

RDI ADCP Ensemble-Averaged Time Series

15-minute ensemble-averaged data files for [Teledyne RDI ADCPs](#) are described here. The complete time-series data product options are also available and described [here](#).

Oceans 3.0 API filter: `dataProductCode=RADCP15MA`

This is no longer offered as a separate data product. It is now an option for the [RDI Time Series](#) data product.

Revision History

- 20130320: rebuild of ensemble code, now supports a much bigger data structure, creates one file per year
- 2011XXXX: NetCDF, CF1.5 compliant product released
- 20111121: Initial product released

Formats

This data is available in **MAT** and **NetCDF** formats. The filename is appended with '-ENSEMBLE' to differentiate it from the MAT format with the complete time-series. Content descriptions and example files are provided below.

MAT

MAT files (v7) can be opened using MathWorks MATLAB 7.0 or later. To produce the file, the following requirements apply:

- A new file is started whenever there is a configuration change or the file would grow too big (approximately one year of data for 15-minute ensembles).
- Only records with valid checksums are included.
- The instrument date/time field is replaced using the NEPTUNE timestamp at the beginning of the [log file](#) (since this timestamp is more accurate than the instrument clock)
- A correlation threshold of 64 and an error velocity threshold of 2 m/s are used to screen the data. Within each bin, only the pings that are within those thresholds are used in the ensemble-averaging. If there were no good pings, the velocity is NaN.

The file contains four structures: meta, adcp, config, and units.

meta: structure containing the following metadata fields.

- `deviceId`: A unique identifier to represent the instrument within the NEPTUNE Canada network.
- `creationDate`: Date and time (using ISO8601 format) that the data product was produced. This is a valuable indicator for comparing to other revisions of the same data product.
- `deviceName`: A name given to the instrument.
- `deviceCode`: A unique string for the instrument which is used to generate data product filenames.
- `lat`: Latitude obtained at time of deployment.
- `lon`: Longitude obtained at time of deployment.
- `depth`: Obtained at time of deployment.
- `deviceHeading`: Obtained at time of deployment (exception: for Device ID 13051, this field is NaN since this ADCP is on a mooring and does not have a fix heading).
- `siteName`: Name corresponding to its latitude, longitude, depth position.
- `locationName`: The node of the NEPTUNE Canada observatory. Each location contains many sites.
- `samplingPeriod`: Sampling rate of the instrument in seconds.
- `searchID`: Identifier for data search query.
- `dataProductVer`: Version of data product.

adcp: structure containing the ADCP data, having the following fields.

- `range`: vector of distance to each bin
- `corr`: 3D matrix, correlation time-series for each bin
- `intens`: 3D matrix, intensity time-series for each bin (also known as received signal strength intensity or RSSI)
- `velocity`: 3D matrix, corresponds directly to output of instrument and so depends on configuration coordinate system
- `percentGood`: 3D matrix, percent good time-series for each bin
- `compassHeading`: vector, magnetic compass heading time-series
- `pitch`: vector, pitch time-series
- `roll`: vector, roll time-series
- `time`: vector, timestamp in datenum format (obtained from time the reading reached the shore station)
- `temperature`: vector, temperature time-series
- `salinity`: vector salinity time-series, (may contain constant values depending on device configuration)
- `pressure`: vector, pressure time-series
- `depth`: vector, depth of the device as measured by the device for each ping. This will vary with the tide and more so if the device is mobile. It should be consistent with `meta.depth`.
- `soundSpeed`: vector speed of sound time-series, (may contain constant values depending on device configuration)
- `uMagnetic` (optional): 2D matrix, East velocity relative to magnetic North
- `vMagnetic` (optional): 2D matrix, North velocity relative to magnetic North

- u: 2D matrix, East velocity relative to True North
- v: 2D matrix, North velocity relative to True North
- w: 2D matrix, Upward Velocity
- velocityError: 2D matrix, computed using RDI algorithm
- backscatter: 3D matrix based on received signal strength intensity (adcp.intensity), compensated for two-way spreading (20LogR) and absorption. Equation based on [Gostiaux and Van Haren](#) ("Extracting Meaningful Information from Uncalibrated Backscattered Echo Intensity Data, Journal of Atmospheric and Oceanic Technology, 72, 943-949, 2010). The absorption computation follows Ainslie and Malcolm ("A simplified formula for viscous and chemical absorption in sea water", Journal of the Acoustical Society of America, 103(3), 1671-1672, 1998). Absorption coefficient based on mean depth, temperature and salinity in adcp structure
- meanBackscatter: same as above, except averaged over the four beams to create a 2D matrix. Averaging is done by converting to standard intensity, averaging, then converting back to decibels.
- pingsPerEnsemble: vector, number of pings used in each bin to obtain 15-minute average (an indicator of pings which passed both the correlation or error velocity tests)
- ensFirst: vector; the first ensemble number in each bin

config: structure containing ADCP configuration details, where some field names are appended with '_XX' to represent the corresponding configuration command (beneficial for experienced RDI ADCP users).

- fwVer: CPU firmware version
- fwRev: CPU firmware revision
- sysCfg: hardware configuration definition
- freq: frequency
- beamPattern: convex or concave
- orient: orientation (e.g., 'Up' indicates transducers are looking upward)
- beamAngle: beam angle
- janusCfg: description of Janus Configuration
- lagLength: time period between sound pulses
- nbeams: number of beams
- nbins_WN: number of bins
- npings_WP: number of pings per ensemble
- cellSize_WS: length per cell
- blank_WF: blank after transmit
- profilingMode: signal processing mode
- corrThresh_WC: correlation threshold
- codeReps: code repetitions in transmit pulse
- percentGoodMin_WG: percent good threshold
- errVelThreshold_WE: error velocity threshold
- timePing_TP: time between pings within ensemble
- coord_EX: coordinate transformation processing parameters
- coordSys: coordinate system (evaluated from coord_EX)
- headingAlign_EA: correction factor for physical heading misalignment
- headingBias_EB: correction factor for electrical/magnetic heading bias
- sensorSrc_EZ: defines selected source of environmental sensor data
- sensorAvail: defines available sources of environmental sensor data
- bin1Dist: distance to the middle of the first depth cell
- transmitLength_WT: length of the transmit pulse
- falseTrgt_WA: false target threshold
- transmitLagDistance: distance between pulse repetitions
- cpuSN: CPU board SN
- sysBndwidth_WB: bandwidth setting (narrow or wide)
- sysPower_CQ: system power setting
- instSN: instrument serial number
- ensInterval: ensemble interval
- ambiguityVelocity_WV: radial ambiguity velocity, if available

units: structure containing unit of measure for fields in structures above. For instance, units.pressure='decibar'.

For details about the configuration parameters, refer to the [manufacturer documentation](#) (especially the WorkHorse Commands and Output Data Format manual).

[Oceans 3.0 API filter:](#) extension=mat

Example: [RDIADCP75WH3808_20111016T000001Z-ENSEMBLE.mat](#)

NetCDF

[NetCDF](#) is a machine-independent data format offered by numerous institutions, particularly within the earth and ocean science communities. Additional resources are noted [here](#).

[Oceans 3.0 API filter:](#) extension=nc

Discussion

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