GP6-96-KA
NOAA Ship Ka'imimoana
San Diego, CA - Manzanillo, Mexico
September 27 - October 27, 1996

Chief Scientist: Mr. Paul Freitag
Survey Department: CST Jim Davis
CTD Personnel: J. Davis
Final Processing: K. McTaggart

ACQUISITION:

Thirty-four CTD profiles were collected during this cruise. Fourteen profiles were collected along 110W from 8N to 8S, and 20 profiles were collected along 95W from 8S to 11N. The majority of casts were to 1000 m. Eight casts were deep (>2500 db) and 2 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, 2027), and conductivity (s/n 1536, 1537). 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 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 the hard disk. Backups of the raw data were made on QIC-80 1/4" cartridge tapes and returned to PMEL for post-cruise processing.

Sea-Bird rosette s/n 54 (PMEL) had mechanical difficulties and was replaced with PMC rosette s/n 88 prior to station 3.

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:

GP696AS.CAL, including duplicate salts, was created at sea using program SBECAL. Anomalous differences between CTD and bottle salinities were scrutinized. Bottle salinities were checked against their original log sheets for typos. Only one bottle salt exists for station 2 owing to mechanical failure of the rosette sampler. GP696BS.CAL was created at the lab. It differs from GP696AS.CAL in that the NRCC calibration correction of 0.001 has been removed from the bottle salinities.

Final pressure and temperature calibrations were pre-cruise. Conductivity calibration coefficients were best determined using a station-dependent fourth-order fitting routine, CALCOS4, written by Greg Johnson in MATLAB.

```
     number of points used   237
   total number of points  252
   % of points used in fit 94.05
```

fit standard deviation 0.001339
fit bias -0.0093763531 mS/cm
min fit slope 1.0004883
max fit slope 1.0006705

Slope and bias values were applied to CTD data using PMEL Fortran program GP696_EPIC; and to bottle files using CALMSTR6.

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 GP696_EPIC applies post-cruise conductivity calibration coefficients, recomputes the derived variables in DERIVE, and converts the ASCII data files to EPIC format. GP696_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, GP696_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 CALMSTR46 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. The following bad bottle data were omitted: station 30 cast 1 bottle 6.

Final CTD and bottle files were moved to DISK$EPIC1:[HAYES.DATA] and included in the RIM data management tables on February 19, 1997.