CCG 2007/10/23

Processing steps for SBC LTER monthly CTD casts.

The main goal of these processing steps is to get all the CTD profiles associated with SBC LTER monthly water sampling into a format compatible with the Ocean Data View program (ODV). http://odv.awi-bremerhaven.de/

I don't think I need to go into all the steps required to generate these files. I've reprocessed all the data from the beginning of SBC LTER which included a variety of odd formats and various instruments of opportunity. Since the protocols are fairly consistent now, I'll just put it the steps necessary to process data obtained from this point in time forward. This too may change as I will probably create routines that simply update existing files rather than redo everything every time. All casts were reprocessed from scratch to maintain a uniform variable list and qaqc over time.

Initial batch processing of *.hex and associated *.con files is performed using SBE Data Processing software. All the lter_*.psa files must be run through once for one file to set path and confirm variable lists. The script below is run in Windows to batch process all files. See the SBE Data Processing Manual for a complete explanation. It's available on line at http://www.seabird.com/.

file = (ex. LTER_monthly_batchrun.txt)

```
@SBE batch processing for monthly data
datcnv /i%1\*.hex /o%1
filter /i%1\*.cnv /o%1
alignctd /i%1\*.cnv /o%1
celltm /i%1\*.cnv /o%1
loopedit /i%1\*.cnv /o%1
derive /i%1\*.cnv /o%1
asciiout /i%1\*.cnv /o%1
```

Some notable differences from the SBC LTER cruise data:
----> only one derive step since no O2 sensor

----> no binaveraging step since the downcast and upcast (if available) have to be clipped out by hand (using Clip_asc_Output_SBE19plus.m) and it's just about impossible to edit these SBE files and get them back into the processing series. Output from this step are *.mat files which are input to the next binavg step.

----> A script (LTER_monthly_binAvg.m) performs a bin averaging routine identical to the SBE software 'binavg' program (without interpolation). Interpolation can be activated in this script but was found to be undesirable. Output from this step are named *.bavg.mat and have the following column designations:

```
% # 1= timeJ: Julian Days
% # 2 = scan: Scan Count
% # 3= latitude: Latitude [deg]
% # 4 = longitude: Longitude [deg]
% # 5 = prdM: Pressure, Strain Gauge [db]
% # 6 = tv290C: Temperature [ITS-90, deg C]
% # 7 = c0S/m: Conductivity [S/m]
% # 8 = v0: Voltage 0
% # 9 = v1: Voltage 1
```

```
% # 10 = v2: Voltage 2
% # 11 = v3: Voltage 3
% # 12 = dz/dtM: Descent Rate [m/s]
% # 13 = xmiss: Beam Transmission, Chelsea/Seatech/Wetlab CStar [%]
% # 14 = bat: Beam Attenuation, Chelsea/Seatech/Wetlab CStar [1/m]
% # 15 = flECO-AFL: Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
% # 16 = upoly0: Upoly 0, Wetlabs
% # 17 = depSM: Depth [salt water, m], lat = 34
% # 18 = potemp090C: Potential Temperature [ITS-90, deg C]
% # 19 = sal00: Salinity [PSU]
% # 20 = sigma-?00: Density [sigma-theta, Kg/m^3]
% # 21 = sva: Specific Volume Anomaly [10^-8 * m^3/Kg]
% # 22 = number of scans per bin
% # 23 = pressure values for bins (integer)


------------------------------------------------------------------------
 Once these .bavg.mat files have been generated they are packaged into an ODV
importable format using the mfiles:

 lter_monthly_CTD_process_all.m
 lter_monthly_CTD_process_onefile.m

 lter_montly_station_info.m
 ---> a function that returns a nominal lon/lat and bottom depth for a desired
station.

           'QI_34.4684/-120.1193_0007';
           'QR_34.4672/-120.1200_0011';
           'QM_34.4649/-120.1192_0015';
           'QO_34.4614/-120.1193_0022';
           'NI_34.4277/-119.9505_0016';
           'NR_34.4238/-119.9503_0016';
           'NO_34.4130/-119.9560_0055';
           'CI_34.3934/-119.5392_0004';
           'CR_34.3902/-119.5399_0008';
           'CO_34.3838/-119.5418_0023';
           'AR_34.4002/-119.7443_0008';  % Note: AR = AB
           'AB_34.4002/-119.7443_0008';
           'AM_34.3939/-119.7292_0010';  % Note: AM = MH = MK = MKI
           'MH_34.3939/-119.7292_0010';
           'MK_34.3939/-119.7292_0010';
           'BI_34.4589/-120.3334_0006';
           'BR_34.4585/-120.3335_0007';
           'BO_34.4582/-120.3336_0008'];

 The final output colums for the ODV importable text file
(LTER_monthly_downcasts.txt) are:

 col{1}= cruise name
 col{2}= station
 col{3}= type (C)
 col{4}= mm/dd/yyyy
 col{5}= hh:mm
 col{6}= lon [deg]
 col{7}= lat [deg]
 col{8}= bottom depth (m)
```

 col{9}= depth sw m
col{10}= decimal year
col{11}= lon [deg]
col{12}= lat [deg]
col{13}= prDM: Pressure, Digiquartz [db]
col{14}= pressure bins (integer)
col{15}= t090C: Temperature [ITS-90, deg C]
col{16}= c0S/m: Conductivity [S/m]
col{17}= voltage 0
col{18}= voltage 1
col{19}= voltage 2
col{20}= voltage 3
col{21}= dz/dtM: Descent Rate [m/s]
col{22}= xmiss:Beam Transmission Chelsea/Seatech/Wetlab CStar [%]
col{23}= bat: Beam Attenuation, Chelsea/Seatech/Wetlab CStar [1/m]
col{24}= flECO-AFL: Fluorescence Wetlab ECO-AFL/FL [mg/m^3]
col{25}= upoly
col{26}= potemp 00
col{27}= sal 00
col{28}= sigma 00
col{29}= sva 00
col{30}= scans per bin in binavg

Some more info.....

----> missing value code in the .txt file - 99999.

The Ocean Data View program is a bit needy and demands strict a strict format
for the first 8 columns in the .txt files. See cols .txt cols 1-8 above.