GP2-99-KA
NOAA Ship Ka'imimoana
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ACQUISITION:

Forty-five CTD profiles were collected on this cruise. Seventeen CTD
profiles were collected along 110W from 8N to 8S; and 23 were collected
along 95W from 8S to 8N. Four additional profiles were collected along
the trackline from 8N, 95W to 12.5N, 99.6W enroute to San Diego. A
test cast was performed at 26N, 115.5W. The majority of CTD casts were
to 1000 m; five were deeper >2000 m; and 4 were shallow casts between
100 m and 500 m.

The ship's Sea-Bird 9plus CTD s/n 09P10493-0405 measuring pressure (s/n
61183) and newly calibrated temperature (s/n 2026, 2027) and conductivity
(s/n 1536, 1537) sensors (PMC12.CON) were used for casts 0011-0191 and
casts 0221-0431. TAO TC pair (s/n 1708, 1467) replaced the ship's
primary TC pair (s/n 2026, 1536) for cast 0192 (PMC13.CON); and ship's
secondary TC pair (s/n 2027, 1537) for casts 0201-0211 (PMC14.CON) in an
effort to troubleshoot intermittent modulo error problems. CTD downcast
data for cast 0091 were lost and unrecoverable from VCR tape. CTD burst
and bottle data exist for cast 0091, however.

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 4100 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 Autosal 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. Samples were not
collected for shallow cast 0192; and cast 0431 samples were lost (over-
looked samples from 0331 were analyzed in their place).

POST-CRUISE CONDUCTIVITY CALIBRATIONS:

GP299S.CAL of primary sensor data (not including any duplicate salts) was
created at sea. It's completeness and correctness were scrutinized and
ammended where needed.

Final pressure and temperature calibrations were pre-cruise. Drift
(-0.0006545 C) and viscous (-0.0006 C) corrections were applied to tempera-
ture. Conductivity fit coefficients were determined using Matlab program
CALCOP3:

            number of points used   374
            total number of points 498
            % of points used in fit 75.1
            fit standard deviation 0.001527
            fit bias   -0.0067240989
            fit co pressure fudge   2.5925486e-007
            min fit slope   1.0001957
            max fit slope   1.000305

Slope, bias, and pressure correction values were applied to CTD data using
PMEL Fortran program GP299_EPIC; and to bottle file data using CALMSTR2.

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 transfered 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
seond 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 transfered to the PMEL VAX.

PMEL programs GP299_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. GP299_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, GP299_EPIC removes raw data records where a sigma-theta inversion is greater than -0.01 kg/m3. 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 CALMSTR2 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 GP299S.CLB for station 3 sample 110, 13 sample 101, 15 sample 104, 16 sample 106, and 28 sample 111.

Final CTD and bottle files were moved to DISK$EPIC1:[HAYES.DATA.GP299.CTD] and included in the RIM data management tables on August 2, 1999.