Notes updated March 5, 2004 by Tihomir Kostadinov.

1. Processing AC9 calibration

Major changes in red.

In /home/data65/pb/AC9/cals/184/QWATER/2003 (the correct year directory should be selected; create if first calibration in that year) create a subdir named with the date of calibration, e.g. 030113 yymmdd; 184 should be replaced with 148 for the other AC9 (serial 148) now and below in instructions where appropriate.

Copy the ASCII
wtr_d_030113a.dat wtr_d_030113b.dat wtr_d_030113c.dat
files from the laptop into that directory;

symbolically link each of the above into two files, one for a, the other for c, like for the first one:

ln -s wtr_d_030113a.dat wtr_a_030113a.dat
ln -s wtr_d_030113a.dat wtr_c_030113a.dat

In the /home/data65/pb/AC9/cals/184/QWATER dir, update the 184_watertemp.txt file with the q-water temp of the calibration, in the format specified.

Copy or link the file
/home/data65/pb/AC9/cals/184/QWATER/revised_cal_par/ac9cal.par
to the local directory. I.e. this should be the local parameter file that overrides the global default parameters read in from `'/home/data65/pb/AC9/LIST/ac9cal_def.par'` as instructed in that local file;

Start matlab in the same dir (/home/data65/pb/AC9/cals/184/QWATER/2003/yymmdd) ; start ac9cal GUI on the command line

in the GUI
→ get list → Find → Add all wtr_a_xxx files → select Wtr and 'a' radio buttons → save → qcal_a.txt in the same dir

→ in the main GUI window → Select AC9 instrument, latest factory calibration date; water and 'a' radio buttons and 'use list file' also → HIT CALView

In CALVIEW with the graphs
→ select the desired clean interval (no major spikes) with the mouse in the time series graph. To go back (zoom out) right click inside the graph. When happy with it, hit Go in the main GUI. It goes like this through all three (a, b and c) repetitions and asks at the end to save list file. Hit save. Save it as qcal_a.txt (override original).

Choose view spectra then save means and exit, or directly save means and exit, when it asks.

NOTE: Start the process here to redo a calibration with the same existing windows (not the whole time series is selected, rather the nice looking part, see above – selecting interval), but to reapply the calculations with new sigma-T values, for example, as defined in local ac9cal.par. Will create new a_ts_cal.dat at the end. Note that calspec creates the individual repetitions T-corrected mean files, ts_cal creates the means of all repetitions, i.e the final product a_ts_cal.dat.

→ Select "Auto adv." and hit calspec on the main GUI; if you had to close or return later, first go to Get List → select Open → then qcal_a.txt , then hit Calspec;
save list file and write mean value files?
→ In the spectra window, when it asks whether to save list file and override, select Yes and override qcal_a.txt again, in the same dir
(/home/data65/pb/AC9/cals/184/QWATER/2003/yymmdd)

Notice the *.txt files that appeared in the dir

→ Hit ts_cal → In the time-series plot of all channels look if any are not desirable (good data). You can go back to the dialog window and select that calibration repetition and choose "Comment Line out"; it will add a pound sign to the front of that line in qcal_a.txt. Hit update and then save as qcal_a.txt (override again);
→ Hit ts_cal again (necessary since it creates a file a_ts_cal.dat) To create a unique link to that file do
ln -s a_ts_cal.dat wtr_a_030113_ave.txt

→ REPEAT ALL OF THE ABOVE FOR THE c-calibartion (attenuation) qcal_c.txt is worked with this time hit water and 'c,a+--'

The whole point is to have/create the wtr_[a,c]_yymmdd_ave.txt files (separate for a and c).

Link *.txt files created in calibration directory to the main QWATER/2003/ directory so in this QWATER/2003/ directory do

ln -s yymmdd/wtr_*.txt . (note dot at end of command is necessary)

You want to update the qcal record for the entire year with the qcal work just done in this calibration. This lets you look at the yearly time series. So in the main QWATER/2003 directory do

gelbstoff!tiho> cat qcal_2003_a.txt 030317/qcal_a.txt > temp
gelbstoff!tiho> cp temp qcal_2003_a.txt
gelbstoff!tiho> rm temp

A better way to execute the above three steps is to do
cat 03*/qcal_a.txt > qcal2003_a.txt

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6-22 - 7-24

First make sure there is no existing qcal2003_a.txt – dleet or archive under different name.

Repeat for 'c'

This adds the current calibration to the yearly record. It lets you look at time-series of calibrations if you run the ac9cal from the QWATER/year/ directory and choose wcal_a_year.txt file.

** If a new factory calibration is performed, it is necessary to update the file /home/data65/pb/AC9/cals/184/DeviceFiles/ac9cal.txt. Add the calibration file names, date etc. as formatted in previous calibrations, and add the Tcal and Ical. These numbers can be found on the paperwork that comes with the calibration.

A way to find which AC9 was used, 184 or 148

grep 00000184 /home/datra65/pb/AC9/pb*/raw/*.dat > output.txt

2. Process AC9 cruise data using a calibration

- **On Laptop**
  - Copy meter1.*** files from c:\mpak\Data\pb### to c:\Wetveiw\Data\pb###. On the cruise, keep a log in a notebook of the on-off cycles of the M-PAK. The files are numbered meter1.000 , meter1.001, etc. for each on-off cycle of the m-pak. So usually meter1.000 will be station 7, meter1.001 station 6, etc, unless syou recast.
  - Rename meter1 files to follow convention of ac9 naming structure: aYYMMDD[a,b,c,d…g].raw where a,b,c… etc stands for station (A = station 7, G= station 1)
  - Run Wetview.exe
  - Open Device File
  - Open Raw input file
  - Set plotting parameters for converting .raw file to .dat file
    - Graph → Spectrograph (scatter)
    - Options → Channels / Binning
      - Change Display Bin Size to 50
  - Hit F1
  - When Wetview is done converting from .raw to ascii, name the file aYYMMDD[a…g].dat
  - Repeat for all stations, reopening device file every time, so you get the .raw dialog. Make sure you read in and save the corresponding files correctly.

- **In Shell**
- Create directory /home/data65/pb/AC9/pb##. & subdir raw in it.
- Transfer the .raw and .dat files created to the /home/data65/pb/AC9/pb##/raw directory (create them first).
- Create additional directories lcd, processing, final in /home/data65/pb/AC9/pb##.
  - Make sure you are in the /processing dir
  - *ln -s ../raw/*.dat .* (old command was ln –s raw/*.dat processing/. and preceded the previous item, but did not work)
  - *ac9file.sh pb##* from shell window → Creates ac9file.txt
  - *sac9create.sh .dat* → Turns *.dat to lcd files. (it can take a while)
  - Link CTD file from *ln -s /home/data65/pb/CTD/pb###/for_ac9/XyymmddD.ASC .*
  - On unbinned ctd .asc file, run *ctdstrip.sh XyymmddD.ASC XyymmddD.ASC.strip*
  - Run *bbopstrip -s 1mer_time 1depth ayymmddd.lcd ayymmddd.lcd.strip*
- **In Matlab**
  - Run *createdepth_ac9_pnb('XyymmddD.ASC.strip','ayymmddd.lcd.strip')* –
    - Pick number of steps. Pick number of steps that will be used in depth correction. Usually will be the number of clearly visible level sections of the plot.
    - Zoom in on steps (click on desired zoom-in box corners)
    - Pick start & end of each step (click).

- It runs twice, once for CTD, and once for AC9. **Make sure you pick the steps in the same order, and use same number of steps.**
- Note scale & offset to be used as input into sac9zcorr. Record scale and offset into /home/data65/pb/AC9/pb###/processing/depthoffset.txt file

- **In Shell**
  - *sac9zcorr.sh offset slope*. Offset and slope are determined by depth correction procedure above → creates z*.lcd (scale == slope) Still in /processing directory.
- **In Matlab**
  - *!ac9list.sh .lcd z*
  - *ac9bt* → creates za*.lcd.strip Pick the top and the bottom of the casts, once for each station (zooming in as above). Pick downcast and upcast pairs separately and save into CastID matrix when asked. (twice for each station). Needs a better explanation, such as → On the resulting plot, pick upcast and downcast extreme/end points, by first zooming in on a box (click upper left and lower right cornet), then selecting point inside it. When it asks whether to save cast to matrix, say yes, and when it asks whether to save another cast, say yes for the first cast (upcast or downcast, whichever you started with) and no for the second, so you can advance to the next station. It is important to select the endpoints of the downcast(top, then bottom) & then the upcast (bottom, then top) in this order. That way you select the upcast and downcast for all 7 stations. Matlab will exit by itself if all successful.
- **In Shell**
  - *sac9proc.sh* (calls bbopsdespike & bbopmovavg) – takes a while!!! (up to overnight). Notice it is always giving too many inconclusive mavg calculation – TrapFLAG set – is that normal??? YES, it is normal. Creates mdza* files.
    - Bbobdespike currently set to filter .01 - 15
    - Bbopb mov avg averages over 5 pt window which corresponds to ~1m.
  - *mv *.lcd ../lcd/* (back to /home/data65/pb/AC9/pb##/lcd)
  - Link *.ASC & *.HDR files from ctd directory to processing directory
    - remove the existing links to CTD files, usually X030115D.ASC (use rm command) Should we remove the X*.ASC.strip file also??? I assume yes!
    - *ln –s /home/data65/pb/CTD/pb###/asc/*.ASC* . Binned ascii file
    - *ln –s /home/data65/pb/CTD/pb###/hdr/*.HDR* . Its header
- **In Matlab**
  - *Help ctdsplit*. Highlight lines that begin w/"clear all" and paste into command prompt. Should be as follows (this splits each CTD cast into downcast X***.ASC.1 and upcast X***.ASC.2)

```
clear all
   !ls [L,X]*ASC > list_ctd
list_load('list_ctd',[1],{'list_ctd'})
   for j=1:size(list_ctd,1),
     ctdsplit(list_ctd(j,:));
   end
```

  It can take a while
- **In Shell**
  - *makeup.sh pb##* -> creates upused.txt. It complains here as follows:

```
no list_merac9 (this one is normal)
sort: can't open _ac9file.txt: No such file or directory
```
is that normal??? YES, as long as the upused.txt file gets created as below.

This command needs the .lcd.1 and .lcd.2 files in the/processing directory. Will not work later when they are moved to final.

- Edit upused.txt to include ctd file names in place of the mer field (b/n time and qcal fields). Should look like :

```
flags  pb142  mdza030115c.lcd.1  01-28-2003  10:52:26  X030115C.ASC.1 qcal
flags  pb142  mdza030115c.lcd.2  01-28-2003  10:52:26  X030115C.ASC.2 qcal
flags  pb142  mdza030115d.lcd.1  01-28-2003  10:55:26  X030115D.ASC.1 qcal
flags  pb142  mdza030115d.lcd.2  01-28-2003  10:55:26  X030115D.ASC.2 qcal
```

and so on. Look to see if third column AC9 files match the 6th column CTD files with regard to station (A through G) and upcast/downcast (*.1 or *.2).

  - Vi tricks… remove mer qcal from each line (*Shift D*).
    - Open new file called foo.txt
      - *!!*
      - *ls X*.ASC.[1,2]*
      - *:wq*
    - *paste upused.txt foo.txt > temp.txt*
    - *cp temp.txt upused.txt*
  - edit upused.txt to include qcal at the end of each line
- vi commands:
  - shift-D deletes everything after cursor
  - x deletes one character
  - esc toggles between typing and command mode
  - esc:wq saves and exits
  - i inserts before the cursor; a inserts after cursor
  - shift-a inserts at the edn of a line
  - . repeats last command

- copy goac9.par and qcal.txt from previous processing example (any cruise, preferably previous one) and edit as follows:
  - in the qcal.txt file keep format and indicate the current calibration to be used;
  - in the goac9.par file make sure the #Tref field corresponds to the factory calibration temperature used which is located in the */home/data65/pb/AC9/cals/184/DeviceFiles/ac9cal.txt* file (the Tcal field)

Tref is 19.7 deg C for the 06/07/2002 factory calibration of the 184 AC9.

  - If LTER cruise, then add

#dataset
'lter'

  - In the goac9.par file it is important to have the right offsets numbers. To make sure, open any merged CTD-AC9 file from this cruise and the one you took the goac9.par from. This merged file will get created when you execute the next command (merge_ctdac9, see below). Make sure that the columns are the same (look at the headers). If they are not, fix all applicable offsets. The offsets indicate the number of the column that conatins the desired parameter. A typical filename for such a merged CTD-AC9 file is 'X031216G.1.031216g.1.strip'

- **In Matlab**
  - *merge_ctdac9_v2* (if LTER cruise then merge_ctdac9_lter)
    goac9_tiho (old was goac9) (if LTER cruise, then goac9_lter)
- **In Shell**
  - *mkdir final* (under cruise directory)
  - *cp m* ../final* to final directory. These are the final output data files that look like

```
mdza030115c.lcd.1          mdza030115c.lcd.2.mat      mdza030115d.lcd.1.ts
mdza030115c.lcd.1.cal      mdza030115c.lcd.2.strip    mdza030115d.lcd.2
mdza030115c.lcd.1.mat      mdza030115c.lcd.2.ts       mdza030115d.lcd.2.cal
mdza030115c.lcd.1.strip    mdza030115d.lcd.1          mdza030115d.lcd.2.mat
mdza030115c.lcd.1.ts       mdza030115d.lcd.1.cal      mdza030115d.lcd.2.strip
mdza030115c.lcd.2          mdza030115d.lcd.1.mat      mdza030115d.lcd.2.ts
mdza030115c.lcd.2.cal      mdza030115d.lcd.1.strip
```

- **In Matlab**
  - *ac9tosb_tiho('pb##')* → creates an ascii file with the useful ac9 data ; It gets created in the /home/data65/pb/SEABASS/ac9/sbin_tiho directory. Old command was ac9tosb('pb###') and creates files in the ***ac9/sbin/ directory, but pulls the wrong fields from the matlab ac9 file – the ones that contain just calibrated, but not TS and scattering corrected data.
  - *ac9_plot_tiho('pb##')* → create plots (This script resides in Tiho's directories and may not be accessible. IS not essential to AC9 processing).
- **NOTE:**
  using the bbopstrip command in shell. bbobstrip is used as follows
  bbobstrip -s fields_to_pull mdza030115c.lcd.1 output_file
  The fields to pull out of the lcd files are listed in its <sampled_parameters> section, e.g. 1mer_time, a650, a676, etc.

Note:
When creating the Big Fat File for surface values, make sure you use surfmerge_tiho.m