



Wave File Format

112.01.1609.FF

Sep 26, 2016

SeaSonde Wave WVLM File Format

Wave Model processing produces monthly WVLM files which are text based built upon the **Columnar Table Format (CTF)** which is covered in a separate document which you should be familiar with before reading this document.

With Radial Release 8, all the processed ranges have been filtered down leaving the result without a range; the files will still contain a distance column set with nan and range cell column set with 1.

Identification

The first keyword of the file will typically be '**%CTF: <version>**' describing the version of the CTF file. Before version 1.00, the file will be missing this key; however, it is still readable with this standard. If the CTF version is 2 or greater then the file will not likely be readable by current readers that expect 1.x

Within the first **ten** lines of the file will must be a keyword of:

%FileType: <type> <subtype> <name>

The <type> must be **WVMD** to identify it as wave model data.

The <subtype> identifies when significant changes have been made and latest is **WVM7**. Even if there are other values here, the file will still likely be readable.

File Naming

File name should be use for archiving the data, not as a software determination of whether the file is a valid **WVLM** file, date stamp or contents.

The filenames follow the time-stamped CTF naming convention
WVLM_XXXX_YYYY_MM_DD_HHMM.wls.

'XXXX' is the four character site name.

'YYYY' is the year

'MM' is the two character month from 01 to 12

'DD' is the two character day from 01 to 31

'HH' is the two character 24 hour from 00 to 23

'MM' is the two character minute from 00 to 59

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

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

Keywords

%CTF: 1.00

Identifies the file as a Columnar Table Format. The 1.00 version will change in the future if any major changes are needed in reading the format. If the CTF version is 2 or greater then the file will not be readable by current readers that expect 1.x

%FileType: WVMD <subtype> <name>

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

WVM1 is the first wave model single range version.

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

WVM3 is 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.

WVM4 is 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.

WVM5 is 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 and adds much more metadata.

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

A universally unique identifier for each file. This key is created using Mac OS X call CFUUIDCreate. Each UUID key has a very, very high chance of being unique. This key will change if the file is reprocessed. Search the Internet for more information on UUIDs.

%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 start time in year, month, day, hour, minute, second of the data collected in the file. The time column in seconds is referenced from this time.

%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: 31

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.

%CoastlineSector: 75.0 215.0 %% Start CW to Stop in Deg NCW

Defined coastline sector that wave processing used from start True clockwise to stop True.

%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: 90.0 124.0 %% Start CW to Stop in Deg NCW

Sector to limit where waves are allowed to come from.

%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.

Columnar Table Data:

If the wave data is multi-range, there will be multiple tables for each range and preceding each table will be %Distance: and %RangeCell: keywords for that table. There is also a table column for distance and range cell, while redundant, this allows you to more easily read the all the tables into a large array and already have the distance in the array.

%Distance: 3.98070 km

Distance to range cell for following table wave results.

%RangeCell: 4

Range cell for following table wave results.

%TableType: WAVL WVM7

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

<subtype> is **WVM7** to identify the version which contains period, energy, direction info.

%TableColumns: 17

This 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 WDPT MTHD FLAG TYRS TMON TDAY THRS TMIN TSEC

This key describes the datum for each column in order. Using this key (extremely recommended) will provide compatibility with future unknown %TableType <subtype>. The %TableColumnTypes: contains a list of four-char-codes 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 meters 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.

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

%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.

Then a line for each table entry which start with a ' ' space.

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: <tablename>

Marks the end of the table. <tablename> will be missing for first table.

After the table(s) the file is followed by processing time and the tools that created the wave file.

%ProcessedTimeStamp: 2016 08 04 22 54 44

Time when the wave file was last updated.

%ProcessingTool: "WaveModelForFive" 11.5.0

%ProcessingTool: "WaveModelFilter" 2.0.0

%ProcessingTool: "SpectraToWavesModel" 11.5.0

%ProcessingTool: "WaveModelArchiver" 12.0.0

%ProcessingTool: "AnalyzeSpectra" 10.9.3

All the processing tools and their version number which worked on the data.

%End:

Marks the end of the file.

Example Table:

```
%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: 1
%TableStart:
%% Time -----Wave----- Wind
%% FromStart Height Period Dir. Dir. Spectra Distance Range Doppler Wave Vector
Time
%% (seconds) (m) (s) (deg) (deg) Count (km) Cell Points Method Flag
Year Mo Dy Hr Mn S
2008 03 10 799200 0.84 5.99 0.0 320.0 3 17.8735 12 16 2 4
%TableEnd;
```

Revision History

First Draft Sep 26, 2016

Copyright and Disclaimer

This document is copyrighted(c) by CODAR Ocean Sensors, Ltd and cannot be copied or reproduced in all or partial without expressed written consent by CODAR Ocean Sensors, Ltd.