GP3-96-KA
NOAA Ship Ka'imimoana
Honolulu, HI - Kwajalein, Marshall Islands
June 19 - July 16, 1996

Chief Scientist: Mr. Andy Shepherd
Survey Department: CST Jim Davis
CTD Personnel: L. Stratton, J. Davis
Final Processing: K. McTaggart, M. O'Haleck

ACQUISITION:

Twenty-six CTD profiles were collected during this cruise covering two meridionals from 8N to 8S. Nineteen profiles were collected along 180W, and 7 along 165E. The majority of casts were to 1000 m. Five casts were deep (>3000 db) and 3 were 500 m calibration casts for TAO moorings.

All casts used the ship's Sea-Bird 9plus CTD s/n 09P10493-0405 measuring pressure (s/n 61183), temperature (s/n 2026), and conductivity (s/n 1536). The CTD was mounted in a custom 24-bottle frame with a Sea-Bird rosette sampler. The CTD data stream was passed through a Sea-Bird 11plus deck unit (s/n 392) with factory settings. An analog signal was recorded onto the audio portion of VCR tape as a backup. Digitized data were sent to a 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 the hard disk. Backups of the raw data were made on 40 Mbyte 1/4" cartridge tapes and returned to PMEL for post-cruise processing.

SALINITIES:

Salinity analysis was performed using Guildline Autosal 8400B salinometer s/n 61.383 (last calibrated at NRCC February 13, 1996). IAPSO standard seawater batch #P127 was used for all casts. NRCC calibrations were not applied to the bottle salinities used to calibrate this data set, only a drift-during-run linear interpolation correction. Standard operating temperature was 24 degrees Celsius.

POST-CRUISE CONDUCTIVITY CALIBRATIONS:

GP396A.CAL was created at PMEL using program SBECAL. Anomalous differences between CTD and bottle salinities were scrutinized. Bottle salinities were checked against their original log sheets for typos. There are no bottle data for station 23 owing to a deck unit failure at depth.

Final pressure and temperature calibrations were pre-cruise. Conductivity calibration coefficients were best determined for PMEL's CTD using a station-dependent second-order fitting routine, CALCOS2, written by Greg Johnson in MATLAB on the following groups.

Stations 1-17: number of points used 98
total number of points 120
% of points used in fit 81.67
fit standard deviation 0.001039
fit bias -0.00047064486 mS/cm
min fit slope 1.0000317

max fit slope 1.0001249

Stations 18-23: number of points used 35
total number of points 36
% of points used in fit 97.22
fit standard deviation 0.002003
fit bias -0.0064073237 mS/cm
min fit slope 1.0002996
max fit slope 1.0004012

Slope and bias values were applied to CTD data using PMEL Fortran program GP396_EPIC; and to bottle files using CALMSTR3.

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 program GP396_EPIC applies post-cruise conductivity calibration

coefficients, recomputes the derived variables in DERIVE, and converts the ASCII data files to EPIC format. Sea-Bird .CNV files are editted to remove bad records near the surface (typically the top 6 m) and any causing spikes in the deeper water column before running GP396_EPIC. GP396_EPIC 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, GP396_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 interpolated over greater than 2 db, the WOCE quality word is '666'.

PMEL program CALMSTR3 applies post-cruise conductivity calibration coefficients and recomputes the derived variables in ROSSUM. EPICBOMSTR converts the ASCII bottle data file into individual cast EPIC data files.

Final CTD and bottle files were moved to DISK$EPIC1:[HAYES.DATA] and included in the RIM data management tables on October 1, 1996.