



## SeaSonde Radial Site Release 6 Wave Model File Format

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Wave Model files are the result of wave processing. As of Release 6, the older wave spectra method is no longer available. The wave model files are created by a new set of wave processing tools as of **July 2004** based upon a modeled wave analysis. As of **July 2005**, newer wave model tools produce wave results for multiple ranges. Each range distance is stored in the file as a series of separate tables.

Each of these text files has the same basic structure using the **CODAR Table Format** layout. Please read the **File\_CodarTableFormat** document as a prelude to this format.

### File Naming:

The Wave model file names are of the format: WVLM\_XXXX\_YYYY\_MM\_DD\_HHMM.wls.

The wave files will typically have a filename extension of '.wls'

Filename should be used for archiving the data, not as a software determination of whether the file is a valid file.

Wave files are typically stored on a monthly basis. This means that each wave file will contain up to a month of wave data.

### Identification of the file:

To determine if the file is a WAVE type, you should read the first ten lines looking for the '%FileType' keyword. The **<type>** value will be **'WVMD'**. The **<subtype>** value tells you which variation it is.

**%FileType <type> <subtype> <name>**

The **<type>** must be **'WVMD'**

The **<subtype>** is

**'WVM1'** for the first wave model single range version.

**'WVM2'** for the second version of single range wave model data, in which the table data was expanded to show full date of each entry.

**'WVM3'** for first multiple ranges (one range per table) wave model data. Table data is expanded to show range distance and spectra range cells. (These have a flaw where the range distance is off by one range cell spacing; WaveDisplay 10.3.3 or later will display the correct distance)

**'WVM4'** for multiple ranges where the range distances are not offset by one range cell. (These have a flaw where the wave direction can be severely off if the coastline is not north/south; The only fix is to reprocess with Radial 10 Release 5 or later)

**'WVM5'** for multiple ranges where wave directions are correct.

**'WVM6'** added columns of wave doppler points WDPT and wave method MTHD. These files were only produced by pre-release software.

**'WVM7'** added columns of wave doppler points WDPT, wave method MTHD and vector flag FLAG. WVM7

adds the following metadata: %TimeZone:, %TimeCoverage:, %RangeResolutionKMeters:,

%AntennaBearing:, %RangeCells, %DopplerCells, %TransmitCenterFreqMHz, %TransmitBandwidthKHz:,

%TransmitSweepRateHz:, %CurrentVelocityLimit:, %BraggSmoothingPoints:,

%WaveBraggNoiseThreshold:, %WaveBraggPeakDropOff:, %WaveBraggPeakNull:,

%MaximumWavePeriod:, %WaveBearingLimits:, %WaveUseInnerBragg:, %WavesFollowTheWind:,

%WaveMergeMethod:.

Following the CodarTableFormat the files name use is

**WVLM\_XXXX\_YYYY\_MM\_DD\_HHMM.wls**

Where XXXX is site code.

YYYY\_MM\_DD is year month day.

HHMM is hour minutes.

## **Keywords:**

**%CTF: 1.00**

Columnar Table Format version.

**%FileType: WVMD <subtype> <name>**

Identifies the file as a Wave History file. The <subtype> identifies version of this format.

**%UUID: D1D12866-7794-403F-9481-0A840978F8A9**

A universally unique identifier for each file.

**%Manufacturer: CODAR Ocean Sensors. SeaSonde.**

Identifies that the file came from SeaSonde. If you create the Wave History file, put your Identity here.

**%Site: XXXX ""**

Contains the four-character site code followed by optional user friendly site name.

**%TimeStamp: 2008 10 13 00 00 00**

Identifies the center time in year, month, day, hour, minute, second of the data collected in the file.

**%TimeZone: "PDT" -7.000 1**

Identifies the timezone used as label, hours from UTC, and non zero if daylight saving time was in effect.

**%Origin: 38.3173167 -123.0724667**

Is the <latitude> <longitude> of the SeaSonde Site.

**%TimeCoverage: 0.250 hours**

The time each vector covers is plus & minus half this value from the timestamp.

**%RangeResolutionKMeters: 2.92572 km**

Range resolution of each range cell from the processed cross spectra.

**%AntennaBearing: 180.0**

Antenna bearing CW from True North.

**%RangeCells: 100**

Number of range cells from the processed cross spectra.

**%DopplerCells: 512**

Number of doppler cells from the processed cross spectra.

**%TransmitCenterFreqMHz: 13.475000**

Transmitter center frequency from the processed cross spectra.

**%TransmitBandwidthKHz: -51.269531**

Transmitter bandwidth from the processed cross spectra. Negative value is a down sweep.

**%TransmitSweepRateHz: 2.000000**

Transmitter sweeprate from the processed cross spectra.

**%CurrentVelocityLimit: 150**

Maximum allowed current velocity used to determine first order Bragg.

**%BraggSmoothingPoints: 3**

Doppler cell point smoothing used to determine first order Bragg.

**%WaveBraggNoiseThreshold: 3.0**

Noise factor threshold used to determine first order Bragg.

**%WaveBraggPeakDropOff: 100.0**

Peak dropoff factor used to determine first order Bragg.

**%WaveBraggPeakNull: 50.0**

Peak null factor used to determine first order Bragg.

**%MaximumWavePeriod: 17.0**

Maximum allowed wave period to calculate.

**%WaveBearingLimits: 0.0 359.0 %% Left,Right Deg NCW**

Sector to limit where waves are allowed to come from. (NOTE: WVM7 has these values reversed from comment labels. The wave sector is from the second bearing clockwise to the first bearing.

**%WaveUseInnerBragg: 0 %% 0 No, 1 Yes**

Was processing using the inner Bragg energy.

**%WavesFollowTheWind: 0 %% 0 No, 1 Yes**

Was processing told to have waves always follow the wind direction.

**%WaveMergeMethod: 2 %% 0 None, 1 Average, 2 Median**

Wave merging method used. Waves are calculated for each CSS spectra. They are merged by either averaging or median filtering. The spectra count column indicates the maximum number of CSS spectra that went into the result. The actual count used for each datum can be less since wave height, period, & direction can come from different calculations where one is calculable but the others are not.

**Columnar Table Data:**

The first table in the file should have a **%TableType:** key.

**%TableType: WAVL <subtype>**

**<type>** must be **WAVL** which indicates table is Wave History

**<subtype>** is **WVM5** to identify the first version which contains period, energy, direction info.

After the TableType key is the

'**%TableColumnTypes:**' key which describes the data in each column. Using this key (highly recommended) will provide compatibility with future unknown **%TableType <subtype>**. The **%TableColumnTypes:** contains a list of fourcharcodes describing each column of the table data in order.

The known column codes are:

- TIME** seconds of the wave info from the date stamp
- MWHT** wave model height in centimeters for every one of three waves. 999 if not calculable.
- MWPD** wave spectra period in seconds. 999 if not calculable.
- WAVB** wave from direction in degrees. 999 or 1080 if not calculable.
- WNDB** wind from direction in degrees.
- ACNT** number of CSS that went into averaging the result. (May be less than maximum possible CSS during coverage time due to non-calculable entries not included in average.)
- DIST** distance of result from origin in kilometers.
- RCLL** range cell of result from cross spectra.
- WDPT** number of doppler points used for wave calculation.
- MTHD** wave method used for result:
  - 1 when doppler displacement is less than 30% of the bragg index. Wave period is 1 / doppler displacement and wave height & direction come from fitting the model to the CSS.
  - 2 when doppler displacement is greater than 30% of the bragg index. Wave period, height & direction from fitting a wave model spectrum to the CSS.
  - 3 same as method 2 except that wave direction follows wind direction due to short period waves.
- FLAG** vector flag. This is a composite value (think binary)
  - 0 normal.
  - (+1) the merged vector result included wave directions at the bearing limits.
  - (+2) the merged vector sources were all at the wave directions at the bearing limits.
  - (+4) the merged vector sources contained different wave methods.
- TYRS** year of data point.
- TDAY** day of the month of the point
- THRS** hour of the day of the point
- TMIN** minute of hour of the point
- TSEC** seconds of the minute of the point

**%TableRows: <count>**

tells reader software how much data to expect.

**%TableColumns: <count>**

can be used with the table type and subtype to determine if all the expected columns are in the file.

Use this to parse the column data to ensure that you are always compatible with future column changes.

%TableColumnTypes: TIME MWHT MWPD WAVB WNDB ACNT DIST RCLL TYRS TMON TDAY THRS TMIN TSEC

The table data should then be preceded by a

**%TableStart: <tablename>**

<tablename> will be missing for the first table.

Before the table data starts two comments are added to help visually identify the data columns

**Example:**

%Distance: 17.87350 km

%RangeCell: 12

%TableType: WAVL WVM7

%TableColumns: 17

%TableColumnTypes: TIME MWHT MWPD WAVB WNDB ACNT DIST RCLL WDPT MTHD FLAG TYRS TMON TDAY THRS TMIN TSEC

%TableRows: 96

%TableStart:

% Time			-----Wave-----			Wind							Time			
% FromStart	Height	Period	Dir.	Dir.	Spectra	Distance	Range	Doppler	Wave	Vector				Year	Mo	Dy
%(seconds)	(m)	(s)	(deg)	(deg)	Count	(km)	Cell	Points	Method	Flag						
Hr Mn S																
799200	0.84	5.99	0.0	320.0	3	17.8735	12	16	2	4				2008	03	10

Followed by a line for each Table Row of data. Each line is preceded by a space. Spaces (no tabs) are used between columns.

%TableEnd:

Data is followed by processing time and the tools that created the wave file.

%%

%%

%ProcessedTimeStamp: 2009 03 09 17 51 47

%ProcessingTool: "WaveModelForFive" 10.6.2

%ProcessingTool: "SpectraToWavesModel" 10.8.0

%ProcessingTool: "WaveModelSlider" 11.2.5

%ProcessingTool: "WaveModelArchiver" 11.2.4

%ProcessingTool: "AnalyzeSpectra" 10.6.0

%End:

**Document Version History.**

090418 – Included WVM6 new columns descriptions . Removed Deprecated Wave Spectra Formats.

081013 – Added WVM6 & WVM7 information.

070214 – Added WVM4 & WVM5 information.

061207 – Indicate that all wave/wind directions are the FROM direction.

061207 – Some minor clean up work.

061207 – Reorganize so that Wave Model comes first.