EP1-94-MB NOAA Ship Malcolm Baldrige Rodman, Panama - San Diego April 14 - May 11, 1994

Chief Scientist: LCDR M. Koehn

Survey Department: CST Sweeney, Lamire, Zaragoza

CTD Personnel: M. McCarty

Final Processing: M. Swapp and K. McTaggart

## ACQUISITION:

A total of 24 CTD casts were taken along 95W, 110W, and 125W during leg 1 of the spring EPOCS cruise using PMEL Neil Brown CTD s/n 1114 and 12-bottle rosette sampling package. All casts were to a depth of 1000 meters. Typically 12 bottles were fired on each cast and salinity samples were taken for calibration checks of the NBIS CTD. Survey department personnel under the supervision of Margie McCarty were responsible for preparing the CTD, all data acquisition, collection of water samples, and analyzing the samples for salinity using the ship's Autosal.

The CTD data were acquired using the ship's LOGGER software. Audio backups were made on VCR tapes. Raw CTD data were transferred from the acquisition microVAX to the processing microVAX where PMEL programs reduced the data for analysis. Final calibrations were determined at PMEL after the cruise.

Cast 10 of EP194-MB used CTD s/n 1111 which was not working properly. These data were not processed and a second cast was taken at this station with CTD s/n 1114.

## CONDUCTIVITY CALIBRATIONS:

CALIB.DAT precruise calibrations for PMEL CTD 1114:

```
1114 6 380
-31.33027 0.9964779 0.740232E-6 -0.420914E-10 P DN S/N 1114 AUG 93
-33.06427 0.9928080 0.227357E-5 -0.187309E-09 P UP S/N 1114 AUG 93
-0.00211 0.9997917 0.000000E-6 0.000000E-10 T 68 S/N 1114 AUG 93
-0.00036 1.0000150 0.000000E-6 0.000000E-10 C S/N 1112 JUN 92
```

Post-cruise, files were restored to the VAX computer system at PMEL from Exabyte 8mm tapes. The .CAL file was created on the ship using CALDSK which takes the CTD values from those written on the cast logs during acquisition and not from the READER listings. The .CAL file was proofed, typos corrected, and put into the latest format compatible with WOCE modified programs at the lab. LINCALW.FOR, CALMSTRW.FOR, CALMCONW.PPC, and CALMDEEPW.PPC were used to find the best calibrations to apply to this data set.

CTD s/n 1114 pressure sensor was drifting significantly with an increasingly negative offset. EP1-294-MB was the last cruise prior to it's tweeking and recalibration at EG&G in July, 1994. The NRCC August 1993 pressure offset calibration was not good enough with the continued drift. So, an average on-deck pressure was computed for EP1-294-MB, 56.76 db, and used as the pressure offset for this data set. In order to not have to redo DLAGB processing, an additional offset of -31 db was applied in EPCTDW. The correct pressure offset of -56.76 was used in the calibration fitting and CALMSTRW.

Final calibrations applied were from an overall fit of bottles from both EP194 and EP294 cruises:

A0 = 0.8888686E-02 A1 = 0.9983918E+00max residual = -0.0320 std error = 0.0120 (37/488 discarded in 7 reps)

## CONDUCTIVITY CALIBRATION PROGRAMS & PPLUS COMMAND FILES:

outputs .CLB calibrated data file (from .COM), and
 .SEA calibrated WOCE data file (edit quality bytes)

LINCALW - inputs .CAL uncalibrated data file (may be broken into groups), applies a linear fit to the data and throws out any points greater than 2.8 times the standard deviation, iterates through the program until no points are thrown out outputs .COEF file containing linear fit coefficients and .LOG file of fit iterations

CALMCONW.PPC - reads .CLB calibrated bottle data file and makes five separate scatter plots: P, T, C, S, and cast number vs. delta-C (CTD-bottle). These are examined for cast breaks and drifts in the CTD.

CALMDEEPW.PPC - reads .CLB calibrated bottle data file and makes two separate scatter plots: CTD salinity and bottle salinity vs. potential temperature from theta=0.6 to 2.2 C.

DEEPCTD.PPC - reads .CTD EPIC pointer file and .BOT EPIC pointer file of deep casts only and overplots the bottle salinity data and CTD salintiy trace from theta=.8 to 2.4 C for each deep cast.

## PROCESSING:

Raw data files were restored from Exabyte 8mm tapes to the VAX at PMEL. Standard processing programs for the Baldrige with default parameters were used to reduce these data. Single point spikes were removed in cast 15 using NOMIT subroutine in EPCTDW.

The EP1-294-MB data set was a mess as noted at sea by Margie McCarty. Post-cruise calibrations included 1) an overall linear fit applied to all casts. 2) Then CTD upcast data were compared to bottle data line by line (95W, 110W, 125W, 140W) and salinity offsets were determined for outlying CTD casts and applied using program EPCTDW\_OFF:

```
if (ncast.eq.001) soffset = -.067
if (ncast.eq.003) soffset = -.021
if (ncast.eq.004) soffset = -.056
if (ncast.eq.005) soffset = -.029
if (ncast.eq.007) soffset = 0.015
if (ncast.eq.008) soffset = 0.017
if (ncast.eq.009) soffset = -.008
if (ncast.eq.012) soffset = -.033
if (ncast.eq.013) soffset = 0.019
if (ncast.eq.014) soffset = 0.008
if (ncast.eq.015) soffset = 0.015
if (ncast.eq.016) soffset = -.008
if (ncast.eq.018) soffset = 0.008
if (ncast.eq.019) soffset = 0.008
if (ncast.eq.019) soffset = 0.008
if (ncast.eq.019) soffset = 0.007
if (ncast.eq.021) soffset = 0.017
```

```
if (ncast.eq.024) soffset = 0.017
if (ncast.eq.025) soffset = 0.008
DATA(3,L)=SAL78(C/42.914,DATA(2,L),DATA(1,L),0)
data(3,1)=data(3,1) + soffset
```

Cruise bottle data were compared to and fell within historical bottle data for each line. 3) As a check of the final calibrations, salinity profiles were overplotted line by line. The spread at  $1000~\rm{db}$  were approximately less than or equal to  $0.004~\rm{psu}$ .

Final CTD and bottle files were moved to DISK\$HAYES and included in the RIM data management tables on December 18, 1995.

- DPDNB inputs EG&G .EDT raw data file
  - outputs .DPZ binary file including computed fall rates and .RECZ ASCII file to choose downcast record range from
- DLAGB inputs .DPZ binary file, applies precruise calibrations from CALIB.DAT, edits data for window outliers (according to WINDOW.DAT) and first differencing outliers, fills gaps by linear interpolation, lags conductivity, edits data exceeding fall rate criteria (according to .INP created by DLAGAVZ.COM; default minimum fall rate acceptable is .8 db/60 scans (25 meters per minute) and pressure interval of 1.5 db; doesn't fill these gaps), computes 1-meter averages, and applies cell dependence to final conductivity values
  - outputs CTDERR.DAT file of outlier flags, interpolated values, and fall rate criteria failures, and an ASCII .CTD data file including computed salinity
- EPCTDW inputs .CTD calibrated P, T, OXC, OXT, and raw conductivity; applies any additional P and T cals (in EPCTDW\_SHIP.COM), corrects raw C for cell factor, and applies C cals from EPCTDW\_SHIP.COM; computes salinity; deals with oxygen if there was a sensor; option to eliminate 1-point spikes according to the gradients hardwired into the source code NOT used by default; omits any values for manual despiking; fills by linear interpolation for a value to exist every whole meter; recomputes C from S; and calculates other EPIC variables. outputs final .CTD data file in EPIC format, and a .LOG
  - file listing editted and filled data points
- - outputs .BOT bottle data files in EPIC format
- TSPLTEP.PPC reads .CTD EPIC pointer file and .BOT EPIC pointer file and overplots full water column bottle salinity and CTD trace as well as sigma-t lines (from SIGMAT.DAT). Use TSPLTB.PPC to include oxygen data.
- TEXTNOX inputs .CTD EPIC pointer file and constructs PPLUS subcommand files
  - outputs TXT\*.PPC files containing %label commands for table listings for each cast
- 3PLTNOX.PPC reads TXT\*.PPC subcommand files and .CTD EPIC pointer file and overplots vertical profiles of temperature, salinity, and sigma-t vs. pressure to 1000 db on left-hand side of page; and lists data in table form on right-hand side of page. Use 4PLT1DB.PPC to include oxygen data.