

GP4-99-KA  
NOAA Ship Ka'imimoana  
Kwajalein, Marshall Islands - Pearl Harbor, HI  
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#### ACQUISITION:

Fifty-five CTD profiles were collected on this cruise. Twenty-six CTD profiles were collected along 165E from 8N to 8S; 24 were collected along 180 from 8S to 8.5N, and 5 were collected along 170W from 6N to 10N. The majority of CTD casts were to 1000 m; 13 were deep (4000 m); and 4 were shallow casts to 200 m.

The ship's Sea-Bird 9plus CTD s/n 09P10493-0405 measuring pressure (s/n 61183), temperature (s/n 2027, 2026), and conductivity (s/n 1537, 1536) was used for all casts (PMC15.CON). Prior to this cruise, primary temperature sensor s/n 2026 was identified as having a much faster drift trajectory over the last year than the secondary temperature sensor s/n 2027. So primary and secondary TC pairs were swapped on the package.

The CTD was mounted in a custom 24-bottle frame with Sea-Bird rosette sampler s/n 88. The CTD data stream was passed through Sea-Bird 11plus deck unit s/n 376 with factory settings. An analog signal was recorded onto the audio portion of VCR tape as a backup. Digitized data were sent to a Dell 5133 personal computer equipped with Sea-Bird's SEASOFT acquisition software (version 4.216) where calibrated data were displayed in graphical form in real-time, as well as stored in raw form onto hard disk. Backups of the raw data were made on QIC-80 1/4" cartridge tapes and returned to PMEL for post-cruise processing. TESAC messages were sent for each cast.

#### SALINITIES:

MBARI requests 8 bottles be tripped between 200 m and the surface. The remaining 4 bottles were used for calibration purposes. Two salinity samples were taken from the deepest Niskin. Duplicate samples were analyzed on a subsequent day from the rest. Salinity analysis was performed using Guildline Autosol 8400B salinometer s/n 61.667. IAPSO standard seawater batch #P135 was used for all casts. NRCC calibrations were not applied to this data set, only a drift-during-run linear interpolation correction in ship program DISAL. Standard laboratory operating temperature was approx 26 degrees Celsius.

#### POST-CRUISE CONDUCTIVITY CALIBRATIONS:

GP499S.CAL of primary sensor data (not including any duplicate salts) was created at sea. It's completeness and correctness were scrutinized and amended where needed.

Final pressure and temperature calibrations were pre-cruise. Drift (0.000867 C) and viscous (-0.0006 C) corrections were applied to temperature. Conductivity fit coefficients were determined using Matlab program

CALCOP1:

number of points used	430
total number of points	549
% of points used in fit	78.32
fit standard deviation	0.001436
fit bias	0.0035613864
fit co pressure fudge	-2.6771197e-007
min fit slope	0.99996688
max fit slope	0.99997377

Slope, bias, and pressure correction values were applied to CTD data using PMEL Fortran program GP499\_EPIC; and to bottle file data using CALMSTR4.

FINAL PROCESSING:

The following are the standard SEASOFT processing modules used to reduce Sea-Bird CTD data:

DATCNV converts raw data to engineering units and creates a bottle file if a Sea-Bird rosette sampler was used. (MARKSCAN creates a bottle file if a General Oceanics rosette was used.)

ROSSUM averages the bottle data specified in the DATCNV or MARKSCAN output and derives salinity, theta, sigma-t, and sigma-th. These bottle files are transferred to the PMEL VAX where post-cruise calibrations are computed.

WILDEDIT makes two passes through the data in 100 scan bins. The first pass flags points greater than 2 standard deviations; the second pass removes points greater than 20 standard deviations from the mean with the flagged points excluded.

CELLTM uses a recursive filter to remove conductivity cell thermal mass effects from the measured conductivity. In areas with steep temperature gradients the thermal mass correction is on the order of 0.005 psu. In other areas the correction is negligible. The value used for the thermal anomaly amplitude (alpha) is 0.03. The value used for the thermal anomaly time constant (1/beta) is 9.0.

FILTER applies a low pass filter to pressure with a time constant of 0.15 seconds, and to conductivity with a time constant of 0.03 seconds. In order to produce zero phase (no time shift) the filter is first run forward through the file and then run backwards through the file.

LOOPEDIT removes scans associated with pressure slowdowns and reversals. If the CTD velocity is less than 0.25 m/s or the pressure is not greater than the previous maximum scan, the scan is omitted.

BINAVG averages the data into 1 db bins. Each bin is centered around a whole pressure value, e.g. the 1 db bin averages scans where pressure is between 0.5 db and 1.5 db.

DERIVE uses 1 db averaged pressure, temperature, and conductivity to compute salinity, theta, sigma-t, sigma-th, and dynamic height.

SPLIT removes decreasing pressure records and keeps only the downcast data.

TRANS converts the data file from binary to ASCII format. These data are transferred to the PMEL VAX.

PMEL programs GP499\_EPIC applies post-cruise temperature corrections and conductivity calibration coefficients, recomputes the derived variables in DERIVE, and converts the ASCII data files to EPIC format. GP499\_EPIC skips bad records near the surface (typically the top 5 m) as well as any records containing  $-9.990e-29$ , and extrapolates raw data to the surface (0 db) within 10 db. Because the SBE module LOOPEDIT does not handle package slowdowns and reversals well in the thermocline where gradients are large, GP499\_EPIC removes raw data records where a sigma-theta inversion is greater than  $-0.01$  kg/m<sup>3</sup>. Data are linearly interpolated such that a record exists for every 1 db. When data are extrapolated to the surface, the WOCE quality word is '888'; when interpolated over greater than 2 db, the WOCE quality word is '666'. The WOCE quality word consists of a 1-digit flag for pressure, temperature (ITS-90), and salinity.

PMEL program CALMSTR4 applies post-cruise temperature corrections and conductivity calibration coefficients and recomputes the derived variables in ROSSUM. EPICBOMSTR converts the ASCII bottle data file into individual cast EPIC data files. Bad bottle salts were flagged in GP499S\_EPIC.CLB for station 7 sample 106 (7/106), 8/102, 13/102, and 13/102. Station 35 sample 105 was flagged as questionable.

Final CTD and bottle files were moved to DISK\$EPIC1:[HAYES.DATA.GP499.CTD] and included in the RIM data management tables on September 21, 1999.