In Multi Range mode, range cell options will appear in the dropdown menu. Click “Remove Axis” to delete the selected axis and “Add Axis” to display it. Edit data position and scale with “Reference” and “Division” menus.



The image shows a dialog box titled "Axis". At the top, there is a dropdown menu with "Wave Period" selected. Below this, there are four rows, each with a toggle switch labeled "ON" and a dropdown menu showing a range cell and its value: "Range Cell 1 - 1.989km", "Range Cell 2 - 3.978km", "Range Cell 3 - 5.967km", and "Range Cell 4 - 7.956km". At the bottom, there are two input fields: "Reference" with the value "0" and "Division" with the value "4". Both fields have up and down arrows on their left sides. To the right of the "Reference" field is a unit indicator "s", and to the right of the "Division" field is a unit indicator "s".

Control Panel

To open the control panel, click the “Control” button in the upper right corner of the main window, and the control panel will appear. An example is shown to the right.

The top two dropdown menus control the time frame of the data displayed. The “Time” dropdown shifts the horizontal time axis left and right, and the “Time Div” controls the total time span of data displayed. For all plots, the horizontal axis is time.

Depending on mode (Single Range or Multi Range), the parameters in the lower part of the control panel will vary. Regardless, the relative position and scale of the vertical axis are controlled with the “Reference” and “Division” features, respectively. “Reference” shifts the time series up or down relative to the vertical axis. “Division” changes the scale of the vertical axis.

The Control Panel interface is shown with the following settings:

- Time:** 2016-04-12 12:00
- Time Div:** 54 hours
- Range:** Multiple (Selected), Single (Greyed out)
- Range Ref:** -
- Wave Height:** ON (toggle), Reference: 0 m, Division: 2 m
- Wave Period:** ON (toggle), Reference: 0 s, Division: 4 s
- Wave From Direction:** ON (toggle), Reference: 0 deg, Division: 90 deg
- Wind From Direction:** ON (toggle), Reference: 0 deg, Division: 90 deg

Single Range Mode versus Multiple Range Mode

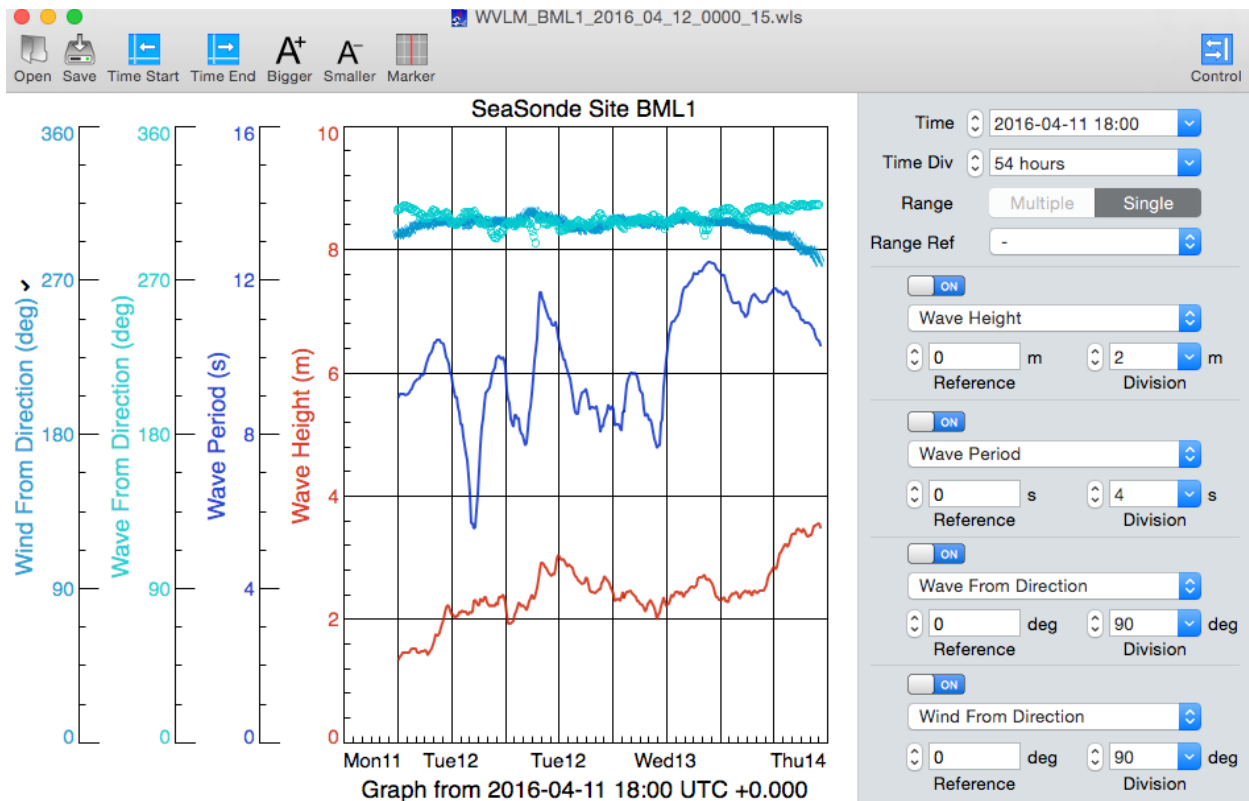
In the third row of the control panel next to “Range,” a “Single” button activates single range mode and a “Multiple” button activates multiple range mode. For filtered files, the Single Range mode is applicable and will display the results of the filtered and averaged data. The “Multiple” button will be greyed out. For ranged files, the “Single” option shows results of individual range cells, all range cells, or averaged range cells. For ranged formatted files, Multi Range mode displays one wave parameter for up to four range cell selections.

Single Range Mode, Filtered Wave Data

When filtered wave data are open, the control panel will look similar to the one in the figure above, which is also displayed below along with main window content. The “Multiple” button next to “Range” is greyed out, and “Range Ref” dropdown menu displays a single dash.

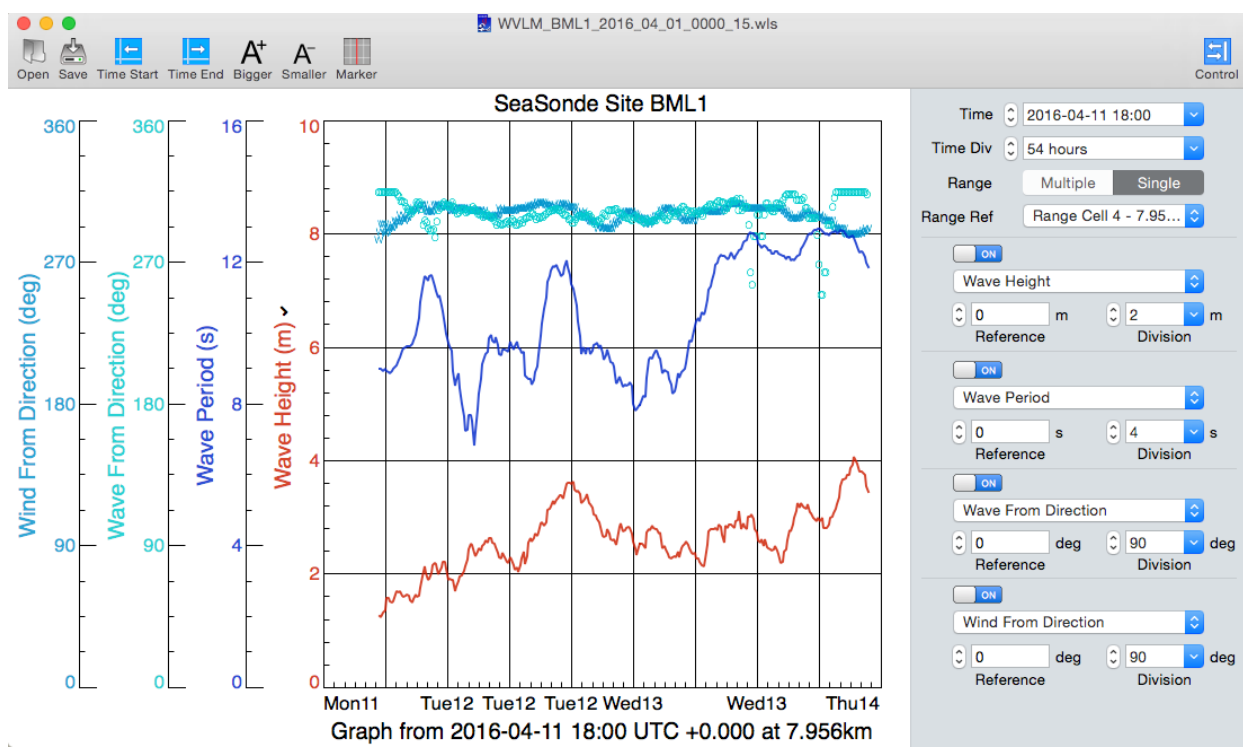
To activate (deactivate) wave parameters in the lower section of the Control Panel, make a selection in each of the four pulldown menus and use the “ON” (“OFF”) toggle settings. In this example, wave height, wave period, wave from direction, and wind from direction are selected. The vertical axis labels

are color-coordinated with plotted data, for example, wave period axis label and data are blue.



Single Range Mode, Ranged Wave Files

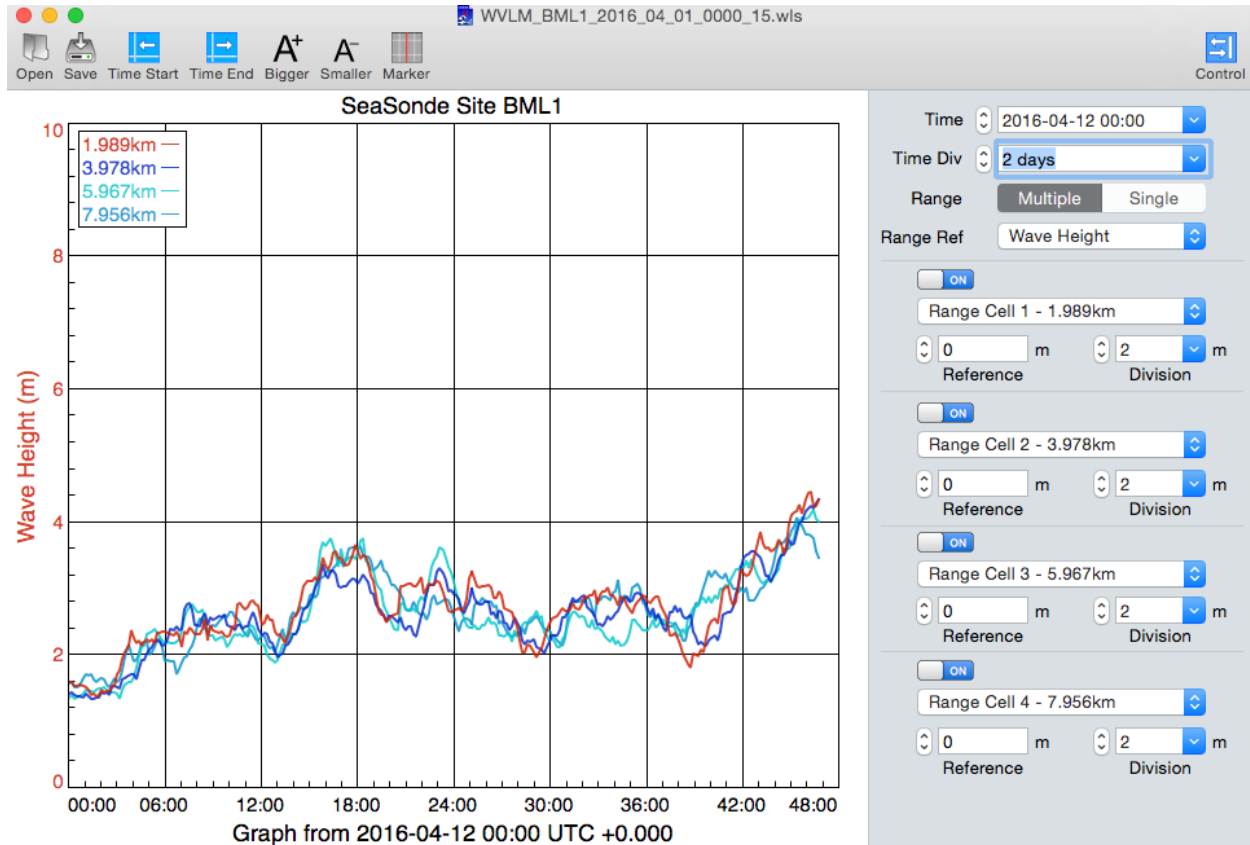
To access the single range mode of ranged data, click the “Single” button. Specify the range cell option in the pulldown menu next to “Range Ref.” For ranged data in single range mode, the “Range Reg” dropdown menu has options for individual range cells, all range cells, or averaged range cells. Data for range cell four is selected in the example below. Wave parameters can be



selected and toggled on and off for display of up to four variables.

Multiple Range Mode (Ranged Wave Files only)

To access the multiple range mode of ranged wave data, click the “Multiple” button. Multiple mode presents data for up to four range cells. Wave height and range cells 1 through 4 are selected in this example.



Revision History

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2nd Draft Aug 12, 2016

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