## REVISION NOTICE TABLE

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| DATE | DESCRIPTION OF REVISION |
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## PROCESSING NOTES

Cruises: 2015-98, 2016-98 and 2017-98

Agency: CHS

Location: Pacific (few casts in Arctic in 2015)

Project: CHS CastAway

Party Chief: Dangerfield N.

Processed by: Roy Hourston and Germaine Gatien

Date of Processing: December 2017

Number of original csv files: 797 (61 for 2015, 403 for 2016, 333 for 2017)

Number of CTD files: 617 (28 for 2015, 303 for 2016, 286 for 2017)

# Instrument

The CastAway-CTD is a small profiling instrument that measures conductivity, temperature, and pressure. Its embedded firmware controls all of the instrument's functions. It is designed for profiling to depths of up to 100m at 5 Hz. It uses a six electrode flow-through conductivity cell with zero external field coupled with a rapid response thermistor (<5Hz) to attain high measurement accuracies.

The instrument does not require a pump and is hydrodynamically designed to free fall rate of 1 m/s.

Resolution and Accuracy as stated by the manufacturer is:

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| --- | --- | --- |
| **Channel** | **Resolution** | **Accuracy** |
| Pressure | 0.01 db | 0.25 db |
| Depth | 0.01 m | 0.25 m |
| Temperature | 0.01 °C  | 0.05 °C  |
| Conductivity | 1 mS/cm  | 5 mS/cm  |
| Conductance:Specific | 1 mS/cm  | 5 mS/cm  |
| Salinity |  0.01 (PSS-78)  |  0.1 (PSS-78)  |
| Speed:Sound | 0.01 m/s  | 0.15 m/s  |
| Density | 0.004 kg/m3  | 0.02 kg/m3  |
| GPS |  | 10m |

## PROCESSING SUMMARY

Processing was done using the CastAway CTD data processing system which included the following steps:

 - Pressure correction to remove ambient atmospheric pressure.

 - Removal of records obtained while the system was stationary.

 - De-spiking of conductivity data to remove erratic measurements near the water surface that can be caused by air bubbles trapped in the conductivity flow cell.

 - Bin-averaging with 0.3db bins with linear interpolation used to fill empty bins or the nearest available value for surface or bottom bins.

 - Combination of downcast and upcast data using a weighted average based on fall velocity.

 - Derivation of specific conductance, salinity, sound speed, density and depth for each pressure bin.

* Density is derived based on temperature resolution and accuracy using the

 International Equation of State for sea water (EOS-80).

* Depth and Specific Conductance are derived using the International Equation

 of State for sea water (EOS-80).

* Salinity was calculated using the 1978 Practical Salinity Scale.
* Sound Speed was calculated using the method of Chen-Millero, 1977.

The output data were in CSV format.

Many files contained no header information.

Other files have headers but no data.

A file list was prepared for each year with the full file names of those casts with both positions and data.

Only files with both position information and data were processed beyond this point.

The file names are non-standard. The names were kept in the original format but a 4-digit event number was added. Those numbers do not signify any temporal or geographic order. Event numbers are needed in order to use some IOS SHELL routines and assist searching for files.

The CSV files were converted to IOS Header format using MatLab.

Program Edit Headers in IOS SHELL was used to adjust formats, to amend header comments and to add channel names above the data columns. The Latitude 2 and Longitude 2 header entries were removed because many entries were blank.

Quality Checks:

* Positions were checked on maps and all positions looked reasonable.
* T-S plots were examined plots were examined. In shallow water many small unstable features are found, but those are expected in shallow waters. No significant outliers were found.
* Profile plots turned up many cases where the salinity is extremely low and constant. Many were investigated and they came from areas where a freshwater layer is not unexpected, so they were left unchanged.
* Some files contain only a single record.

Cross-reference lists were produced for each year. The file names are truncated, but the event numbers and their times and positions are complete.

Header check files were produced for each year that show what channels are available and which particular CTD was used for each event.