

GP2-01-KA
NOAA Ship Ka'imimoana
San Diego, CA - San Diego, CA
March 28 - May 4, 2001

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ACQUISITION:

Thirty-nine CTD profiles were collected on this cruise. Twenty-six profiles were collected along the ship's trackline from 12N to 8N and along 110W from 8N to 8S, and thirteen profiles were collected along 95W from 5S to 12N. Two casts were deep (3000 m) and the rest were to 1000 m. There was one TC module calibration cast to 400 m at station 32. This cast was not processed as part of this data set.

PMEL's Sea-Bird 9plus CTD s/n 09P10881-0390 measuring pressure (s/n 58950), the ship's temperature (s/n 2027, 2026), and the ship's conductivity (s/n 1537, 1536) was used for 37 casts (PMC24.CON, sensors yearly calibrated prior to this cruise). The primary sensor pair was swapped out with TAO sensors (s/n 1710, 1469) for 3 casts in an effort to troubleshoot modulo errors, which turned out to be the winch slip rings replaced May 8, 2001.

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. Cruise data were also archived on 8 mm tape and CD-ROM.

Cast 4 and 17 were cancelled due to modulo errors and the data lost.

SALINITIES:

Seawater was collected at 12 depths each cast and salinity samples drawn. Two salinity samples were taken from the deepest Nisken. 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 #P139, was used for all casts. Laboratory operating temperature ranged from 22.8-25.1 degrees Celsius, depending on the session.

POST-CRUISE CONDUCTIVITY CALIBRATIONS:

GP201S.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.

The primary sensor pair for the majority of casts was the usual s/n

2027 and 1537. For 3 casts the primary sensor pair was s/n 1710 and 1469. Final pressure and temperature calibrations were pre-cruise. A viscous heating correction of -0.0006 C was applied to both temperature sensors. A historical drift correction of -0.000217 was also applied to s/n 2027. No drift correction was applied to temperature sensor 1710.

Conductivity fit coefficients were determined using Matlab program CALCOS0. Although there were two deep stations to 3000 m, there were no sample data collected deeper than 1000 m so CALCOP routines were not considered. However, a beta value was preset at $-7.2e-07$ before running CALCOS0 in order to align the deep theta-s with historical profiles. Also, salinity analysis was poor and jumped around with each run owing to an inexperienced operator so station dependent and higher order fits were not considered.

Casts 1-17, 21-41:	number of points used	354
	total number of points	420
	% of points used in fit	84.29
	fit standard deviation	0.005776
	fit bias	-0.0089999554
	fit slope	1.0002644

Casts 18-20:	number of points used	22
	total number of points	32
	% of points used in fit	68.75
	fit standard deviation	0.002456
	fit bias	-0.018766755
	fit slope	1.0009307

Slope and bias correction values were applied to CTD data and converted directly into netCDF format using CNV_EPS; and to bottle file data using CALMSTR and CLB_EPS.

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. Both down and up casts are processed.

ROSSUM averages the bottle data specified in the DATCNV output and derives salinity, theta, sigma-t, and sigma-th. Bottle data are used to calibrate the CTD post-cruise.

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.

TRANS converts the data file from binary to ASCII format.

Program CNV_EPS applies post-cruise temperature corrections and conductivity calibration coefficients, recomputes the derived variables in DERIVE, and converts the ASCII data files to netCDF format. CNV_EPS skips bad records near the surface (typically the top 3 m) as well as any records containing $-9.990e-29$, and copies back 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, CNV_EPS 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 copied back 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.

Casts 0181-0221 (n=5) downcast data were bad between 0-100 db, both primary and secondary data. So the upcast was used in the final processing. Program GET_UPCAST was run on these 5 casts prior to running CNV_EPS.

Program CALMSTR applies post-cruise temperature corrections and conductivity calibration coefficients and recomputes the derived variables in ROSSUM. CLB_EPS converts the ASCII bottle data file into individual cast netCDF data files. The following sample salinities were flagged as bad and removed from individual bottle files:

station	5	sample	106
	18		108
	25		101
	27		101
	27		103
	28		104
	28		105
	31		101
	37		106
	41		104

Final CTD and bottle files were moved to DISK\$EPIC1:[HAYES.DATA.GP201.CTD] and included in the MySQL data management tables on May 24, 2001. Ammended data were copied to DH on May 29, 2001.