Notes on MVP Matlab Processing Tools
Dr. Susanne E. Craig 10th April 2014

Several Matlab functions were written to process MVP raw data, determine the best lag to apply to minimize CTD salinity spiking effects, and to bin the processed data to 1 dbar bins. All functions are well documented via in-function comments and the following is a guideline on their use.

1. Raw Data Processing

`processMVPrawdata.m`

This function batch processes a directory containing raw (.raw) MVP text files and organizes them into structure arrays (one structure per cast). Raw files are chosen instead of processed files (.m1) to provide higher temporally resolved data that is required for lag calculations (see below). Output is two structure arrays that contain down (MVPd) and upcast (MVPu) data.

1.1 Dependent Sub-Functions

`getMVPdirRaw.m`: Gets raw filenames from the data directory.

`iniRawStructs.m`: Preallocates structures and fields to speed up computation time.

`loadMVPraw.m`: Opens and reads data from an MVP .raw data file.

2. Calculation of Conductivity Lag

`calc_lag_MVPdata.m`

This function determines the conductivity lag that should be applied to downcast MVP conductivity data to correct for the differing response times of temperature and conductivity sensors, which is further exacerbated by the rapid descent rate of the MVP. This is achieved by calculating the largest cross correlationa of dT/dt and dC/dt. The method was developed by Barth et al. (1996) and implemented by Ullman & Hebert (2013).

      The function outputs the parameter *lagMean*, which is the mean lag of all the casts. This can then be used in the final processing steps implemented by `process_MVP_CTD_data.m` (see below).

REFERENCES

Barth, J. A., R. O'Malley, J. Fleischbein, R. L. Smith and A. Huyer (1996). SeaSoar and CTD observations during the Coastal Jet Separation cruise W9408A August to September 1994. College of Oceanic and Atmospheric Sciences, Oregon State University, Corvallis. Reference 96-1, Data Report 162, November 1996.

Ullman, D. S. and D. Hebert (2013), Processing of underway CTD data, J. Atmos. Oceanic Tech., (submitted).

3. Final Processing

This function smooths downcast pressure, temperature and conductivity data using a filter, then applies the lag to conductivity that was previously determined using `calc_lag_MVPdata.m`. Salinity and sigma T are calculated, and then all parameters are binned into 1-dbar bins. Data are organized into a structure array (MVP), with a structure per cast.

3.1 Dependent Sub-Functions

`seabirdFilter.m`: This filter runs a low-pass filter on an input signal. A low-pass filter smooths high frequency (rapidly changing) data. To produce zero phase (no time shift), the filter is first run forward through the data and then run backward through the data. This removes any delays caused by the filter. This filter is described in SeaBird Data Processing Manual (page 91).