MotiveWave™

Hurst Cycles Guide

Version: 1.0

Acknowledgements

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1   Introduction

Welcome to the MotiveWave™ Hurst Cycles Guide! If you are reading this document then you have already installed MotiveWave™ on your computer and you are ready to start using the application. The Hurst Cycle study is only available in the Ultimate Edition of MotiveWave™ (which is part of the free trial).

If you have not yet installed MotiveWave™ or registered for a trial on our website, please read the Installation Guide before continuing on with this document.

The purpose of this document is to highlight and explain some of the recent features added to MotiveWave™ for plotting Hurst Cycles. This document is not intended to be a comprehensive guide to Hurst Cyclic theory.

1.1 Hurst's Cyclic Theory

Hurst's Cyclic Theory was developed in the 1970's by an American engineer by the name of JM Hurst. The basic tenant behind this theory is that markets achieve significant lows (or troughs) at the beginning (or end) of a cycle. Cycles have varying degrees based on wave length (in time) and are harmonized with the higher level cycles. Hurst spent years of research on mainframe computers to identify and validate cycles and how they coincide with the markets. During this period he identified a nominal model of cycle wave degrees that is common across many markets and securities.
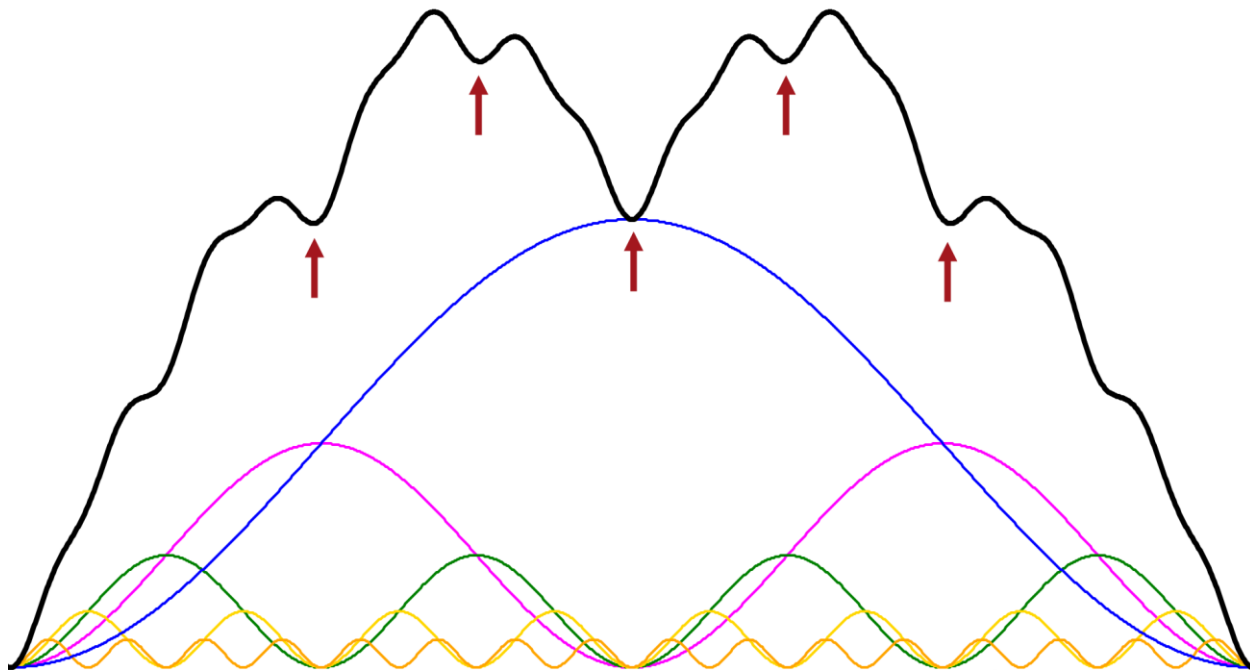
The underlying goal of this theory is to predict when a significant price low will occur for a market or individual security (such as a stock or a foreign exchange pair). The time frame for a prediction will depend on the wave length of the cycle being analyzed.

Hurst defined eight principles that apply to cycles:

1. **The Principle of Commonality** – Markets and security price movements have many elements in common. In particular they tend to have common high and low points that coincide with cycles.
2. **The Principle of Cyclicality** – Price movements correspond to a combination of waves that exhibit cyclic characteristics.
3. **The Principle of Summation** – Cycle waves of different degrees combine to affect price movement and do so by adding the waves together.
4. **The Principle of Harmonicity** – Cycle waves of different degrees are harmonized and are related by a small integer value.
5. **The Principle of Synchronicity** – Cycle waves are phased and synchronized at price troughs.
6. **The Principle of Proportionality** – Waves in price movement have amplitude that is proportional to their wavelength.
7. **The Principle of Nominality** – A specific, nominal collection of harmonically related waves is common to all price movements.
8. **The Principle of Variation** – Variation in harmonicity, synchronicity, proportionality and nominality (previous 4 principles) is expected.

Together these principles define a theory that describes the price movement of markets and securities as a combination of an infinite number of harmonically related cycles. The troughs (as opposed to the peaks) of these cycles are synchronized at significant price lows. The theory defines exactly how these cycles combine to explain how price moves in a market or individual security (with allowance for some variation).

The following diagram illustrates how cycles of different wave lengths can combine to affect price movement in a market (using sine waves). Where the troughs of the cycles align, significant lows appear in the price structure. The black line represents price and is the summation of the cycles (sine waves).

While the basic concepts of this theory may be relatively simple, application of a cyclic model to a particular market or security is not and may require years of study and experience to apply properly.

The Hurst Cycle study in MotiveWave™ applies sophisticated pattern recognition to identify and label Hurst cycles but it is not a substitute for experience and knowledge of cyclic theory. It is therefore very important to understand all of the settings in this study in order to realize its full benefits. Manual intervention may be necessary to adjust the locations of some of the cycles to achieve optimal results.

1.1.1 Hurst Nominal Model

From years of research on market data in the 1970s, JM Hurst identified a nominal cycle model that was common in the markets that he followed. This nominal model is the default model that is built into the Hurst Cycle study.

Cycle Degree (Name)	Average Wave Length	Harmonic Ratio
18 Year	17.93 Years	
9 Year	8.96 Years	2 x 1
54 Month	53.77 Months	2 x 1
18 Month	17.93 Months	3 x 1
40 Week	38.97 Weeks	2 x 1
20 Week	19.48 Weeks	2 x 1
80 Day	68.2 Days	2 x 1
40 Day	34.1 Days	2 x 1
20 Day	17 Days	2 x 1
10 Day	8.5 Days	2 x 1

| 5 Day | 4.3 Days | 2 x 1 |

Several years ago David Hickson developed a charting platform called Sentient Trader (http://www.sentienttrader.com). He extended the original Hurst nominal model to include lower time frames (intraday) as can be seen in the following table.

Cycle Degree (Name)	Average Wave Length	Harmonic Ratio
2 Day	2.2 Days	2 x 1
1 Day	1.11 Days	2 x 1
5 Hour	5.3 Hours	5 x 1
160 Minute	160 Minutes	2 x 1
1 Hour	53.3 Minutes	3 x 1
30 Minute	26.67 Minutes	2 x 1
15 Minute	13.3 Minutes	2 x 1
7 Minute	6.6 Minutes	2 x 1
3 Minute	3.3 Minutes	2 x 1

1.2 Terms and Definitions

The following are common terms and their definitions that explain some of the concepts in Hurst Cyclic analysis:

Cycle

Cycles form the basis of Hurst Cyclic theory. A cycle is a repeating period of time that begins and ends at troughs in price movement. Cycles are defined by their average wavelength (in time) but do exhibit variability in their length and amplitude.

Cycle Degree

The degree of a cycle essentially defines its wave length. Higher level degrees have longer wavelengths vs shorter wavelengths for lower level degrees.

Cycle Model

Market cycles are grouped together to form a cycle model. All cycles in the model are related to the other cycles using a simple harmonic ratio. The default cycle model used in MotiveWave™ is the Hurst Nominal Model, but custom cycles may be used as well.

FLD

FLD stands for Future Line of Demarcation. The FLD is calculated by transposing the midpoint of each candle forward in time by half the wave length of the cycle degree. For example and 20 day cycle (17 day wave length) would transpose the midpoint of each candle forward by 9 bars if displayed on a daily chart (9 is roughly half of the 17 day wave length).

Harmonic Ratio

A *Harmonic Ratio* represents the ratio of cycle waves to the next cycle wave of higher degree. In most cases a cycle wave will be related to the next higher cycle by a ratio of **2 to 1** but other ratios are possible (such as **3 to 1** or **5 to 1**).

Hurst Nominal Model

This is the cyclic model as defined by JM Hurst in the 1970s after years of computational analysis using mainframes.

Peak

A peak is a high point in price movement for a market or individual security.

Sine Wave

A curve the represents the periodic oscillations of amplitude computed from a sine function. Sine waves may be optionally plotted for any cycle in the Hurst Cycle study.
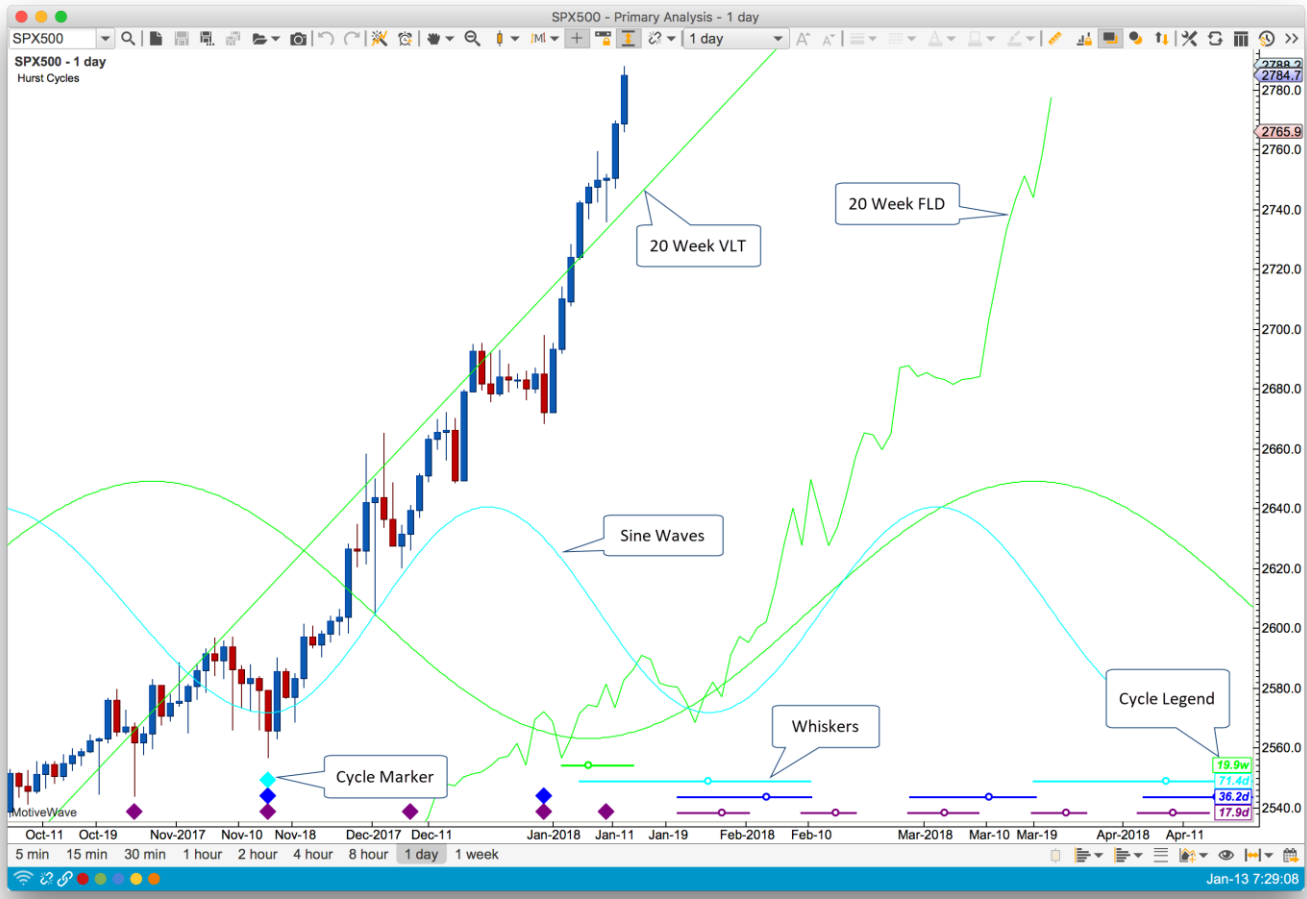
Trough

A trough is a low point in price movement for a market or individual security.

VLT

VLT stands for Valid Trend Line. VLTs are used to validate the placement of cycle markers. They are drawn by connecting the troughs of the two most recent cycle markers of the given degree and extending the line. VTLs drawn for the troughs of a cycle are used to confirm a peak in the cycle of one degree higher when the price crosses below the VTL. Conversely, VTLs drawn for the peaks of a cycle may be used to confirm a trough in the cycle of one degree higher when the price crosses above the VTL.

2 Study Overview

In this section we explore the elements of the Hurst Cycle study in MotiveWave™. The screen shot below contains a sample Hurst Cycle study overlaid on an S&P 500 daily chart:
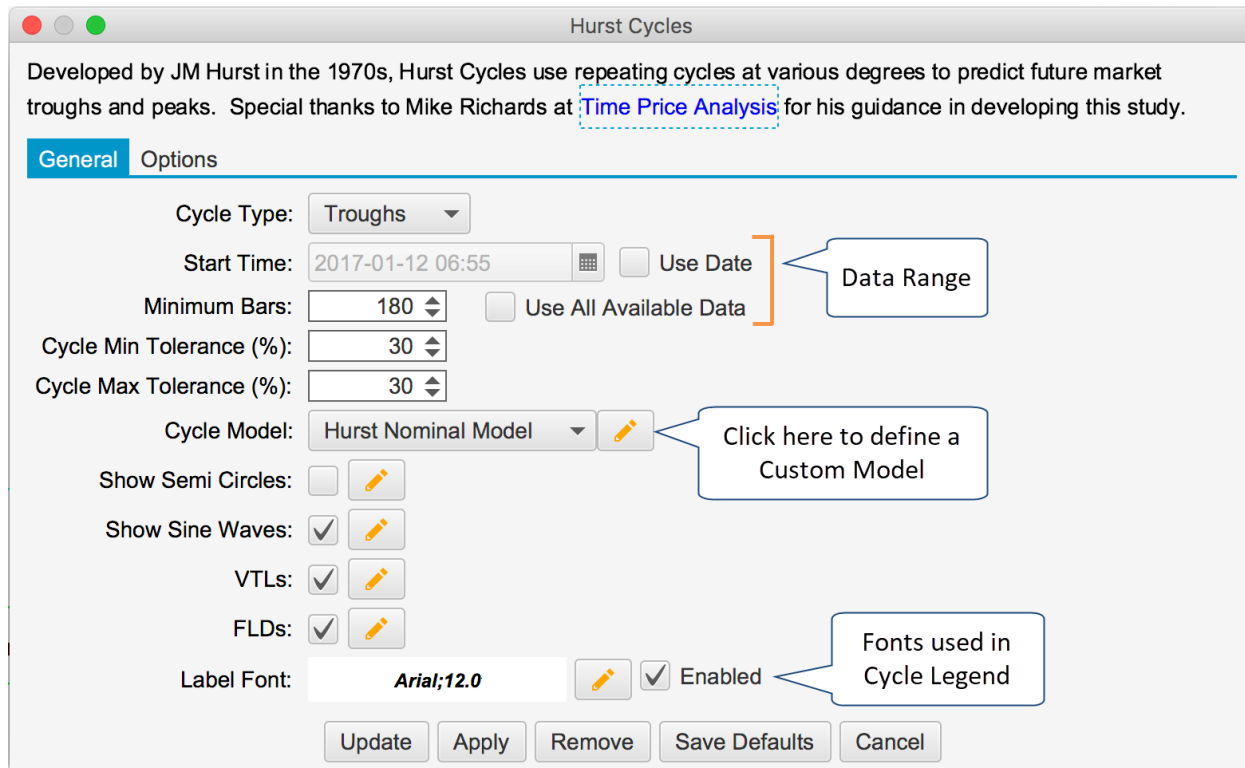

Study Components:

1. **Cycle Marker** – These markers indicate where they cycles begin and end for each cycle that is plotted in the study. The color of the marker indicates the cycle degree to which the marker belongs.
2. **Whiskers and Circles** – Each whisker (a colored horizontal line with a small circle) delineates the possible range for the completion of the next cycle. The circle on the line is the location of the average cycle length (computed from the plotted cycle markers)
3. **Cycle Legend** – Identifies each cycle degree (by color) and gives the average computed cycle length.
4. **Sine Waves** – Sine waves may be plotted for each cycle. These can be useful to visually identify where the cycle troughs line up for multiple cycles.
5. **Semi Circles** – (not shown) optionally semi circles may be use identify there the cycles begin and end.
6. **VLT** – Valid Trend Line. A VLT may be drawn by connecting the two most recent price troughs for a cycle. VLTs are often used to validate (or invalidate) the location of the cycle markers.
7. **FLD** – Future Line of Demarcation. This line plots the midpoint of each candle and transposes it by half the cycle period into the future.
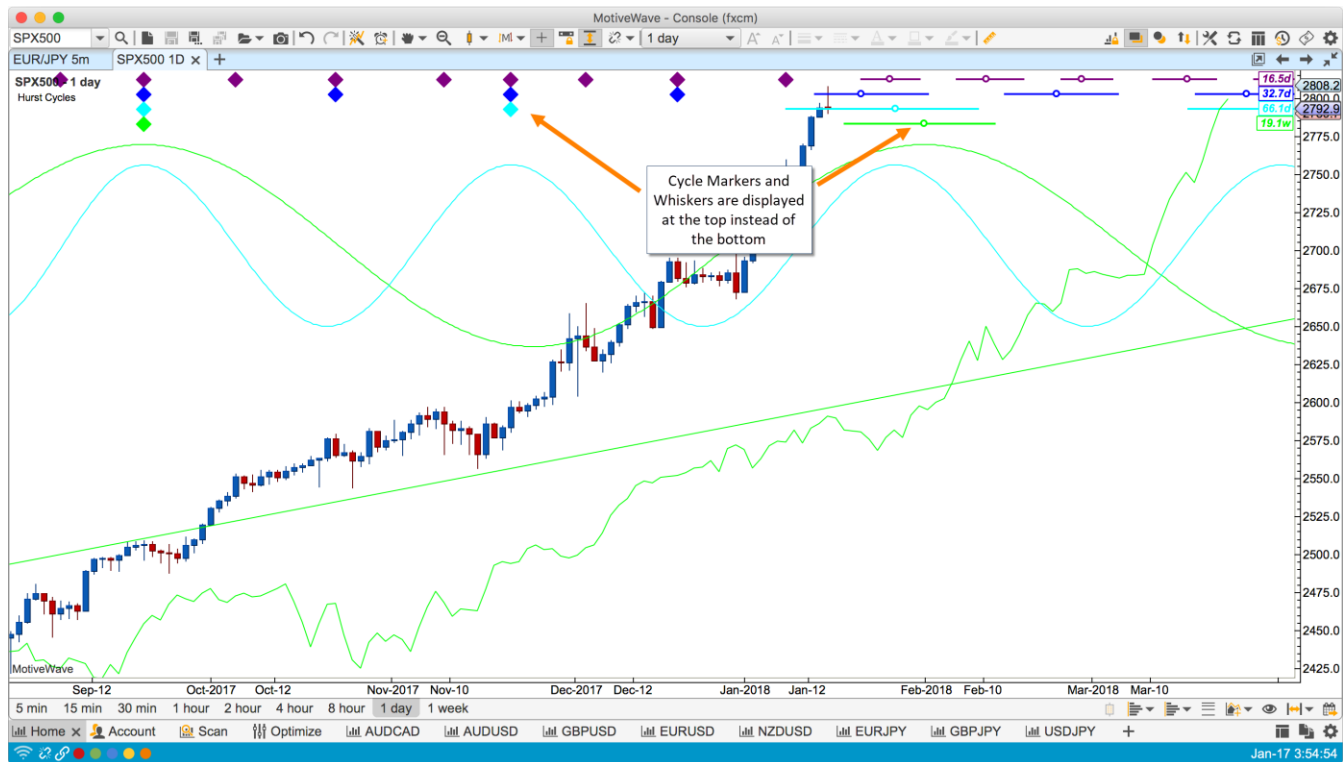
2.1 Settings

The following screen shot shows the available settings for the Hurst Cycles Study.

2.1.1 Cycle Type

JM Hurst's original cyclic theory only applied to price troughs. You can however switch this mode to analyze the price peaks instead. In "Peaks" mode the study is displayed at the top of the chart (instead of the bottom). This enables you to display both a Peaks and a Troughs study on the same chart. The screen shot below shows the Hurst Cycles study with the Cycle Type parameter set to "Peaks":

2.1.2 Data Range

The data range settings are very important for the pattern matching algorithm inside the Hurst Cycles study. The available range of data directly determines the top level cycle degree (since this is time based). Once the top level markers are determined, MotiveWave will recursively "decompose" each cycle degree using the harmonic relationships and tolerance to find the best matching peaks/troughs. The following options may be used to determine the range of data available to the study:

1. **Start Time** – Use this option to specify a specific start date/time. MotiveWave will place the first (top degree) cycle marker at this point (or closest significant price trough/peak).
2. **Minimum Bars** – This option will ensure that MotiveWave loads the specified minimum number of bars (provided the historical data is available from your broker/data service). However, more data may be loaded if the user scrolls back in time or another study requires more data.
3. **All Available Data** – Use this option to load all data from the local cache of historical data. Note: this option will not enforce minimum number of bars to be loaded.

2.1.3 Tolerance

Hurst's principle of variation states that the wave length of each cycle will vary. The Cycle Min/Max Tolerance settings enable to you set boundaries on how much the wave length will vary.

Consider for example the 10 Day cycle (which actually has a wave length of 8.5 days). If the minimum tolerance is set to 20% and the maximum tolerance is set to 30%, then the range for this cycle is:
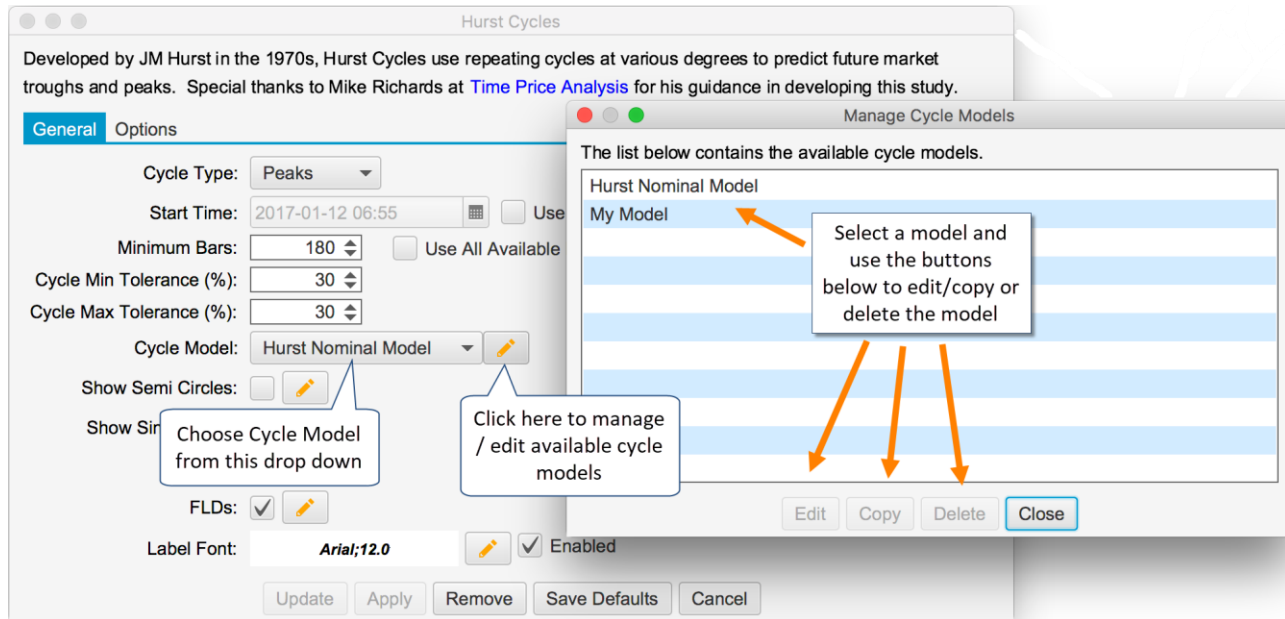
- **Minimum Length:** 6.8 Days (8.5 – 8.5*0.20)
- **Maximum Length**: 11.05 (8.5 + 8.5*0.30)

It is very important to ensure that the tolerance settings do not cause the wave lengths of the cycle degrees to overlap. For example a min/max tolerance of 100% would cause most cycles to overlap with their parent cycles in the Hurst Nominal Model.
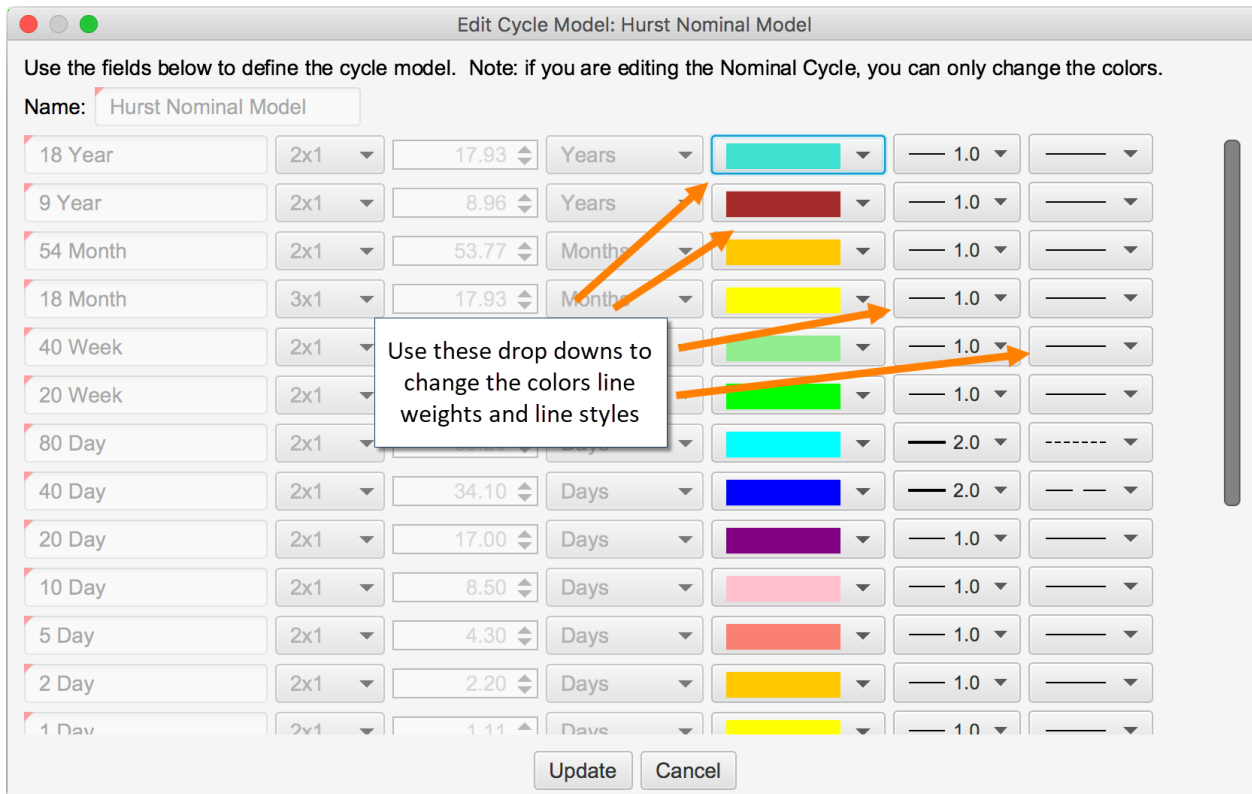
2.1.4 Cycle Model

By default, MotiveWave™ will use the Hurst Nominal Cycle Model for its cyclic analysis (which has been expanded with the intraday cycles developed by David Hickson). You can modify the colors and line weights/styles for this model, but the cycle lengths and harmonic ratios cannot be changed.

Additional cycle models may be defined and used instead of the Hurst Nominal Cycle Model. Click on the edit button (pencil icon) next to the Cycle Model drop down. From the Manage Cycle Models dialog, a new cycle model can be created by selecting an existing model and pressing the "Copy" button.
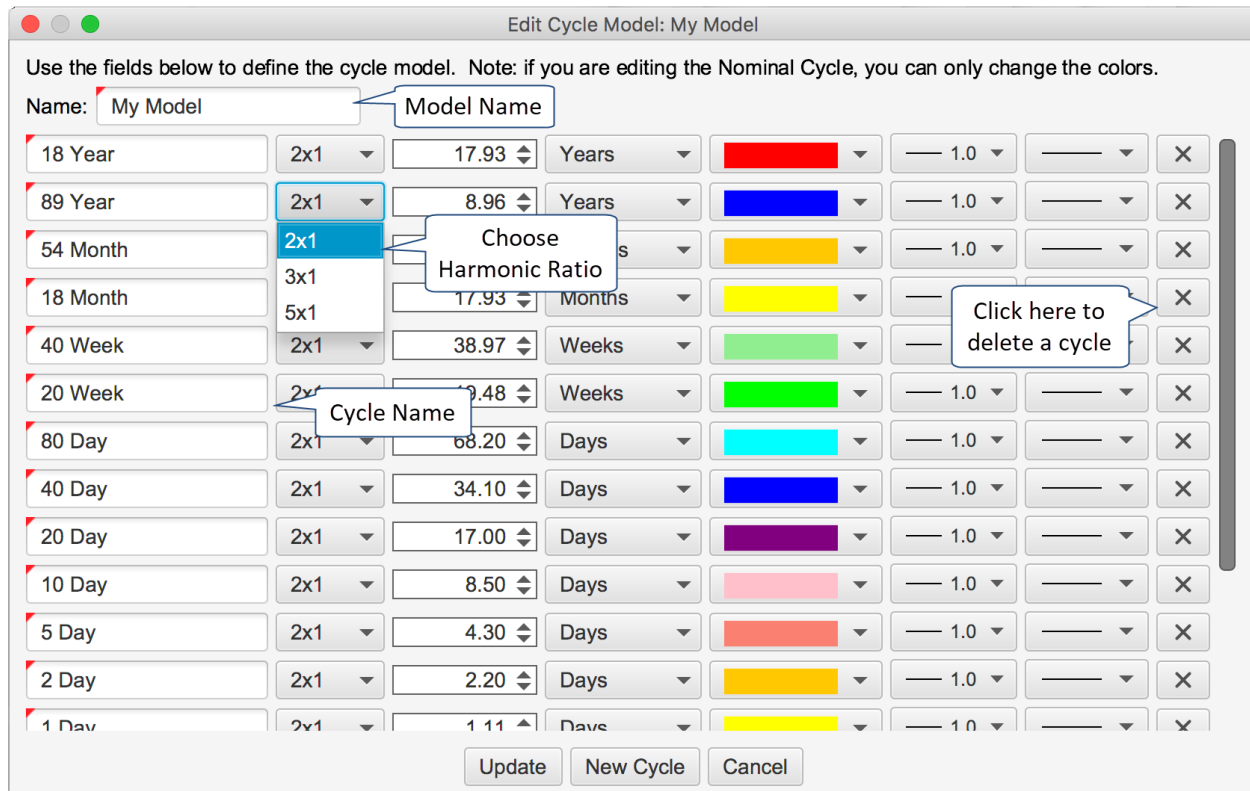

2.1.4.1   Editing the Hurst Nominal Model

You can adjust the colors of the cycle markers and the line weights/styles for the built-in Hurst Nominal model. Select the model in the Manage Cycle Models dialog (see previous section) and click on the "Edit" button. You can choose the color and line weight/style for each cycle degree from the active dropdown buttons.
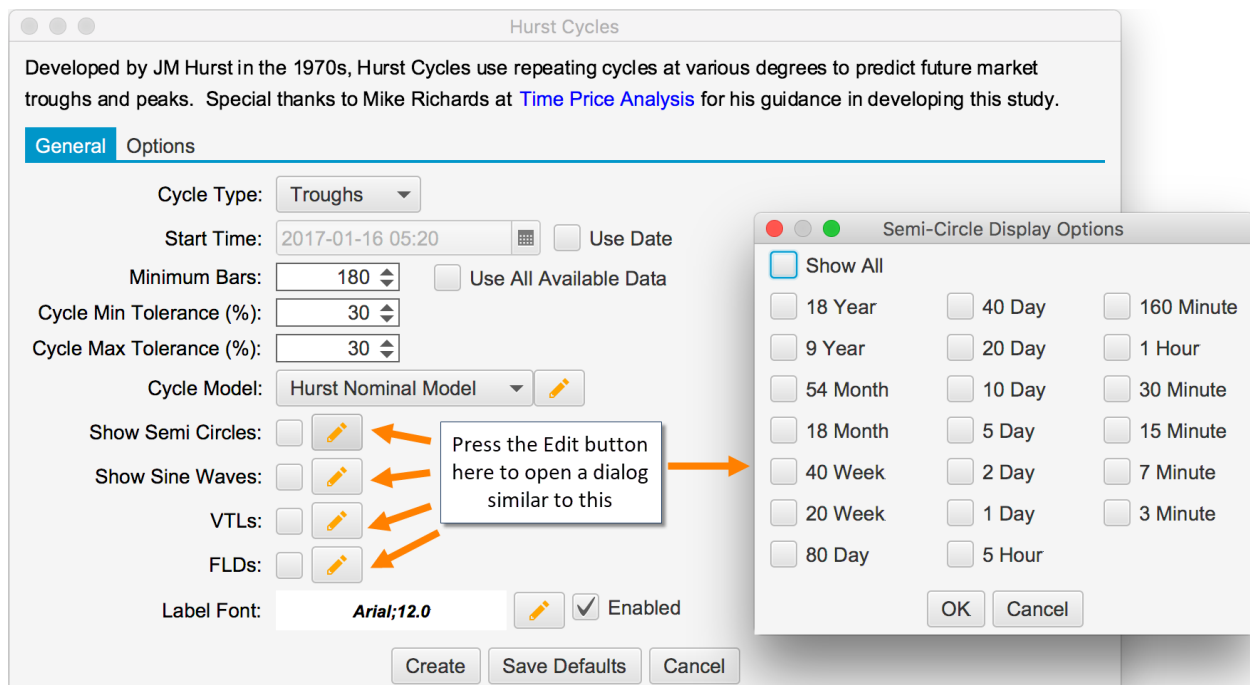
2.1.4.2   Creating Custom Models

Custom models can be created by copying an existing model and modifying its properties (see Manage Cycle Models dialog above). Once you have copied an existing model, press the Edit button from the Manage Cycle Models dialog to open the cycle editor dialog (see below). You can add or remove existing cycles and change the cycle names, wave lengths, colors and harmonic ratios.

2.1.5 Other Options

The following options can be configured to be displayed for all or specific cycles on the chart. The available cycles will depend on the Cycle Model that was chosen for the study.
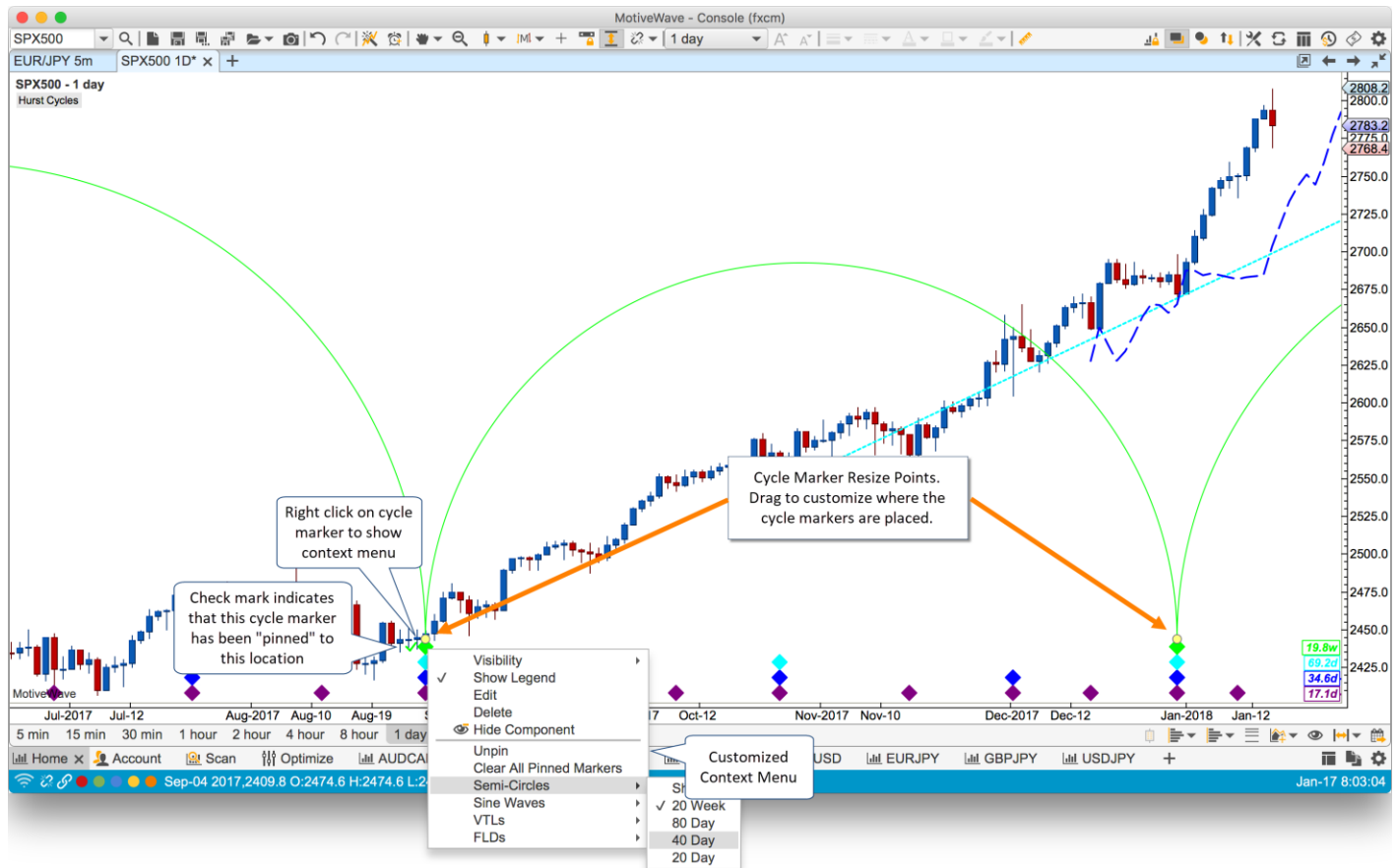
1. Semi Circles
2. Sine Waves
3. VTLs
4. FLDs

2.2 User Interaction

After the Hurst Cycles study is added to a chart, you can interact with it directly through the following:

1. **Context Menu** – Right click on the study to display a custom context menu for configuring some of the study options
2. **Resize Points** – Resize points are displayed for the top level cycle markers. You can adjust the location of some or all of the cycle markers to override the automatic placement of cycle markers using the built-in pattern recognition algorithm.

The screen shot below illustrates user interaction points with the Hurst Cycles study (without opening the study properties dialog):

2.2.1 Context Menu

From the context menu, you can quickly show or hide Semi-Circles, Sine Waves, VTLs or FLDs or specific cycle degrees. In addition, the context menu also has the following options:

1. **Unpin** – If the cycle marker at the right click location has been pinned (dragged to a specific location) this option will allow the study to automatically adjust the marker location using its pattern matching algorithm. This option will not be available it the selected cycle marker has not been pinned.
2. **Clear All Pinned Markers** – removes all the user defined positions for the cycle markers. This tells the study to automatically choose the highest scoring peaks/troughs for all cycle markers.

2.2.2 Resize Points

The resize points (yellow dots on the top level cycle markers) allow you to specify where some of the markers should be placed. The study will place the remaining markers around these points using the constraints from the cycle model.

Once a cycle marker has been moved, it is considered to be "pinned" and the study will not move its location. Pinned cycle markers will have a check mark displayed on the left hand side to visually indicate that it has been chosen by the user.

Cycle markers can be moved at any time by dragging the yellow dots. The dots will snap to the closest bar. You can "unpin" (tell the study to automatically position it) via the right click context menu (choose the "Unpin" option).
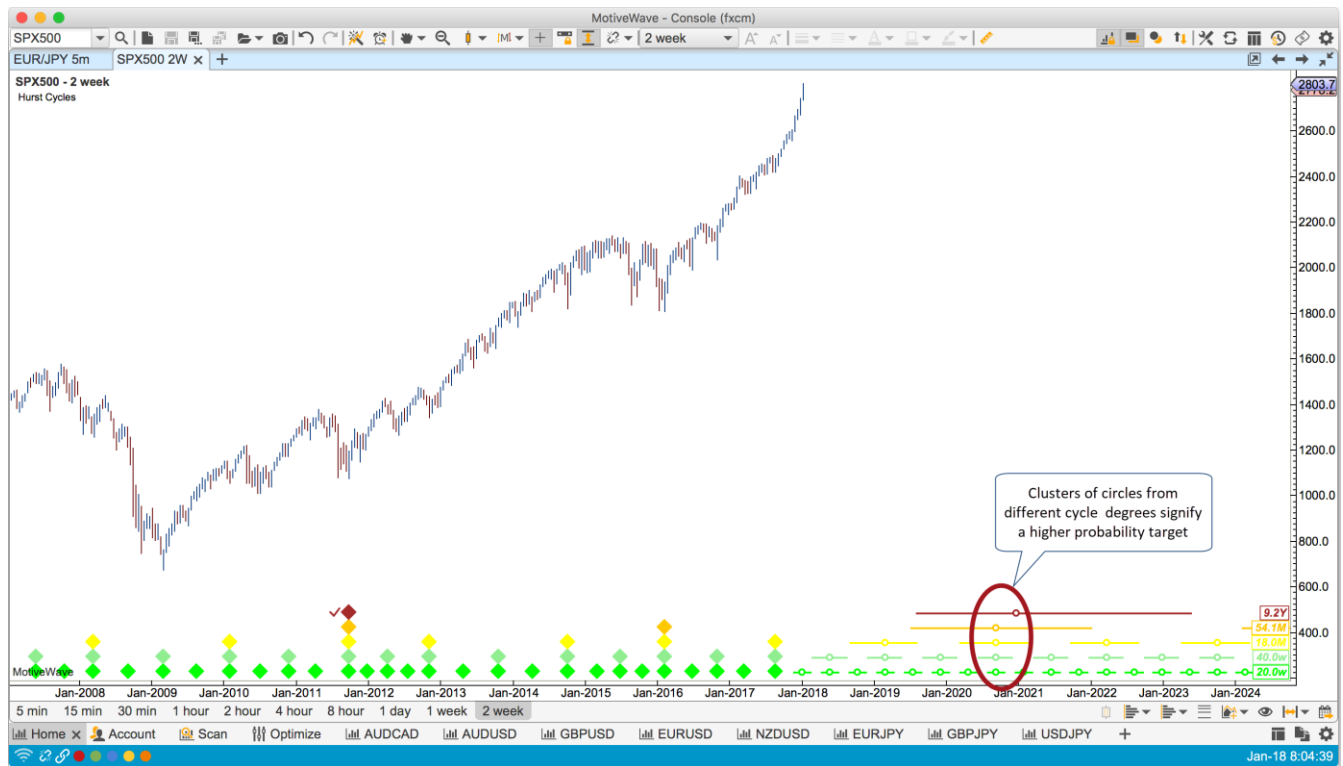
3 Using the Hurst Cycle Study

This section discusses some of the basics of how to use the Hurst Cycles study to predict future market peaks or troughs.

3.1 Circles and Whiskers

The circles and whiskers (horizontal lines with a circle overlaid) are a projection from the latest confirmed cycle marker into the future. The circle represents the average cycle time and the start/end of the lines mark the minimum and maximum lengths of the cycle (using the Cycle Min/Max tolerance settings).
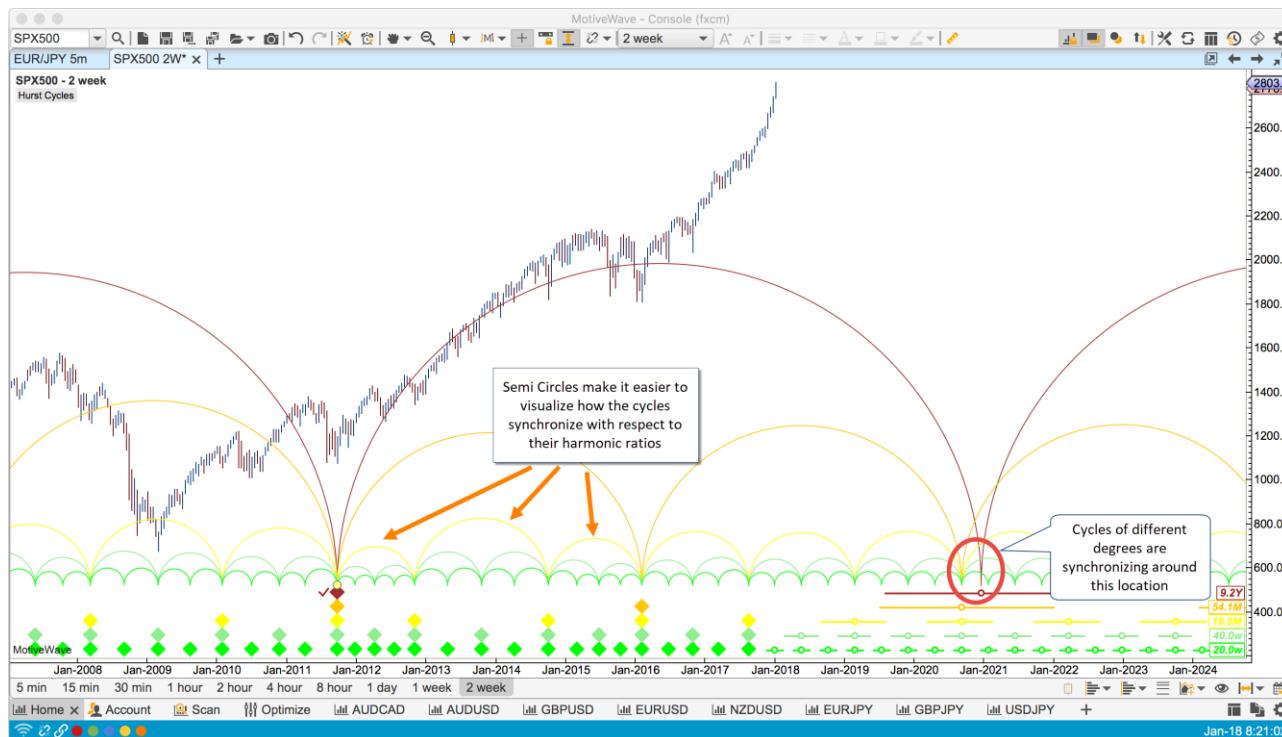
These can be used to predict when a price trough (or peak) may occur. Higher probability targets occur where circles from different cycles cluster together.
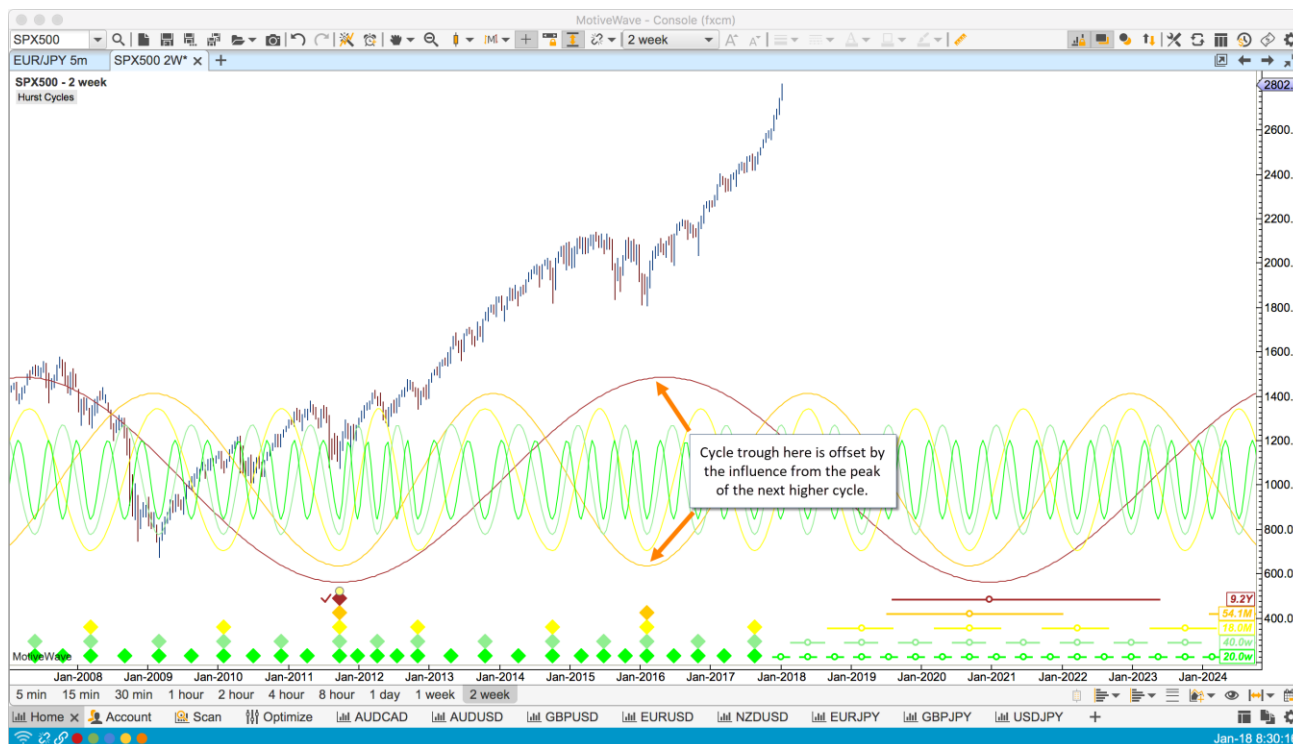

3.2 Semi-Circles and Sine Waves

Semi-Circles and Sine Waves may be used to help visualize where the cycles of different degrees align at price troughs (or peaks). Hurst's cyclic theory states that cycles of different degrees will synchronize at certain points that are determined by their harmonic ratios.

Semi-circles in particular are good for visualizing the points where the cycles synchronize at their harmonic ratios. The higher level cycle's circle encompasses circles from the lower cycles.

Sine waves help to visualize the influence from the higher level cycle on a price trough (or peak). Locations where the sine waves are out of sync may be muted by the impact of the higher level cycle:

3.3 Valid Trend Lines (VTLs)

Valid Trend Lines (VTLs) are a very useful tool for confirming price peaks or troughs in your cyclic analysis. VTLs connecting price troughs will confirm price peaks when they are crossed and conversely VTLs connecting price peaks will confirm troughs when they are crossed.

The following example shows the confirmation of a 40 week price trough using the 20 week VTL for the price peaks. If the price crosses the 20 week VTL of the price troughs, it will confirm a price peak for the 40 week cycle.