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CTD MEASUREMENTS DURING 2005 AND 2006 AS PART OF THE TAO/TRITON PROGRAM

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Abstract. During 2005 and 2006, CTD data were collected in the equatorial Pacific Ocean during cruises to service the TAO/TRITON array, a network of deep ocean moored buoys deployed to support ENSO research and forecasting. Summaries of Sea-Bird CTD measurements and hydrographic data acquired on 16 cruises are presented. Composite potential temperature-salinity diagrams and section plots of oceanographic variables along 95°W, 110°W, 125°W, 140°W, 155°W, 170°W, 180°, and 165°E meridians are given. Profiles including station location, meteorological conditions, and abbreviated CTD data listings are shown for each cast on the report CD. Hydrographic data are listed for each cruise on the report CD.

1. Introduction

CTD data are collected in the equatorial Pacific Ocean in conjunction with the maintenance of the Tropical Atmosphere Ocean (TAO)/TRITON array. TAO/TRITON servicing cruises (and the shipboard measurements that are an integral part of them) provide support for NOAA's strategic plan element to Implement Seasonal-to-Interannual Climate Forecasts, and support of the International Climate Variability and Predictability (CLIVAR) program, the El Niño/Southern Oscillation (ENSO) Observing System, the Global Ocean Observing System (GOOS), and the Global Climate Observing System (GCOS).

The TAO/TRITON array, completed in 1994, consists of approximately 70 deep ocean moorings within 8 degrees of the equator (except 9°N at 140°W) spanning the Pacific Basin from 95°W to 137°E. Moorings west of 165°E are maintained by the Japan Agency for Marine Earth Science and Technology (JAMSTEC). High quality oceanographic and surface meteorological data are recorded and reported in real time using the Argos satellite data telemetry system. These data are used to improve understanding, modeling, and prediction of the global interannual climate fluctuations associated with the El Niño-Southern Oscillation phenomena in the tropical Pacific Ocean.

The primary objective of TAO/TRITON cruises is the recovery and deployment of moorings. Each mooring line is occupied twice a year, once during the first half of the year, and again approximately 4–7 months later. CTD station locations vary slightly for each half-yearly occupation during 2005–2006 (Figs. 1a and b). Many CTD stations were skipped during the second occupation of 170°W, 180°, and 165°E during GP705 and GP805 owing to a failure in the A-frame hydraulics. At a minimum, CTD casts supporting the TAO/TRITON program are conducted at each mooring site to a depth of 1000 m. As time allows, additional CTD work is prioritized as follows: (1) 1000-m casts at 1-degree intervals between 12°N and 8°S along the ship's trackline, (2) deep casts at mooring sites to a minimum depth of 3000 m or a maximum depth 200 m above the bottom, (3) 1000-m casts every one-half degree of latitude between 3°N and 3°S. Although there is only one TAO/TRITON mooring north of 8°N, CTD profiles are collected to 12°N along the ship's trackline whenever possible to measure across the North Equatorial Counter Current. Physical underway operations include shipboard Acoustic Doppler Current Profiler (ADCP) measurements, sea surface temperature (SST) and salinity (SSS) measurements, and routine weather observations.

CTD measurements are used to verify moored temperature sensor data, calculate dynamic height, and at many sites, are the only in situ calibrated observations of the equatorial Pacific salinity field. CTD measurements are also used to aid in the calibration of moored conductivity sensor data. These CTD data are quickly processed, calibrated, and distributed internationally to a wide variety of users: biological, chemical, and physical oceanographers at universities and government laboratories, including NOAA/NCEP, for improvement of ENSO predictions. They are also useful for checking Argo float salinity measurements.

Summaries of CTD measurements and hydrographic data collected on 16 cruises during 2005 and 2006 are presented here. Data include meridional sections across the equator along 95°W, 110°W, 125°W, 140°W, 155°W, 170°W, 180°, and 165°E. The cruise track and CTD station locations are shown (Figs. 2a–p) for each cruise. CTD station information is summarized (Tables 1a–p) for each cruise. Cruise name notation is GPx-yy-zz, where x is the sequential cruise number during each year, yy is the year (05 or 06), and zz is the ship code (KA for the NOAA ship *Ka'imimoana*, RB for the NOAA ship *Ronald H. Brown*). Sea-Bird 911plus systems are used to acquire CTD data on all cruises. Pressure, temperature, and conductivity are sampled at a rate of 24 Hz. A Sea-Bird 43 oxygen sensor was added to the primary sensor suite during GP205, GP106, GP206, and GP306. Water samples are collected on the upcast using an electronically fired rosette sampler and used to calibrate CTD data (see section 6). Water sample salinities are analyzed using an autosalinometer (see section 4). Water sample oxygen concentrations during GP205 were measured using the Winkler method as specified in the WOCE Operations Manual (1994). Water sample oxygen concentrations were not measured during GP106, GP206, and GP306.

2. Sea-Bird 911plus CTD System

The Sea-Bird Electronics, Inc. (SBE) 911plus CTD system is a real-time data system with the CTD data from the SBE 9plus underwater unit transmitted via a conducting cable to the SBE 11plus deck unit. The serial data from the underwater unit are sent to the deck unit in RS-232 NRZ format. The deck unit decodes the serial data and sends it to a personal computer for display and storage using Sea-Bird SEASOFT software program SEASAVE. The SBE 911plus CTD system transmits data from its primary and auxiliary sensors in the form of binary number equivalents of the frequency or voltage outputs from those sensors. These are referred to as the raw data. The calculations required to convert raw data to engineering units are performed in the software, either in real time, or after the data has been stored in a disk file (Seasoft, 1994).

2.1 Conductivity

The flow-through conductivity sensing element is a glass tube (cell) with three platinum electrodes. The resistance measured between the center electrode and end electrode pair is determined by the cell geometry and the specific conductance of the fluid within the cell, and controls the output frequency of a Wien Bridge circuit. The sensor has a frequency output of approximately 3 to 12 kHz corresponding to conductivity from 0 to 7 Siemens/meter (0 to 70 mmho/cm). The SBE conductivity sensor has a typical accuracy/stability of ±0.0003 S/m/month, and resolution of 0.00004 S/m at 24 Hz.

Sensor calibrations are performed at Sea-Bird Electronics, Inc. in Bellevue, Washington, on a roughly annual basis. Conductivity calibration certificates show an equation containing the appropriate pressure-dependent correction term to account for the effect of hydrostatic loading (pressure) on the conductivity cell:

$$C(\mathrm{S/m}) = (g + hf^2 + if^3 + jf^4)/[10(1 + ctcor\ t + cpcor\ p)]$$

where g, h, i, j, *ctcor*, and *cpcor* are calibration coefficients, f is the instrument frequency (kHz), t is the water temperature (°C), and p is the water pressure (dbar). SEASOFT automatically implements this equation.

2.2 Temperature

The temperature sensing element is a glass-coated thermistor bead, pressure-protected by a stainless steel tube. The sensor output frequency ranges from approximately 5 to 13 kHz corresponding to temperature from −5 to 35 degrees Celsius. The output frequency is inversely proportional to the square root of the thermistor resistance which controls the output of a patented Wien Bridge circuit. The thermistor resistance is exponentially related to temperature. The SBE thermometer has a typical accuracy/stability of ±0.004°C per year; and resolution of 0.0003°C at 24 Hz. The SBE thermometer has a fast response time of 0.070 seconds.

Sensor calibrations are performed at Sea-Bird Electronics, Inc. on a roughly annual basis. Temperature (ITS-90) is computed according to

$$T(^\circ\mathrm{C}) = 1/\{g + h[\ln(f0/f)] + i[\ln^2(f0/f)] + j[\ln^3(f0/f)]\} - 273.15$$

where g, h, i, j, and $f0$ are calibration coefficients, and f is the instrument frequency (kHz). SEASOFT automatically implements this equation, and converts between ITS-90 and IPTS-68 temperature scales when selected.

2.3 Pressure

The Paroscientific series 4000 Digiquartz high pressure transducer uses a quartz crystal resonator whose frequency of oscillation varies with pressure-induced stress measuring changes in pressure as small as 0.01 parts per million with an absolute range of 0 to 10,000 psia (0 to 6885 decibars). Also, a quartz crystal temperature signal is used to compensate for a wide range of temperature changes. Repeatability, hysteresis, and pressure conformance are 0.005% FS. The nominal pressure frequency (0 to full scale) is 34 to 38 kHz. The nominal temperature frequency is 172 kHz + 50 ppm/°C.

Periodic sensor calibrations are performed at Sea-Bird Electronics, Inc. Pressure coefficients are first formulated into

$$\begin{aligned} c &= c1 + c2U + c3U^2 \\ d &= d1 + d2U \\ t0 &= t1 + t2U + t3U^2 + t4U^3 + t5U^4 \end{aligned}$$

where U is temperature in degrees Celsius. Then pressure is computed according to

$$P(\text{psia}) = c[1 - (t0^2/t^2)]\{1 - d[1 - (t0^2/t^2)]\}$$

where t is pressure period (μs). SEASOFT automatically implements this equation.

2.4 Oxygen

The SBE-43 oxygen sensor uses an electrochemical cell that is constantly polarized. The sensor is temperature compensated using special temperature sensing and an internal microcomputer. The interface electronics reports voltages for oxygen current only. A linear equation of the form $I = mV + b$, where $m = 1.0\text{e}{-6}$ and $b = 0.0$, yields sensor current as a function of sensor output voltage. The sensor has a thermal time constant of approximately 2.5 s; and an oxygen response time constant that is temperature dependent, increasing with cooler temperatures, ranging from 2 to 12 s.

Pre-cruise sensor calibrations are performed at Sea-Bird Electronics, Inc., providing slope, bias, tcor, and pcor coefficients. SEASOFT computes dissolved oxygen according to Owens and Millard (1985).

3. Data Acquisition

The package enters the water and is held at 10 m for 60 seconds after the pumps turn on in order to prime the system. The package is brought back to just beneath the surface and the acquisition program is restarted. Under ideal conditions the package should be lowered at a rate of 30 m/min to 50 m, 45 m/min to 200 m, and 60 m/min to depth. Ship heave may cause substantial variation about these mean lowering rates. Cable tension is monitored at the winch box display. Maximum cast depth is 200 m from the bottom as reported by the ship's fathometer.

Nominally eight water samples are collected during the upcast using an SBE rosette. Four, five, or ten-liter Niskin sample bottles are used depending on the cruise. Bottle closures are performed through the SEASOFT software.

Digitized data are collected on two PCs simultaneously. Raw data files are archived on CD-ROM.

4. Salinity Analysis

Bottle salinity analyses are performed in temperature-controlled environments using Guildline Model 8400B inductive autosalinometers equipped with Ocean Scientific International, Ltd. ACI2000 computer interface and standardized with IAPSO Standard Seawater. The autosalinometer is standardized before each run and the correction is applied in the software. Ten scans of data are averaged for each reading. Three readings are taken per sample and averaged for one sample salinity value. Bottle salinities are compared to preliminary CTD salinities at sea to aid in the identification of leaking bottles as well as to monitor the CTD conductivity cells' performance and drift. Their use in calibrating CTD conductivity on shore is detailed in section 6. The expected precision of the autosalinometer with an accomplished operator is 0.001 PSS-78, with an accuracy of 0.002.

5. SEASOFT Processing

SEASOFT consists of modular menu-driven routines for acquisition, display, processing, and archiving of oceanographic data acquired with Sea-Bird equipment and is designed to work with an IBM or compatible personal computer. Raw data are acquired from the instruments and stored unmodified. The conversion module DATCNV uses instrument configuration and pre-cruise calibration files to create a converted engineering unit data file that is operated on by all SEASOFT post processing modules. The following describes each processing module used and notes the specifications in the reduction of TAO CTD data.

ALIGNCTD advances secondary conductivity relative to temperature by 0.073 s. This is the typical net advance of ducted temperature and conductivity sensors with a 3000-rpm pump. The SBE 11plus deck unit automatically advances primary conductivity. ROSSUM creates a summary of the bottle data. Pressure, temperature, and conductivity are averaged over a 2-s interval after the confirm bit in the upcast data stream. WILDEDIT marks extreme outliers in the data files. The first pass obtains an accurate estimate of the true standard deviation of the data. The data are read in blocks of 100 scans. Data greater than two standard deviations are flagged. The second pass computes a standard deviation over the same 100 scans excluding the flagged values. Values greater than 20 standard deviations are marked bad. All flagged data are excluded. FILTER performs a low-pass filter on pressure with a time constant of 0.15 s. In order to produce a zero phase (no time shift) the filter first runs forward through the file and then runs backwards through the file. CELLTM uses a recursive filter to remove conductivity cell thermal mass effects from the measured conductivity. Nominal values are used for thermal anomaly amplitude ($\alpha = 0.03$) and the time constant ($1/\beta = 7.0$). LOOPEDIT excludes scans where the minimum velocity of the package is less than 0.25 m/s or the package has reversed its direction owing to ship heave. BINAVG averages the data into 1-dbar pressure bins starting at 1 dbar (no surface bin). The center value of the first bin is set equal to the bin size. The bin minimum and maximum values are the center value plus or minus half the bin size. DERIVE computes selected variables such as salinity, potential temperature, and potential density.

6. Post-Cruise Calibrations

6.1 Conductivity

PMEL Fortran program SBECAL combines SEASOFT bottle files into one listing. PMEL Fortran program ADDSAL reads bottle salinity data received from the ship's survey personnel and adds it to the combined listing by station/sample number. MATLAB functions CALCOSn are used to determine the best fit of CTD and bottle data, where n is the order of the station-dependent linear or polynomial fit. CALCOSn recursively throws out data greater than a specified number of standard deviations (usually 2.8). CALCOSn returns a single conductivity bias and a conductivity slope for each station. A station-dependent slope coefficient best models the gradual shift in the conductivity sensor within each station grouping with time. CALCOPn additionally returns a linear pressure term (modified beta) that is multiplied by CTD pressure and added to conductivity. The order of the polynomial was chosen to keep the standard deviation of each grouping to a minimum while avoiding fitting to fluctuations due to noise in standardizations of salinity sample runs.

Conductivity calibration coefficients are determined for each station grouping (Table 2). Calibrated profiles were compared to historical deep theta-salinity profiles. For three cruises, GP606, GP706, and GP806, an additional offset had to be applied to CTD salinity in order to bring the profiles into agreement with the historical envelope of deep profiles.

PMEL Fortran program CALMSTR applies post-cruise calibrations to temperature and conductivity, and computes final salinity values. Final pressure calibrations were pre-cruise. CTD-bottle conductivity differences (Figs. 3a–h) are used to verify the success of the fit parameters.

6.2 Temperature

Normally, adjustments are made to the bias of the thermistors using a linear fit of the sensor drift history from calibration data taken over the previous few years, projected to the midpoint of each cruise (Table 3). These drift corrections are small (order $1\times10^{-3}\,^{\circ}$C). Also, a uniform correction was applied to all sensors for heating of the thermistor owing to viscous effects (Table 3). Thermistors are biased high by this effect and were adjusted down by $0.6\times10^{-3}\,^{\circ}$C. This results in errors of no more than $\pm\,0.15\times10^{-3}\,^{\circ}$C from this effect for the full range of oceanographic temperature and salinity.

6.3 Oxygen

Significant hysteresis between the down and up oxygen profiles at deep stations warranted using the downcast oxygen data for calibration. Primary sensor data were extracted from the .BTL files using SBECAL1K.f for GP205. Sample salinities were matched to CTD records by station/sample number using ADDSALK.f. Sample oxygen data were matched to CTD records by station/sample number using ADDOXYK.f.

Upcast bottle data were matched to downcast profile data by sigma-2 using MATCH_SG2_313K.m. RUN_OXYGEN_CAL_1.m was used to determine a least squares fit with a linear station dependent slope. Final coefficients stored in FINAL.mat and applied to oxygen sensor S/N 313 were slopes ranging from 0.4583 to 0.5069, bias = −0.5543, lag = 4.6 s, tcor = 0.0054, pcor = 0.0001, and weight = 0. 99% of the 67 data points were used in the fit with a standard deviation of 1.7 μmol/kg. Calibrated up/down profiles with bottles overplotted were examined to verify the fit using PLOT_OX.m. Although the upcast and downcast oxygen traces were separated by as much as 20 dbar, the lag seemed appropriate with few instances of over- or undershooting in oxygen, even in high gradient regions. For casts 0011–0141, the air-bleed hole in the y-piece of the primary plumbing was clogged so oxygens in the top 60 dbar were replaced with upcast oxygens using FIX_OX.m.

A SBE-43 oxygen sensor was provided by Monterey Bay Aquarium Research Institute for GP106, GP206, and GP306. However, no Winkler titrations were done on these cruises. Oxygen data were processed using precruise Sea-Bird calibrations only. The lag was set to zero.

CTD-bottle oxygen differences for GP205 are plotted against station number and pressure to show the stability of the calibrated CTD oxygens relative to the bottle oxygens (Fig. 4).

7. Additional Processing

SEASOFT processing modules are followed by PMEL Fortran program CNV_EPS. CNV_EPS applies post-cruise calibrations to conductivity and converts the 1-dbar averaged CTD data to NetCDF format. CNV_EPS creates a WOCE quality flag associated with each record of pressure, temperature, and CTD salinity. Quality flag definitions can be found in the WOCE Operations Manual (1994). CNV_EPS skips bad records near the surface and also any records flagged bad by SEASOFT. Measured data are copied back to 0 dbar and gaps are linearly interpolated such that a record exits every 1 dbar. WOCE flags are amended to reflect these changes. CNV_EPS calculates ITS-90 temperature and salinity (PSS-78), as well as potential temperature (IPTS-68), sigma-t, and sigma-theta using the 1980 equation of state algorithms described by Fofonoff and Millard (1983). Dynamic height in dynamic meters is calculated by integrating down from the sea surface.

PMEL Fortran program CLB_EPS creates individual bottle files in NetCDF format for each cast.

When oxygen data are present, CALCTD_K.m applies all post-cruise corrections and calibrations to the profile data, and CNV_EPSO.f converts it into NetCDF format. Likewise for bottle data, CALCLO_K.m applies the calibrations to the discrete data, and CLB_EPSO.f converts it into NetCDF format.

8. Data Presentation and Access

The majority of plots in this report were produced using Plot Plus Scientific Graphics System (Denbo, 1992). Vertical-meridional sections of potential temperature, salinity, and sigma-theta are plotted for each meridian (Figs. 5–58). Oxygen sections are also included for 95°W and 110°W from GP205 and GP206, 125°W and 140°W from GP106, and 155°W and 170°W from GP306. Composite potential temperature-salinity (θ-S) diagrams for each meridian are presented (Figs. 59–74), as are composite potential temperature-oxygen (θ-O_2) diagrams for each meridian of GP205, GP106, GP206, and GP306 (Figs. 75–78). Tables 4–8 define the abbreviations and units used in the CTD data summary listings that are presented alongside $0-1000$ m profiles of each cast for each cruise on the report CD. Hydrographic bottle data at discrete depths are also given for each cruise on the report CD.

These and previous TAO/TRITON data are available via the World Wide Web at `www.epic.noaa.gov/epic/ewb/` using EPIC. EPIC is a set of programs developed at PMEL to manage large numbers of hydrographic and time series oceanographic in situ data sets collected as part of NOAA climate study programs. The EPIC Web Browser is a Web application that provides interactive on-line data access to EPIC hydrographic data sets. Multiple data file formats include netCDF data format, Classic EPIC format, and formatted ASCII data format. Users select data by specifying data type, latitude, longitude, and time range. The EPIC system contains a full suite of routines to provide graphical display, data analysis, and calculation of oceanographic parameters.

9. Acknowledgments

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FIGURES AND TABLES

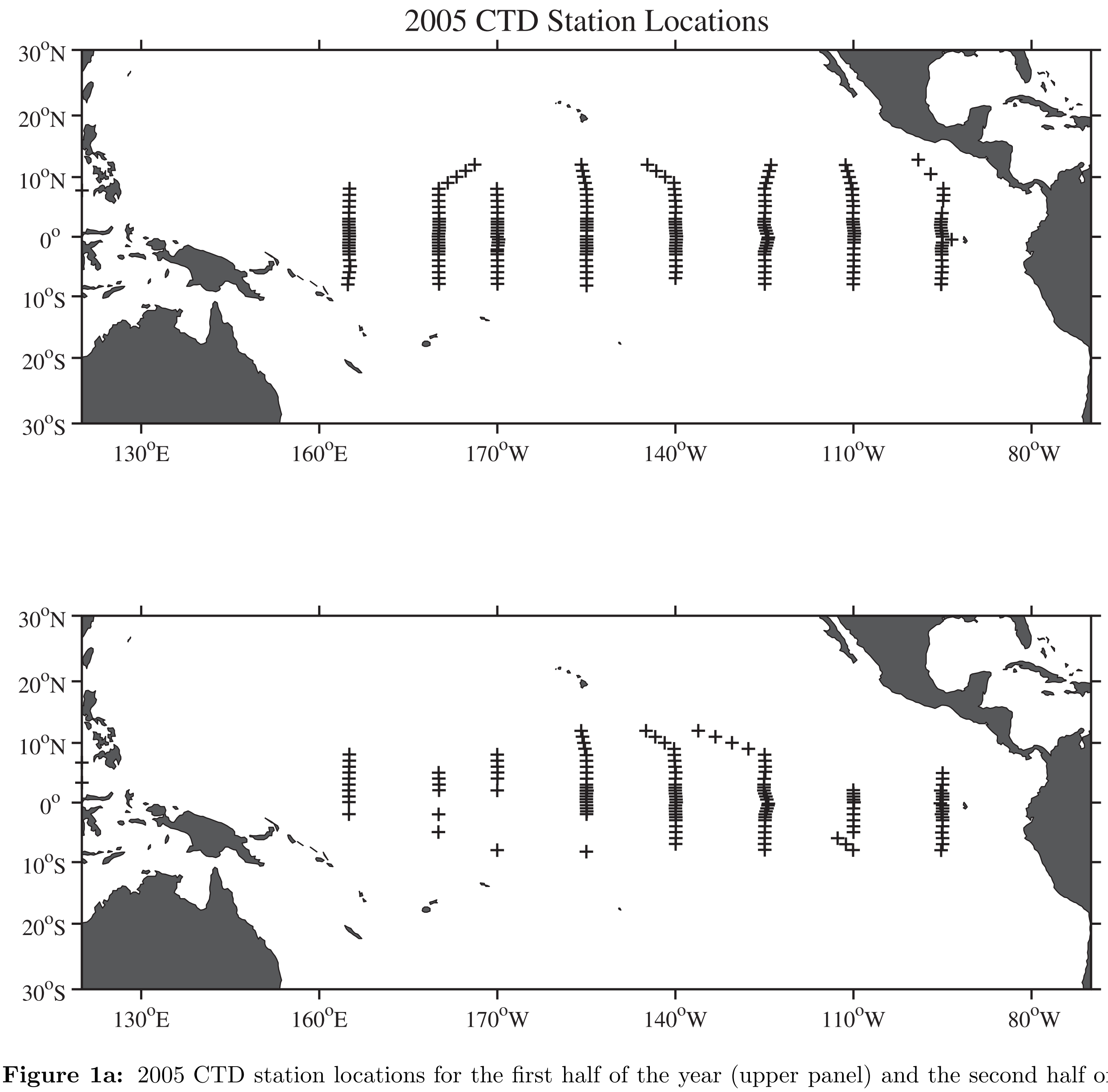


Figure 1a: 2005 CTD station locations for the first half of the year (upper panel) and the second half of the year (lower panel).

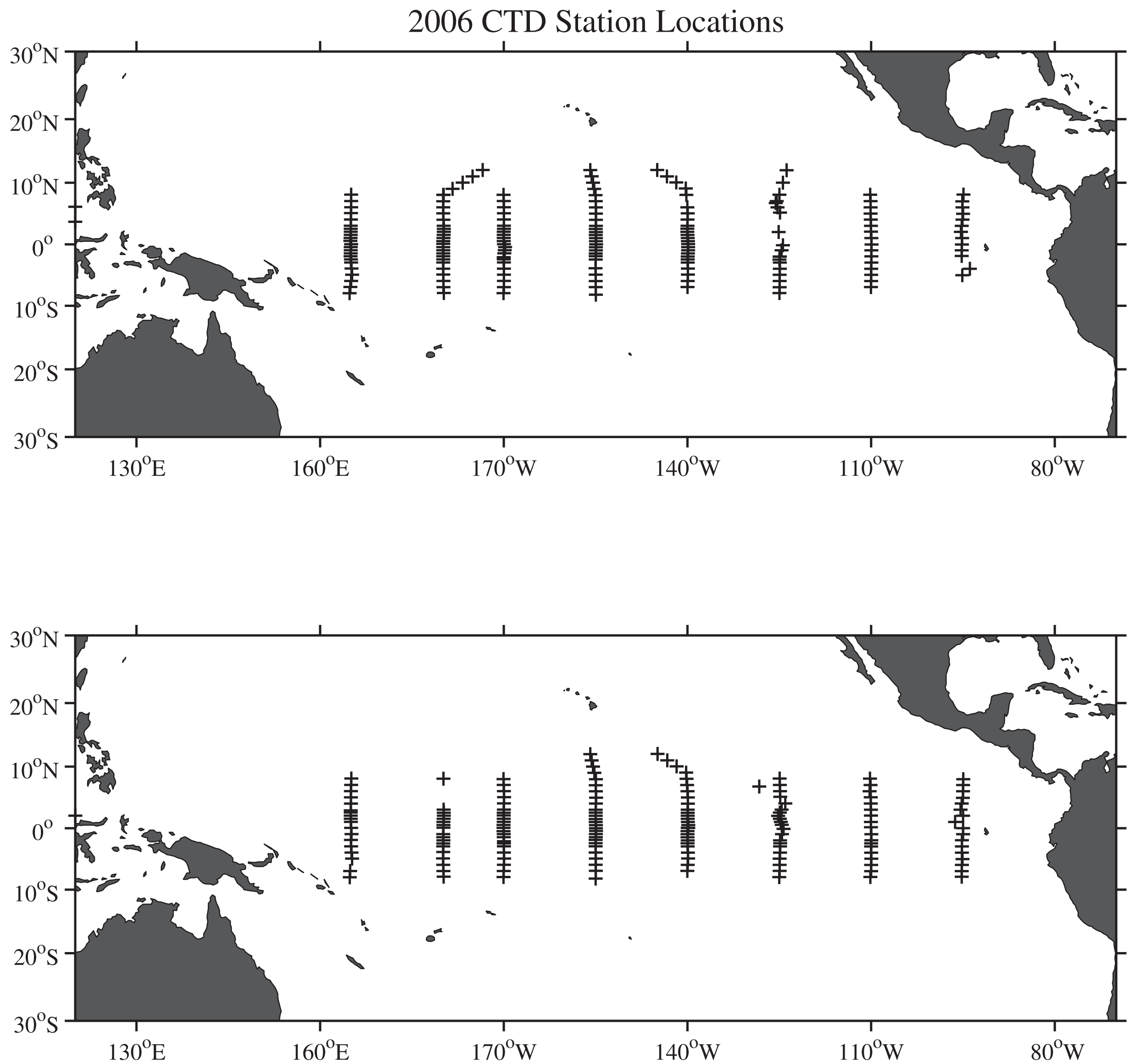


Figure 1b: 2006 CTD station locations for the first half of the year (upper panel) and the second half of the year (lower panel).

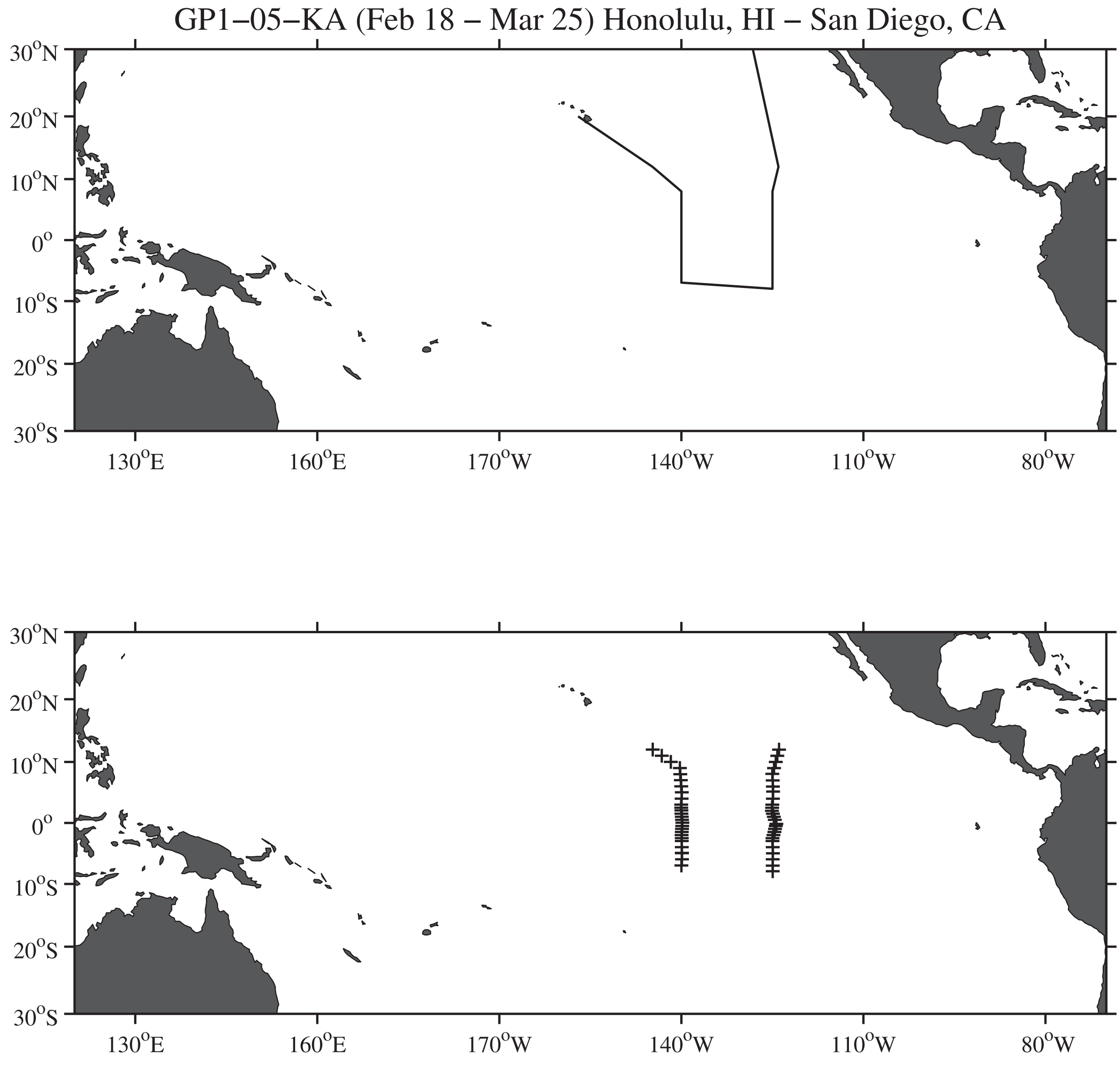


Figure 2a: GP1-05-KA cruise track and station locations.

Table 1a: GP1-05-KA CTD Cast Summary.

Cast #	Latitude		Longitude		Date	Time	W/D T	W/S (kts)	Depth (m)	Cast (db)
11	12°	1.1′N	144°	44.2′W	23 Feb 05	751	88	15	5617	1001
21	11°	0.3′N	143°	13.8′W	23 Feb 05	2019	93	18	5158	1000
31	10°	0.8′N	141°	44.0′W	24 Feb 05	850	73	18	4978	1001
41	9°	1.3′N	140°	14.8′W	25 Feb 05	644	54	17	4811	4604
51	8°	0.2′N	140°	11.0′W	25 Feb 05	1612	47	20	5131	1006
61	7°	0.9′N	140°	6.5′W	25 Feb 05	2315	54	20	4977	1002
71	6°	1.6′N	140°	1.4′W	26 Feb 05	646	77	13	4751	1009
81	5°	2.2′N	139°	57.3′W	26 Feb 05	1415	117	11	4481	1002
91	4°	0.5′N	139°	58.3′W	27 Feb 05	1036	128	15	4315	1000
101	3°	0.4′N	140°	1.3′W	27 Feb 05	1956	116	17	4305	1000
111	2°	30.3′N	140°	1.2′W	28 Feb 05	40	105	21	4390	1002
121	2°	2.8′N	140°	0.7′W	28 Feb 05	546	122	21	4402	4201
131	1°	30.5′N	140°	0.0′W	1 Mar 05	52	91	18	4443	1003
141	1°	0.3′N	139°	56.7′W	1 Mar 05	449	105	19	4324	1001
151	0°	30.9′N	139°	53.8′W	1 Mar 05	856	101	18	4349	1002
161	0°	2.7′N	139°	50.7′W	1 Mar 05	1345	84	17	4305	4101
171	0°	29.6′S	139°	52.9′W	2 Mar 05	754	99	12	4255	1001
181	0°	59.7′S	139°	54.6′W	2 Mar 05	1205	96	17	4206	1002
191	1°	29.7′S	139°	56.2′W	2 Mar 05	1621	60	16	4348	1003
201	2°	0.8′S	139°	58.3′W	3 Mar 05	252	74	15	4318	1005
211	2°	29.5′S	139°	56.6′W	3 Mar 05	726	73	13	4397	1001
221	2°	59.7′S	139°	56.0′W	3 Mar 05	1140	73	14	4283	1003
231	3°	59.2′S	139°	55.7′W	3 Mar 05	1907	64	11	4509	1001
241	4°	57.2′S	139°	53.9′W	4 Mar 05	1222	109	15	4324	3449
242	4°	58.6′S	139°	55.9′W	5 Mar 05	27	79	9	4296	1001
251	5°	59.3′S	139°	55.2′W	5 Mar 05	815	68	11	4149	1001
261	6°	59.5′S	139°	59.7′W	5 Mar 05	1623	46	13	4190	4002
271	7°	57.0′S	124°	58.1′W	12 Mar 05	1259	100	14	4492	4206
281	7°	1.2′S	124°	58.0′W	12 Mar 05	2204	100	15	4664	1002
291	5°	59.7′S	124°	58.0′W	13 Mar 05	549	115	10	4636	1001
301	4°	59.6′S	124°	55.9′W	13 Mar 05	1329	124	10	4536	1002
311	3°	59.7′S	124°	57.2′W	14 Mar 05	533	122	6	4475	1000
321	2°	59.3′S	124°	58.7′W	14 Mar 05	1145	119	12	4727	1001
331	2°	29.6′S	124°	59.1′W	14 Mar 05	1526	143	14	4580	1001
341	1°	59.6′S	124°	49.5′W	15 Mar 05	621	148	7	4592	4400
351	1°	29.6′S	124°	40.9′W	15 Mar 05	1134	127	6	4632	1000
361	0°	59.8′S	124°	34.1′W	15 Mar 05	1519	115	1	4741	1003
371	0°	29.8′S	124°	27.0′W	15 Mar 05	1918	187	5	4552	1001
381	0°	8.8′S	124°	21.3′W	16 Mar 05	412	145	8	4774	4401
391	0°	30.1′N	124°	35.6′W	16 Mar 05	1000	201	6	4435	1004
401	1°	0.6′N	124°	45.8′W	16 Mar 05	1335	176	1	4263	1002
411	1°	30.8′N	124°	55.8′W	16 Mar 05	1716	205	3	4629	1003
421	1°	59.7′N	125°	5.5′W	17 Mar 05	505	274	1	4707	1001
431	2°	30.5′N	125°	2.3′W	17 Mar 05	933	148	2	4616	1002
441	3°	0.4′N	125°	0.4′W	17 Mar 05	1258	105	1	4436	1001
451	4°	0.4′N	124°	56.4′W	17 Mar 05	1915	34	12	4514	1010
461	5°	9.3′N	124°	53.1′W	18 Mar 05	251	66	11	4419	1001
471	6°	0.2′N	124°	55.6′W	18 Mar 05	817	56	11	4391	1002
481	7°	0.2′N	124°	58.0′W	18 Mar 05	1438	36	13	4671	1001
491	8°	4.9′N	125°	1.0′W	18 Mar 05	2325	84	15	4583	4401
501	9°	0.3′N	124°	44.8′W	19 Mar 05	700	56	16	4607	1004
511	10°	0.1′N	124°	27.9′W	19 Mar 05	1336	33	17	4640	1002
521	11°	0.2′N	124°	12.0′W	19 Mar 05	2020	43	18	4611	1002
531	12°	0.2′N	123°	54.1′W	20 Mar 05	322	75	9	4546	1000

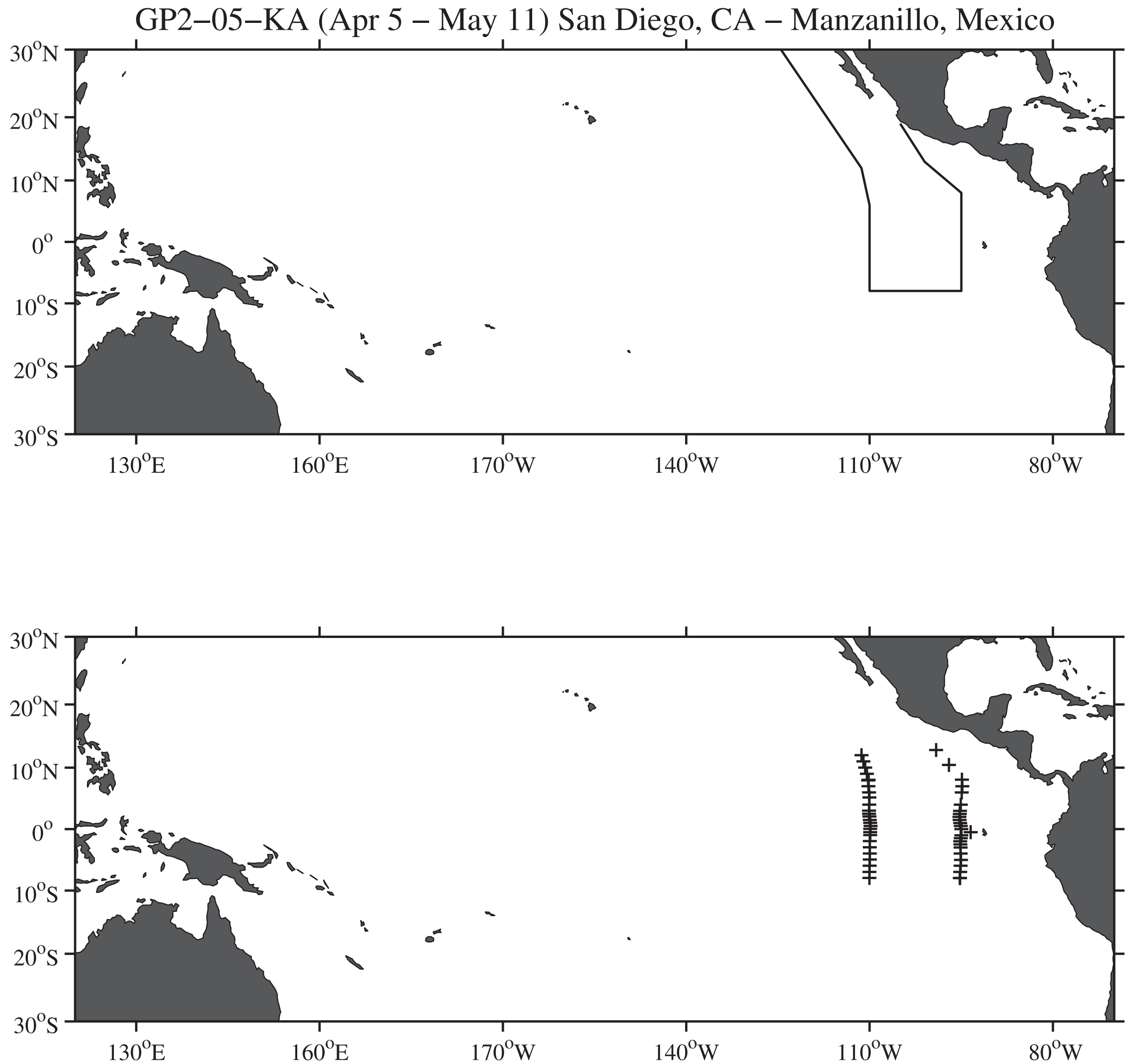


Figure 2b: GP2-05-KA cruise track and station locations.

Table 1b: GP2-05-KA CTD Cast Summary.

Cast #	Latitude	Longitude	Date	Time	W/D T	W/S (kts)	Depth (m)	Cast (db)
11	12° 0.2′N	111° 20.7′W	10 Apr 05	1457	15	13	4175	1003
21	11° 0.2′N	111° 1.8′W	10 Apr 05	2243	20	3	3342	1001
31	10° 0.4′N	110° 44.5′W	11 Apr 05	524	34	16	3731	1008
41	8° 59.9′N	110° 26.7′W	11 Apr 05	1148	29	14	3741	1001
51	8° 2.3′N	110° 10.0′W	12 Apr 05	117	53	11	4219	402
52	7° 56.7′N	110° 14.9′W	12 Apr 05	518	47	19	4126	3703
61	7° 0.5′N	110° 11.4′W	12 Apr 05	1329	59	14	3781	1003
71	6° 0.1′N	110° 6.2′W	12 Apr 05	2129	307	1	3863	1002
81	5° 9.2′N	110° 2.5′W	13 Apr 05	513	157	3	3950	3603
91	4° 0.4′N	110° 4.2′W	14 Apr 05	447	122	4	3878	1003
101	3° 0.3′N	110° 6.4′W	14 Apr 05	1124	81	3	3885	1001
111	2° 30.0′N	110° 7.1′W	14 Apr 05	1530	136	8	3784	1004
121	2° 3.7′N	110° 2.7′W	15 Apr 05	320	134	10	3722	1003
131	1° 30.1′N	109° 59.1′W	15 Apr 05	835	131	8	3762	1010
141	1° 0.2′N	109° 55.4′W	15 Apr 05	1253	170	10	3787	1002
151	0° 30.6′N	109° 51.7′W	15 Apr 05	1720	128	5	3800	1002
161	0° 2.2′N	109° 54.5′W	16 Apr 05	146	128	6	3790	402
162	0° 2.0′N	109° 53.9′W	16 Apr 05	540	124	7	3765	3504
171	0° 30.0′S	109° 55.5′W	17 Apr 05	210	136	9	3843	1002
181	0° 59.8′S	109° 54.8′W	17 Apr 05	615	152	9	3772	1002
191	1° 58.4′S	109° 57.7′W	18 Apr 05	111	139	7	3927	1002
201	2° 59.8′S	109° 58.7′W	18 Apr 05	748	123	12	3873	1001
211	3° 59.9′S	109° 59.0′W	18 Apr 05	1416	118	12	3714	1002
221	4° 58.7′S	109° 59.1′W	18 Apr 05	2111	149	16	3611	1001
231	5° 59.7′S	110° 0.9′W	19 Apr 05	418	156	11	3307	1002
241	6° 59.9′S	110° 2.2′W	19 Apr 05	1057	145	15	3539	1003
251	7° 59.1′S	110° 2.7′W	19 Apr 05	1814	158	9	3395	3004
261	7° 58.8′S	95° 14.7′W	23 Apr 05	756	131	11	3960	401
262	7° 59.6′S	95° 13.4′W	23 Apr 05	1129	150	6	3872	3701
271	7° 0.0′S	95° 11.2′W	23 Apr 05	2138	142	11	3921	1001
281	5° 59.8′S	95° 7.7′W	24 Apr 05	443	137	8	3872	1004
291	5° 2.9′S	95° 3.8′W	24 Apr 05	1149	238	10	3848	1001
301	3° 59.7′S	95° 6.4′W	25 Apr 05	445	338	8	3568	1002
311	3° 0.1′S	95° 8.3′W	25 Apr 05	1216	28	2	3437	1002
321	2° 30.2′S	95° 9.4′W	25 Apr 05	1632	55	5	3403	1002
331	1° 0.4′S	94° 59.9′W	26 Apr 05	758	134	7	3299	422
332	1° 0.2′S	95° 0.0′W	26 Apr 05	1036	132	7	3308	1003
341	1° 29.8′S	95° 4.7′W	26 Apr 05	1440	129	7	3372	1001
351	1° 59.7′S	95° 10.9′W	26 Apr 05	2133	120	10	3432	1001
361	0° 30.4′S	93° 29.1′W	3 May 05	1025	130	3	3268	1007
371	0° 0.7′N	94° 59.6′W	3 May 05	2055	117	8	3306	3002
381	0° 30.0′N	95° 5.7′W	4 May 05	159	158	3	3280	1002
391	0° 59.8′N	95° 11.5′W	4 May 05	610	161	12	3005	1001
401	1° 30.0′N	95° 17.0′W	4 May 05	1036	155	7	2550	1001
411	2° 0.2′N	95° 17.8′W	4 May 05	2316	140	6	2941	1002
421	2° 29.1′N	95° 14.9′W	5 May 05	411	167	14	2395	1001
431	2° 59.7′N	95° 12.3′W	5 May 05	843	139	6	2755	1002
441	3° 59.4′N	95° 5.4′W	5 May 05	1634	150	9	3344	1005
451	5° 59.8′N	94° 55.5′W	6 May 05	918	323	4	3204	1003
461	6° 59.8′N	94° 51.0′W	6 May 05	1616	154	7	3770	1001
471	8° 3.4′N	94° 54.6′W	7 May 05	545	124	12	3653	3428
481	10° 27.3′N	97° 1.8′W	8 May 05	1524	72	7	4049	1004
491	12° 50.3′N	99° 8.1′W	9 May 05	1151	3	6	3420	1002

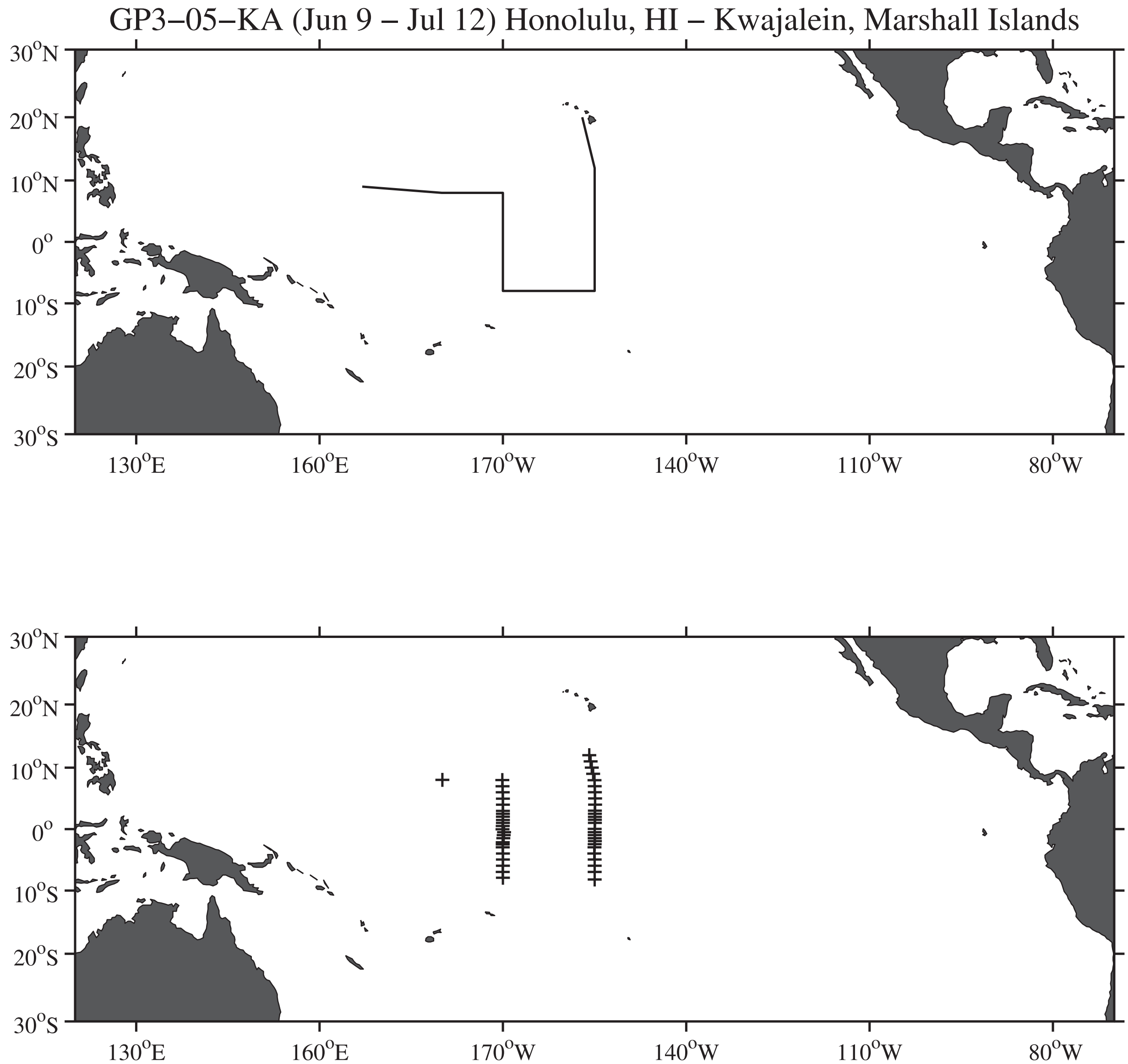
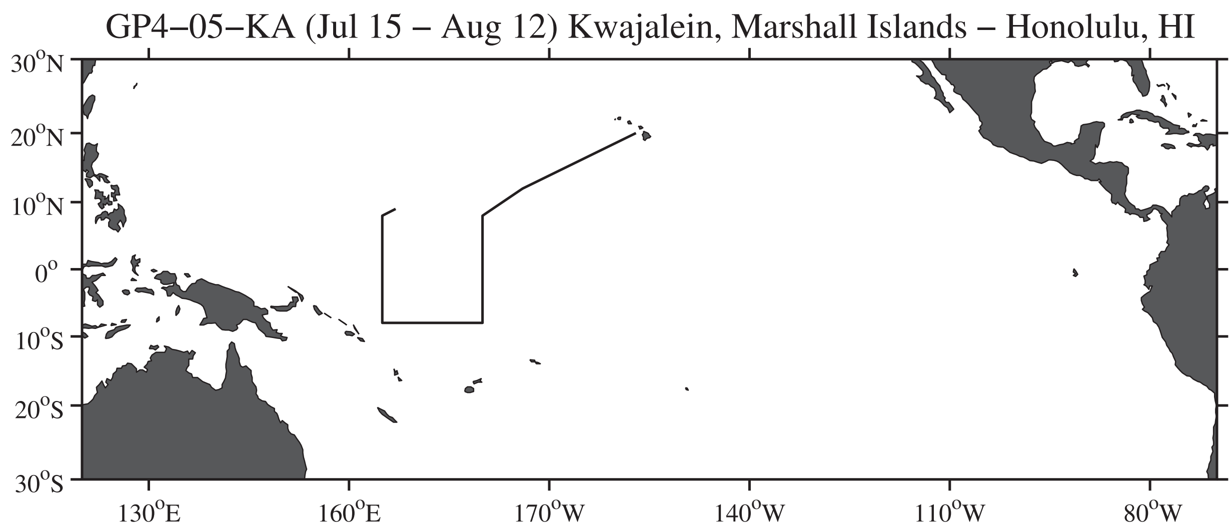


Figure 2c: GP3-05-KA cruise track and station locations.

Table 1c: GP3-05-KA CTD Cast Summary.

Cast #	Latitude		Longitude		Date	Time	W/D T	W/S (kts)	Depth (m)	Cast (db)
11	12°	0.4′N	155°	52.0′W	12 Jun 05	1128	68	22	5191	1005
21	11°	0.4′N	155°	39.8′W	12 Jun 05	1833	63	21	5192	1001
31	10°	0.7′N	155°	26.8′W	13 Jun 05	152	91	21	5311	1011
41	9°	0.4′N	155°	14.4′W	13 Jun 05	857	93	18	3276	1003
51	7°	58.3′N	155°	1.4′W	13 Jun 05	1704	80	20	5187	4002
61	7°	0.1′N	154°	58.9′W	14 Jun 05	143	27	4	5162	1003
71	6°	0.5′N	154°	57.6′W	14 Jun 05	832	84	14	4828	1001
81	5°	0.8′N	154°	55.7′W	14 Jun 05	1522	60	14	4591	1001
91	4°	0.6′N	154°	56.0′W	15 Jun 05	753	137	16	4692	1001
101	3°	0.2′N	154°	56.7′W	15 Jun 05	1453	134	12	4798	1001
111	2°	30.6′N	154°	57.0′W	15 Jun 05	1916	131	17	4832	1002
121	2°	0.9′N	154°	56.8′W	15 Jun 05	2351	95	4	4696	1003
131	1°	30.7′N	154°	58.0′W	16 Jun 05	405	129	17	4647	1002
141	1°	0.6′N	154°	58.1′W	16 Jun 05	805	120	19	4750	1001
151	0°	2.4′N	154°	58.6′W	16 Jun 05	1545	86	15	4635	3515
161	0°	29.5′S	154°	59.1′W	17 Jun 05	657	94	13	4881	1002
171	0°	59.2′S	154°	58.4′W	17 Jun 05	1102	88	5	4761	1003
181	1°	29.9′S	154°	58.2′W	17 Jun 05	1519	123	15	4878	1003
191	1°	59.0′S	154°	57.8′W	17 Jun 05	1923	104	15	4983	1002
201	2°	29.4′S	154°	59.0′W	17 Jun 05	2330	119	16	4998	1002
211	2°	59.9′S	155°	0.2′W	18 Jun 05	317	86	13	4962	1001
221	3°	59.6′S	155°	2.7′W	18 Jun 05	940	74	9	2657	1003
231	4°	58.6′S	154°	59.0′W	18 Jun 05	1606	131	4	5026	1000
241	5°	59.8′S	154°	59.2′W	19 Jun 05	745	136	8	4904	1002
251	7°	0.0′S	154°	59.7′W	19 Jun 05	1421	148	17	5130	1002
261	8°	13.8′S	154°	58.7′W	20 Jun 05	833	123	25	5325	5104
271	7°	56.5′S	169°	59.9′W	29 Jun 05	1529	71	9	5344	5001
281	6°	59.9′S	170°	0.9′W	30 Jun 05	44	62	9	4718	1003
291	6°	0.0′S	170°	0.7′W	30 Jun 05	818	89	13	4796	1002
301	4°	59.0′S	170°	0.0′W	30 Jun 05	1602	88	10	5397	1002
311	4°	0.0′S	170°	0.7′W	1 Jul 05	916	120	6	5729	1002
321	2°	59.8′S	170°	1.2′W	1 Jul 05	1555	213	1	5035	1003
331	2°	30.1′S	170°	1.0′W	1 Jul 05	1939	319	7	5513	1001
341	2°	9.5′S	170°	1.8′W	2 Jul 05	657	99	6	4936	1003
351	1°	30.0′S	169°	56.2′W	2 Jul 05	1155	145	2	5207	1003
361	0°	59.8′S	169°	52.0′W	2 Jul 05	1529	168	3	5705	1003
371	0°	30.0′S	169°	47.8′W	2 Jul 05	1916	160	2	5605	1002
381	0°	2.7′S	170°	4.5′W	3 Jul 05	1225	163	0	5605	5201
391	0°	29.9′N	170°	1.7′W	4 Jul 05	754	153	16	5433	1001
401	1°	0.3′N	170°	0.6′W	4 Jul 05	1137	153	13	5450	1002
411	1°	30.2′N	170°	0.0′W	4 Jul 05	1527	143	14	5527	1025
421	2°	1.9′N	169°	59.7′W	4 Jul 05	1946	133	8	5391	1002
431	2°	29.9′N	169°	59.2′W	4 Jul 05	2316	134	7	5352	1001
441	2°	59.9′N	170°	0.2′W	5 Jul 05	244	104	6	5475	1002
451	4°	0.1′N	169°	59.6′W	5 Jul 05	941	90	2	5745	1006
461	4°	58.7′N	169°	59.5′W	5 Jul 05	1646	41	5	5900	1002
471	6°	0.6′N	170°	1.0′W	6 Jul 05	1030	80	27	5650	973
481	7°	0.2′N	170°	2.7′W	6 Jul 05	1834	65	14	6008	1003
491	8°	1.0′N	170°	4.9′W	7 Jul 05	419	64	21	5538	3009
501	8°	1.3′N	179°	54.2′W	9 Jul 05	1530	109	16	5939	5003



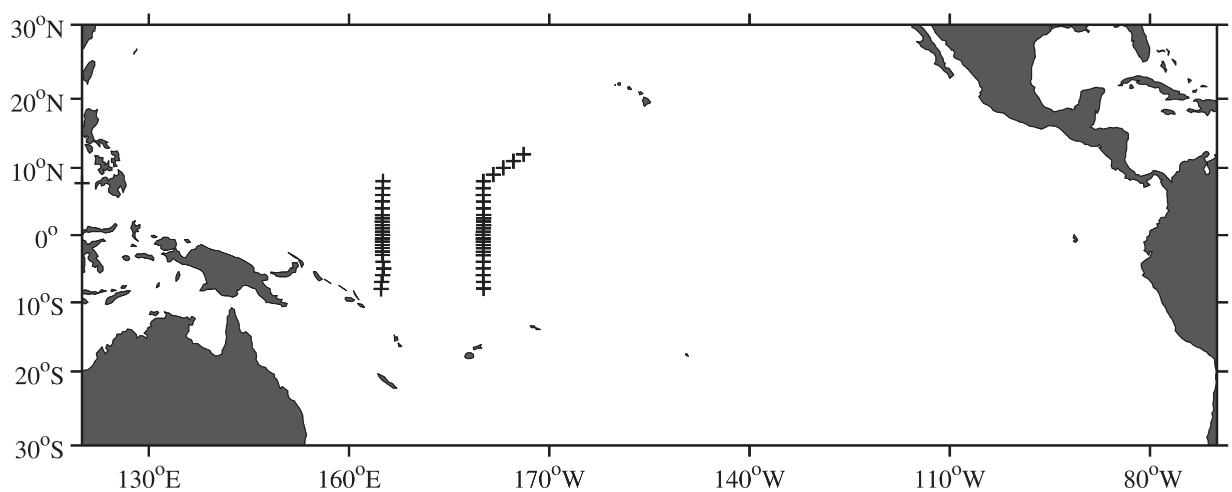


Figure 2d: GP4-05-KA cruise track and station locations.

Table 1d: GP4-05-KA CTD Cast Summary.

Cast #	Latitude	Longitude	Date	Time	W/D T	W/S (kts)	Depth (m)	Cast (db)
11	8° 2.7′N	165° 5.6′E	16 Jul 05	2128	105	9	5213	4003
21	7° 0.3′N	165° 3.6′E	17 Jul 05	1408	57	10	5157	1004
31	6° 0.2′N	165° 2.7′E	17 Jul 05	2058	59	6	5008	1003
41	5° 1.5′N	165° 0.8′E	18 Jul 05	344	26	6	4774	1004
51	3° 59.8′N	165° 0.2′E	18 Jul 05	1051	305	1	4493	1002
61	2° 59.8′N	164° 59.4′E	18 Jul 05	1730	338	7	4230	1001
71	2° 30.4′N	164° 59.8′E	18 Jul 05	2121	199	9	4119	1002
81	2° 0.2′N	164° 58.1′E	19 Jul 05	809	40	9	4172	1002
91	1° 30.4′N	165° 0.8′E	19 Jul 05	1308	107	8	4257	1000
101	1° 0.2′N	165° 1.4′E	19 Jul 05	1705	100	8	4330	1002
111	0° 30.5′N	165° 2.0′E	19 Jul 05	2058	79	7	4364	1003
121	0° 2.4′N	165° 2.7′E	20 Jul 05	724	100	12	4409	4202
131	0° 29.8′S	165° 0.6′E	21 Jul 05	520	118	2	4408	1001
141	0° 59.5′S	165° 0.4′E	21 Jul 05	944	50	4	4429	1003
151	1° 29.3′S	165° 0.0′E	21 Jul 05	1423	70	5	4455	1003
161	1° 56.8′S	165° 0.4′E	21 Jul 05	1833	39	5	4465	1002
171	2° 29.3′S	165° 0.8′E	22 Jul 05	111	94	2	2572	1005
181	2° 59.8′S	165° 1.6′E	22 Jul 05	513	81	3	4172	1002
191	3° 59.4′S	165° 5.8′E	22 Jul 05	1202	82	3	3374	1001
201	5° 0.4′S	165° 12.0′E	22 Jul 05	1908	38	1	2501	1002
211	5° 59.3′S	165° 2.4′E	23 Jul 05	843	92	4	3585	1000
221	6° 59.6′S	164° 54.2′E	23 Jul 05	1552	64	4	3714	1002
231	8° 2.2′S	164° 47.9′E	24 Jul 05	823	37	8	3893	3701
241	7° 58.2′S	179° 49.6′W	28 Jul 05	820	142	13	5536	5003
251	6° 59.8′S	179° 51.5′W	29 Jul 05	548	138	16	5271	1002
261	5° 59.8′S	179° 53.1′W	29 Jul 05	1218	110	13	5079	1004
271	4° 58.2′S	179° 53.9′W	29 Jul 05	1903	130	12	5643	1002
281	3° 59.8′S	179° 54.1′W	31 Jul 05	623	90	11	5924	1001
291	3° 0.0′S	179° 53.9′W	31 Jul 05	1255	70	12	5396	1010
301	2° 29.9′S	179° 53.4′W	31 Jul 05	1652	86	15	5421	1001
311	1° 59.0′S	179° 52.7′W	31 Jul 05	2054	76	14	5353	1004
321	1° 30.0′S	179° 53.8′W	1 Aug 05	117	95	14	5228	1008
331	0° 59.7′S	179° 54.2′W	1 Aug 05	532	85	12	5354	1004
341	0° 30.0′S	179° 54.5′W	1 Aug 05	947	87	13	4705	1004
351	0° 1.3′N	179° 56.3′W	1 Aug 05	1515	104	7	4193	5001
361	0° 30.2′N	179° 53.3′W	2 Aug 05	904	90	12	5693	1003
371	1° 0.0′N	179° 50.5′W	2 Aug 05	1251	94	13	5744	1004
381	1° 30.1′N	179° 49.0′W	2 Aug 05	1641	98	14	5558	1002
391	2° 1.8′N	179° 50.8′W	3 Aug 05	458	117	11	4532	1002
401	2° 30.4′N	179° 48.4′W	3 Aug 05	905	115	11	5288	1002
411	3° 0.3′N	179° 48.2′W	3 Aug 05	1243	143	17	5644	1000
421	4° 0.3′N	179° 51.5′W	3 Aug 05	1902	360	2	5727	1002
431	5° 0.4′N	179° 52.9′W	4 Aug 05	204	128	2	5657	1001
441	5° 59.8′N	179° 54.1′W	4 Aug 05	825	24	5	5419	1004
451	7° 0.2′N	179° 54.2′W	4 Aug 05	1503	88	6	5752	1003
461	8° 1.6′N	179° 51.7′W	5 Aug 05	751	90	10	5905	5503
471	9° 0.4′N	178° 22.8′W	5 Aug 05	2057	82	13	5908	1002
481	10° 0.4′N	176° 53.3′W	6 Aug 05	847	87	20	6033	1002
491	11° 0.4′N	175° 21.7′W	6 Aug 05	2103	58	13	5427	1003
501	12° 0.4′N	173° 49.4′W	7 Aug 05	924	69	17	5555	1004

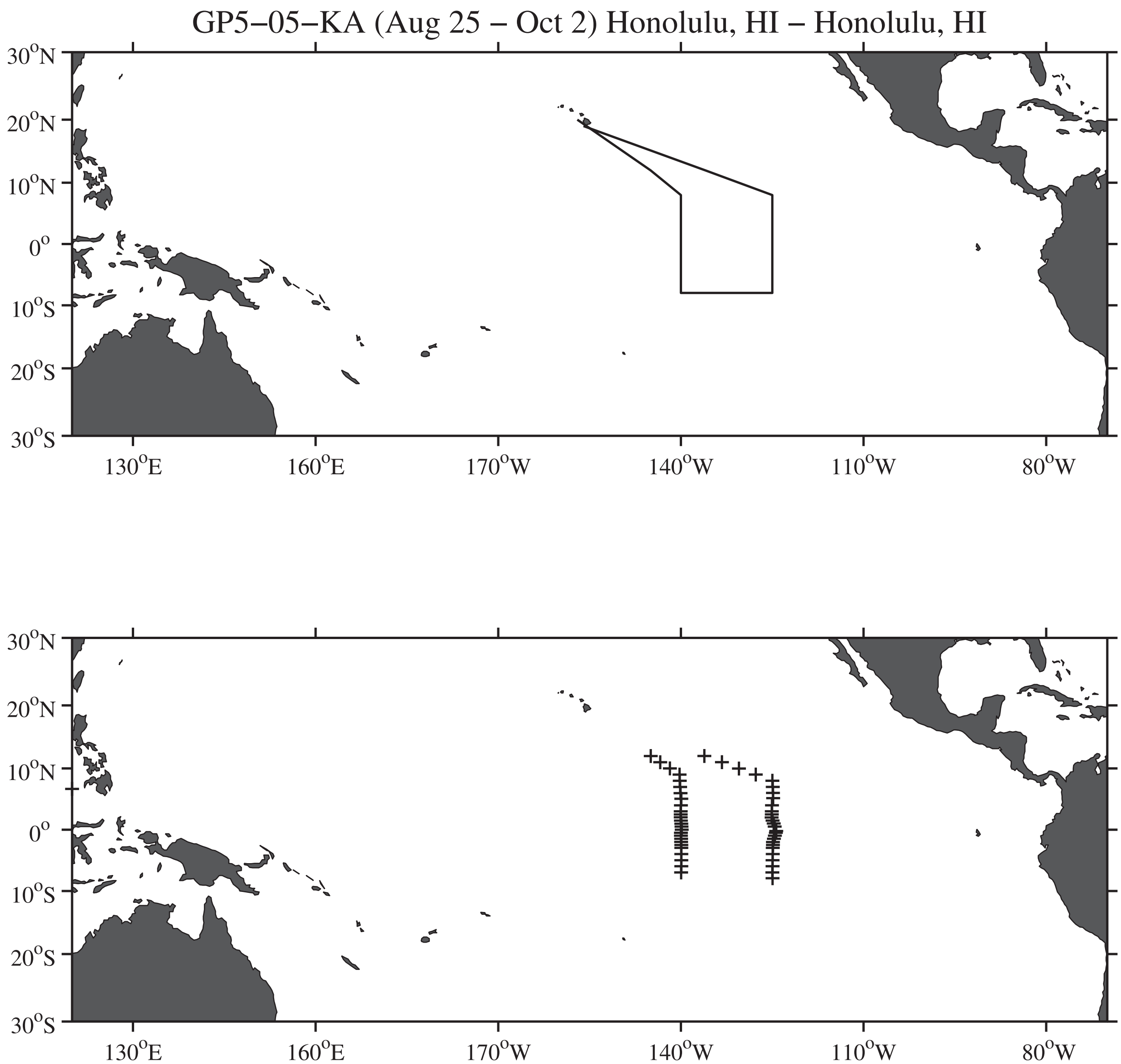


Figure 2e: GP5-05-KA cruise track and station locations.

Table 1e: GP5-05-KA CTD Cast Summary.

Cast #	Latitude	Longitude	Date	Time	W/D T	W/S (kts)	Depth (m)	Cast (db)
11	12° 0.1′N	136° 9.4′W	31 Aug 05	1516	147	2	4990	1001
21	11° 0.1′N	133° 17.1′W	1 Sep 05	859	120	5	4933	1002
31	9° 59.4′N	130° 28.0′W	2 Sep 05	226	4	2	4842	1002
41	8° 59.6′N	127° 42.6′W	2 Sep 05	1919	36	2	4650	1004
51	8° 1.1′N	124° 58.6′W	3 Sep 05	1317	192	11	4329	4204
61	7° 0.2′N	124° 56.5′W	4 Sep 05	748	202	16	4555	1005
71	6° 0.5′N	124° 54.0′W	4 Sep 05	1526	172	16	4422	1001
81	5° 9.4′N	124° 51.7′W	5 Sep 05	519	164	20	4399	1001
91	3° 59.2′N	125° 3.0′W	5 Sep 05	1528	150	13	4452	1003
101	3° 0.2′N	125° 5.0′W	5 Sep 05	2347	132	18	4487	1002
111	2° 30.5′N	125° 5.8′W	6 Sep 05	427	123	20	4356	1003
121	2° 0.6′N	125° 6.3′W	6 Sep 05	912	130	16	4176	1002
131	1° 30.3′N	124° 56.7′W	6 Sep 05	1436	119	15	4665	1002
141	1° 0.5′N	124° 46.6′W	6 Sep 05	1921	106	15	4633	1003
151	0° 30.2′N	124° 36.2′W	7 Sep 05	26	111	14	2586	1003
161	0° 12.4′S	124° 21.2′W	7 Sep 05	805	78	5	4669	4105
171	0° 29.9′S	124° 25.8′W	7 Sep 05	1229	71	12	4569	1004
181	0° 59.7′S	124° 34.9′W	7 Sep 05	1657	73	7	3974	1002
191	1° 29.5′S	124° 44.0′W	7 Sep 05	2155	69	12	4569	1002
201	2° 1.0′S	124° 54.0′W	8 Sep 05	325	85	13	4751	1004
211	2° 29.5′S	124° 54.4′W	8 Sep 05	744	97	12	4578	1002
221	2° 59.8′S	124° 54.7′W	8 Sep 05	1204	65	14	4628	1006
231	3° 59.8′S	124° 56.3′W	8 Sep 05	2049	96	16	4478	1002
241	5° 0.6′S	124° 57.7′W	9 Sep 05	513	115	21	4512	1004
251	5° 59.7′S	124° 57.1′W	9 Sep 05	1256	126	24	4510	1004
261	6° 59.2′S	124° 58.9′W	9 Sep 05	2118	107	20	4575	1002
271	7° 57.3′S	124° 58.3′W	10 Sep 05	600	122	22	4490	4201
281	6° 59.8′S	139° 57.8′W	19 Sep 05	918	112	6	4181	3904
291	6° 0.0′S	139° 56.5′W	19 Sep 05	1708	77	10	4201	1003
301	5° 0.4′S	139° 56.4′W	19 Sep 05	2357	99	12	4256	1002
311	3° 59.9′S	139° 56.0′W	20 Sep 05	656	107	16	4507	1003
321	2° 59.8′S	139° 56.8′W	20 Sep 05	1316	119	14	4327	1003
331	2° 29.9′S	139° 57.0′W	20 Sep 05	1700	120	15	4379	1003
341	2° 0.5′S	139° 58.4′W	21 Sep 05	330	114	14	4277	1002
351	1° 29.8′S	139° 58.5′W	21 Sep 05	739	115	14	4292	1002
361	0° 59.6′S	139° 59.7′W	21 Sep 05	1117	131	16	4265	1002
371	0° 29.7′S	140° 1.0′W	21 Sep 05	1504	136	13	4286	1002
381	0° 0.5′N	139° 52.8′W	22 Sep 05	530	118	16	4348	4103
391	0° 30.1′N	139° 55.1′W	23 Sep 05	630	136	10	4343	1002
401	0° 59.9′N	139° 57.3′W	23 Sep 05	1053	118	14	4312	1002
411	1° 30.2′N	139° 59.4′W	23 Sep 05	1529	108	13	4475	1003
421	2° 1.4′N	140° 2.0′W	24 Sep 05	533	135	12	4371	1003
431	2° 30.0′N	140° 1.6′W	24 Sep 05	1012	143	10	4380	1001
441	3° 0.1′N	140° 1.2′W	24 Sep 05	1427	157	9	4301	1002
451	3° 59.8′N	140° 0.0′W	24 Sep 05	2212	97	6	4343	1002
461	5° 3.8′N	139° 57.3′W	25 Sep 05	911	156	6	4452	4204
471	6° 0.1′N	140° 4.0′W	26 Sep 05	124	229	2	4768	1002
481	7° 0.2′N	140° 7.8′W	26 Sep 05	809	151	3	4981	1002
491	7° 59.9′N	140° 11.7′W	26 Sep 05	1505	146	9	5193	1001
501	8° 59.8′N	140° 13.7′W	27 Sep 05	602	176	13	4811	4004
511	9° 59.8′N	141° 49.1′W	27 Sep 05	1929	191	12	5029	1005
521	10° 59.7′N	143° 23.1′W	28 Sep 05	713	216	8	5086	1017
531	11° 59.8′N	144° 56.9′W	28 Sep 05	1838	297	2	4978	1002

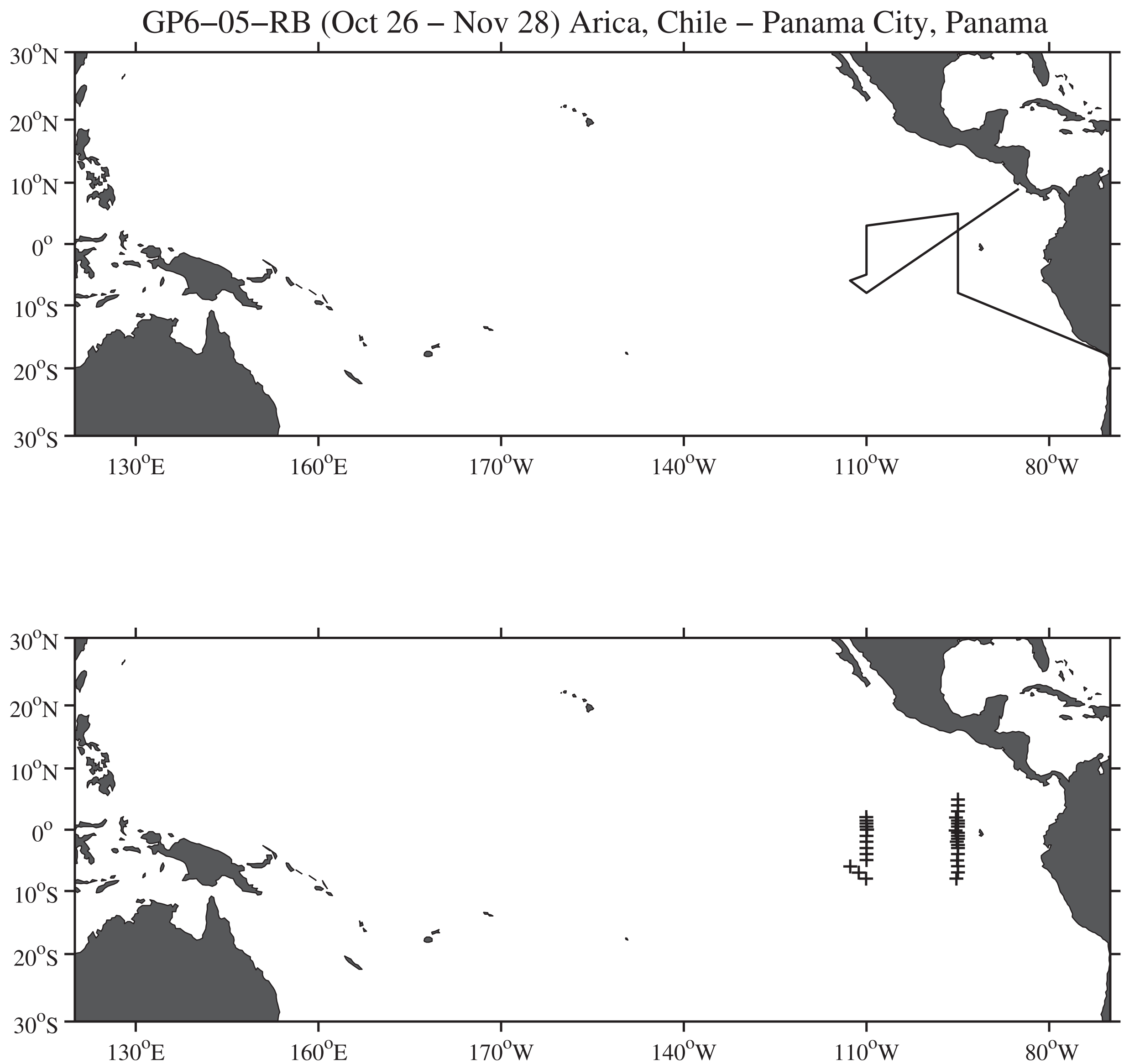


Figure 2f: GP6-05-RB cruise track and station locations.

Table 1f: GP6-05-RB CTD Cast Summary.

Cast #	Latitude	Longitude	Date	Time	W/D T	W/S (kts)	Depth (m)	Cast (db)
11	8° 0.3′S	95° 15.3′W	31 Oct 05	2148	134	12	3983	1002
21	7° 0.0′S	95° 0.0′W	1 Nov 05	500	130	14	3995	1000
31	5° 59.9′S	95° 0.0′W	1 Nov 05	600	140	12	3839	1006
41	5° 2.7′S	95° 7.0′W	1 Nov 05	1700	130	14	3852	1002
51	4° 0.0′S	95° 0.1′W	1 Nov 05	2356	150	16	3695	1002
61	3° 0.0′S	95° 0.0′W	2 Nov 05	613	140	12	3555	1002
71	2° 30.0′S	95° 0.1′W	2 Nov 05	1011	140	12	2737	1001
81	1° 58.4′S	95° 11.1′W	2 Nov 05	1730	140	10	3441	1001
91	1° 30.0′S	95° 0.0′W	2 Nov 05	2152	150	11	3349	1002
101	1° 0.0′S	95° 0.0′W	2 Nov 05	155	150	9	3326	1001
111	0° 29.9′S	95° 0.0′W	2 Nov 05	554	170	10	3402	1002
121	0° 8.2′S	95° 22.8′W	3 Nov 05	1040	160	8	3321	3003
131	0° 30.0′N	95° 0.0′W	3 Nov 05	323	170	8	3291	1001
141	1° 0.0′N	95° 0.0′W	4 Nov 05	658	170	20	3519	1002
151	1° 30.0′N	95° 0.0′W	4 Nov 05	1100	180	17	2840	1002
161	2° 0.1′N	95° 18.6′W	5 Nov 05	6	180	18	2993	1000
171	3° 0.1′N	94° 59.9′W	5 Nov 05	644	190	16	2736	1001
181	4° 0.1′N	95° 0.0′W	5 Nov 05	1247	190	15	3405	1001
191	4° 57.4′N	94° 59.3′W	6 Nov 05	230	200	13	3556	1002
201	2° 3.8′N	110° 2.9′W	14 Nov 05	1653	140	13	3732	1002
211	1° 30.1′N	110° 0.0′W	14 Nov 05	2209	140	14	3780	1001
221	1° 0.2′N	110° 0.3′W	15 Nov 05	241	130	11	3817	1002
231	0° 30.1′N	110° 0.1′W	15 Nov 05	724	120	13	3804	1000
241	0° 0.1′N	109° 58.1′W	15 Nov 05	1217	130	13	3822	3001
242	0° 2.6′N	109° 55.3′W	16 Nov 05	327	110	2	3817	1002
251	1° 0.1′S	110° 0.0′W	16 Nov 05	1015	110	12	3977	1002
261	1° 58.6′S	109° 59.8′W	17 Nov 05	38	110	15	3906	1001
271	3° 0.0′S	110° 0.1′W	17 Nov 05	731	120	15	3771	1005
281	4° 0.0′S	110° 0.0′W	17 Nov 05	1330	140	18	3826	1001
291	4° 59.4′S	109° 59.7′W	17 Nov 05	2256	140	16	3615	1002
301	6° 0.9′S	112° 40.1′W	19 Nov 05	1621	120	13	4096	1001
311	7° 1.0′S	111° 17.5′W	20 Nov 05	213	100	13	3761	1002
321	7° 59.7′S	110° 4.0′W	20 Nov 05	2134	100	13	3424	1002

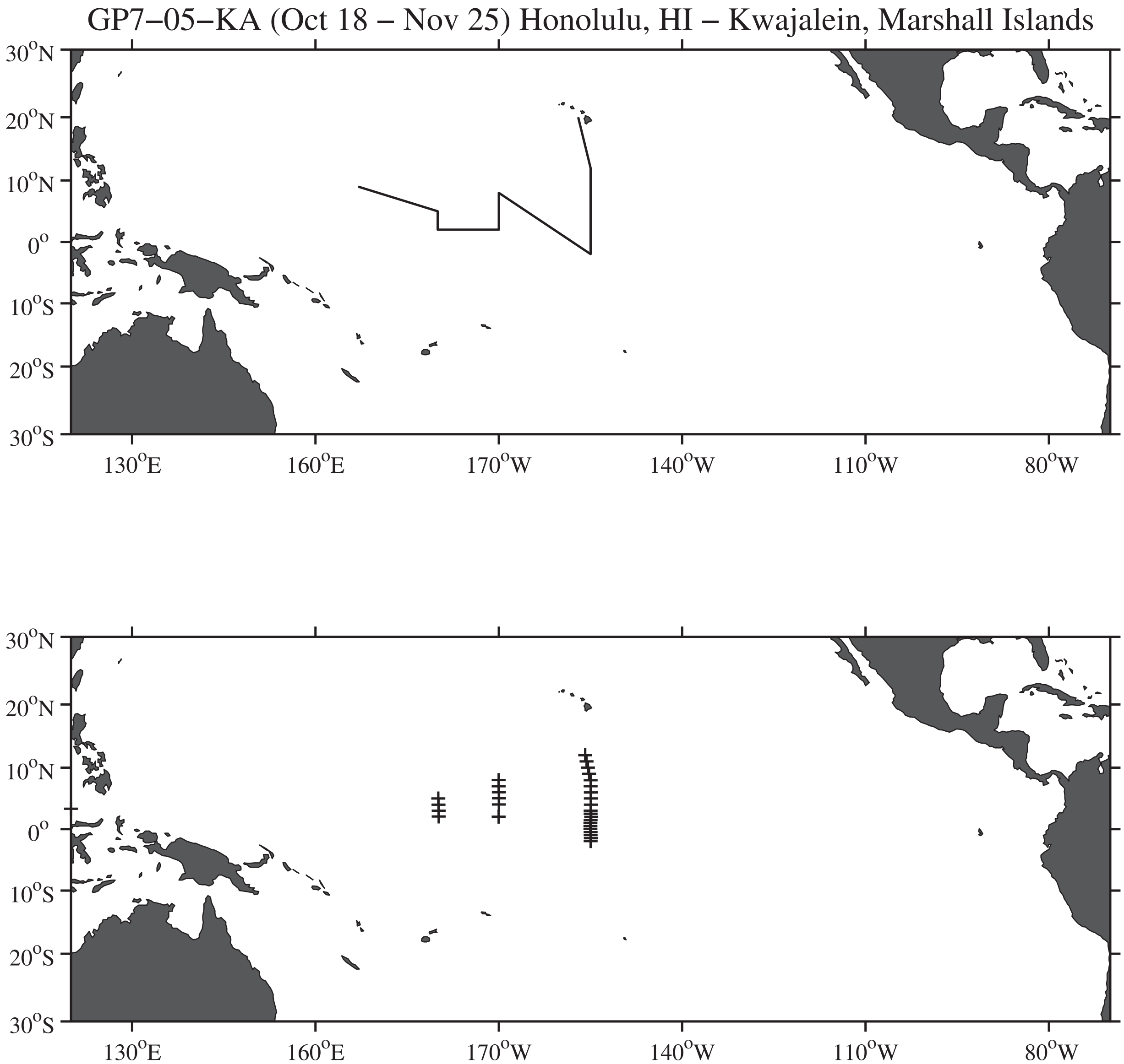


Figure 2g: GP7-05-KA cruise track and station locations.

Table 1g: GP7-05-KA CTD Cast Summary.

Cast #	Latitude		Longitude		Date	Time	W/D T	W/S (kts)	Depth (m)	Cast (db)
11	12°	0.2′N	155°	52.9′W	21 Oct 05	831	100	12	5185	1004
21	11°	0.8′N	155°	39.7′W	21 Oct 05	1546	68	18	5173	1010
31	10°	0.5′N	155°	26.3′W	21 Oct 05	2221	50	20	5304	118
41	9°	0.8′N	155°	13.7′W	22 Oct 05	547	57	17	4895	1001
51	7°	57.8′N	154°	58.8′W	22 Oct 05	1529	55	14	5205	4005
61	7°	0.0′N	154°	58.3′W	23 Oct 05	820	167	7	4664	1003
71	6°	0.0′N	154°	57.5′W	23 Oct 05	1525	181	12	4828	1001
81	5°	0.8′N	154°	56.4′W	24 Oct 05	340	147	11	4583	1000
91	4°	0.6′N	154°	57.2′W	24 Oct 05	1100	97	10	4696	1002
101	3°	0.3′N	154°	58.6′W	24 Oct 05	1755	113	12	4715	1002
111	2°	30.4′N	154°	59.4′W	24 Oct 05	2200	126	10	4828	1002
121	2°	0.7′N	154°	53.1′W	25 Oct 05	1604	112	12	4485	1003
131	1°	30.4′N	154°	59.8′W	26 Oct 05	153	80	10	4636	1001
141	1°	0.5′N	155°	0.2′W	26 Oct 05	605	122	19	4752	1001
151	0°	30.5′N	155°	0.4′W	26 Oct 05	1038	109	3	4602	1001
161	0°	2.4′N	155°	0.3′W	26 Oct 05	1532	126	5	4664	4304
171	0°	29.9′S	154°	59.5′W	26 Oct 05	2259	115	6	4882	1002
181	0°	59.9′S	154°	59.1′W	27 Oct 05	413	130	4	4737	1002
191	1°	29.5′S	154°	58.1′W	27 Oct 05	837	111	13	4869	1003
201	1°	58.2′S	154°	58.9′W	27 Oct 05	1552	127	19	4863	1006
211	8°	0.9′N	170°	1.8′W	16 Nov 05	959	115	11	5527	4701
221	7°	0.0′N	170°	1.0′W	17 Nov 05	514	34	6	5860	1002
231	6°	0.4′N	169°	59.1′W	17 Nov 05	1147	62	17	5158	1002
241	5°	2.0′N	169°	58.0′W	17 Nov 05	1815	32	16	5749	1002
251	4°	0.8′N	169°	59.7′W	18 Nov 05	129	68	13	5527	1002
261	2°	1.8′N	170°	2.1′W	18 Nov 05	2140	131	17	5385	1003
271	2°	3.0′N	179°	49.5′W	21 Nov 05	1735	103	20	5457	1005
281	3°	0.3′N	179°	51.0′W	22 Nov 05	220	113	10	5613	1002
291	4°	0.0′N	179°	52.4′W	22 Nov 05	903	85	8		1002
301	4°	59.8′N	179°	54.8′W	22 Nov 05	1654	134	9	5670	1002

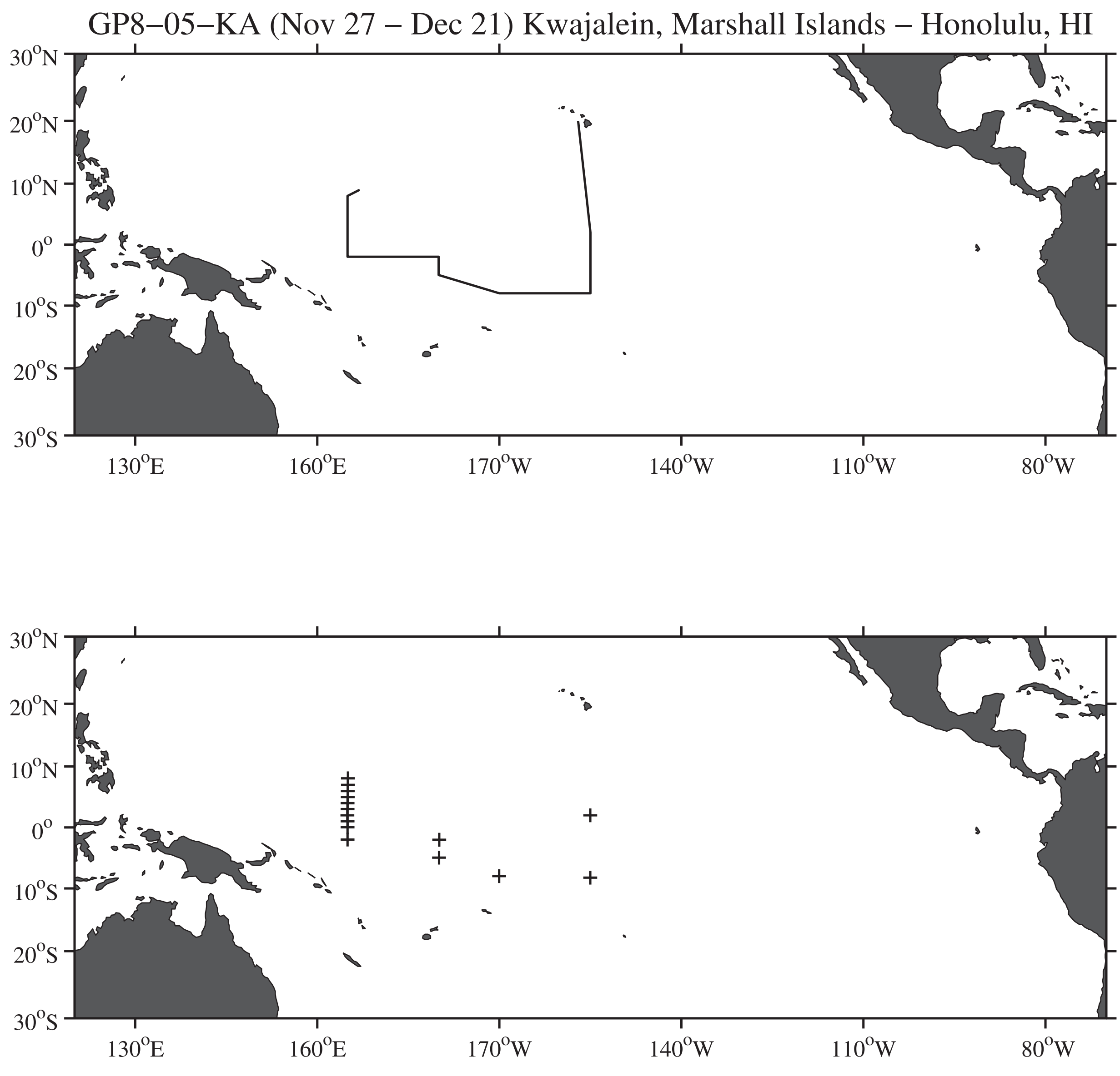


Figure 2h: GP8-05-KA cruise track and station locations.

Table 1h: GP8-05-KA CTD Cast Summary.

Cast #	Latitude	Longitude	Date	Time	W/D T	W/S (kts)	Depth (m)	Cast (db)
11	8° 3.4′N	165° 4.1′E	27 Nov 05	1943	108	16	5222	1006
21	7° 0.7′N	165° 3.3′E	28 Nov 05	342	110	4	5171	1001
31	6° 0.0′N	165° 1.3′E	28 Nov 05	1127	57	8	5008	1002
41	5° 1.2′N	165° 0.8′E	29 Nov 05	228	11	3	4775	1004
51	4° 0.0′N	164° 59.7′E	29 Nov 05	924	94	5	4492	1002
61	3° 0.2′N	164° 58.8′E	29 Nov 05	1543	160	4	4210	1002
71	2° 0.6′N	164° 58.4′E	29 Nov 05	2221	132	9	4170	1003
81	1° 0.4′N	164° 59.5′E	30 Nov 05	533	133	5	4331	1002
91	0° 2.5′N	164° 58.8′E	30 Nov 05	1332	130	3	4404	4101
101	1° 59.9′S	165° 0.0′E	1 Dec 05	1733	262	0	4467	3003
111	2° 1.2′S	179° 54.4′W	6 Dec 05	204	66	14	5236	1002
121	4° 58.7′S	179° 55.8′W	6 Dec 05	1919	74	13	5601	1003
131	8° 0.5′S	170° 1.5′W	9 Dec 05	1346	334	18	5374	5003
141	8° 16.2′S	155° 0.9′W	14 Dec 05	59	42	15	5332	1005
151	1° 59.8′N	155° 0.4′W	16 Dec 05	1423	101	14	4702	1002

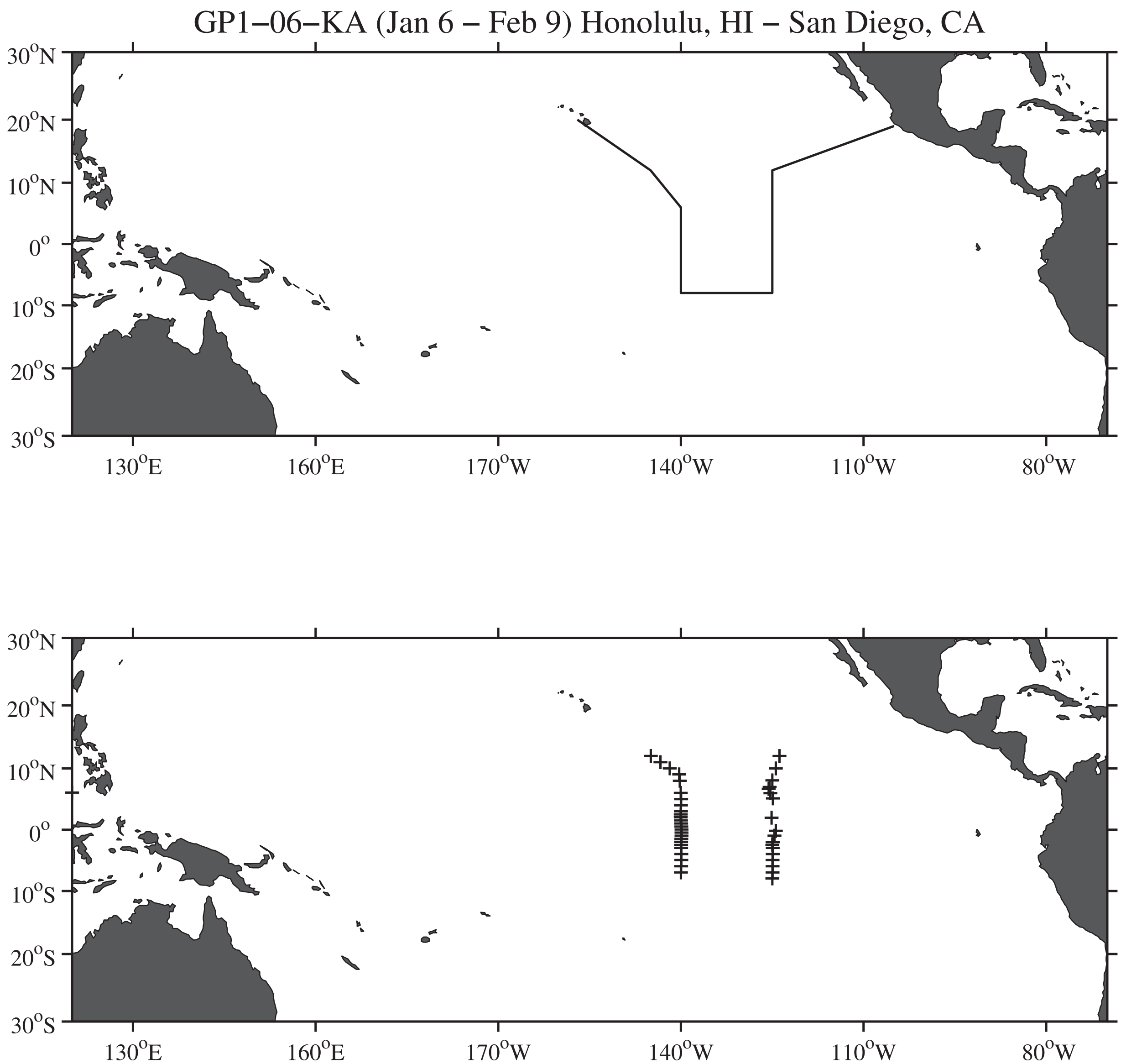


Figure 2i: GP1-06-KA cruise track and station locations.

Table 1i: GP1-06-KA CTD Cast Summary.

Cast #	Latitude	Longitude	Date	Time	W/D T	W/S (kts)	Depth (m)	Cast (db)
11	12° 0.9′N	144° 57.2′W	11 Jan 06	1447	98	27	5110	1001
21	11° 0.5′N	143° 22.4′W	12 Jan 06	441	31	19	5049	1001
31	10° 1.3′N	141° 49.8′W	12 Jan 06	1824	49	24	5186	1004
41	9° 2.6′N	140° 17.2′W	13 Jan 06	901	40	18	4980	3004
51	8° 0.4′N	140° 10.9′W	13 Jan 06	1830	31	5	5132	1003
61	6° 0.3′N	140° 2.7′W	14 Jan 06	712	91	14	4813	1002
71	5° 0.6′N	139° 57.9′W	14 Jan 06	1406	152	8	4476	1002
81	4° 0.1′N	139° 59.2′W	15 Jan 06	722	130	8	4341	1007
91	3° 0.2′N	140° 0.3′W	15 Jan 06	1408	135	9	4306	1004
101	2° 30.4′N	140° 1.2′W	15 Jan 06	1818	139	4	4388	1004
111	2° 1.5′N	140° 1.9′W	15 Jan 06	2233	133	18	4376	1002
121	1° 30.5′N	139° 59.7′W	16 Jan 06	305	117	18	4467	1016
131	1° 0.3′N	139° 57.7′W	16 Jan 06	703	119	12	4319	1000
141	0° 30.2′N	139° 55.6′W	16 Jan 06	1111	141	13	4350	1002
151	0° 1.5′N	139° 54.6′W	17 Jan 06	312	85	13	4356	3003
161	0° 28.9′S	139° 54.8′W	17 Jan 06	827	89	11	4288	1003
171	0° 59.6′S	139° 55.3′W	17 Jan 06	1235	89	15	4222	1003
181	1° 29.8′S	139° 56.7′W	17 Jan 06	1641	100	13	4344	1001
191	2° 0.0′S	139° 57.7′W	17 Jan 06	2042	102	12	4323	1002
201	2° 29.5′S	139° 57.8′W	18 Jan 06	56	110	15	4367	1003
211	2° 59.5′S	139° 57.6′W	18 Jan 06	449	113	17	4384	1002
221	3° 59.6′S	139° 56.3′W	18 Jan 06	1158	100	14	4513	1002
231	4° 57.9′S	139° 56.0′W	19 Jan 06	243	113	14	4313	4103
241	5° 59.6′S	139° 57.4′W	19 Jan 06	1116	79	22	4197	1005
251	6° 59.5′S	139° 59.6′W	19 Jan 06	1832	123	20	4187	1002
261	7° 57.9′S	125° 0.2′W	26 Jan 06	1240	114	5	4573	3003
271	7° 0.0′S	124° 58.0′W	27 Jan 06	555	128	13	4464	1002
281	5° 59.9′S	124° 56.8′W	27 Jan 06	1327	115	10	4491	1002
291	4° 59.0′S	124° 56.8′W	28 Jan 06	401	116	13	4539	1002
301	3° 59.9′S	124° 55.6′W	28 Jan 06	1151	84	12	4515	1002
311	2° 59.9′S	124° 54.8′W	28 Jan 06	1935	99	12	4646	1003
321	2° 30.6′S	124° 58.8′W	29 Jan 06	315	105	12	4599	1002
331	2° 2.0′S	124° 56.7′W	29 Jan 06	1125	125	4	4702	4403
332	2° 1.7′S	124° 56.0′W	29 Jan 06	2346	28	4	4640	1005
341	0° 59.9′S	124° 38.7′W	30 Jan 06	942	97	7	4667	1002
351	0° 10.7′S	124° 25.7′W	31 Jan 06	413	107	7	4549	1001
361	1° 58.7′N	125° 6.7′W	1 Feb 06	439	128	7	4743	1001
371	5° 8.2′N	124° 53.0′W	2 Feb 06	535	88	10	4397	1003
381	6° 0.0′N	125° 18.8′W	2 Feb 06	1235	73	12	4291	1011
391	6° 40.9′N	125° 35.6′W	2 Feb 06	1819	61	16	4511	1001
401	6° 59.9′N	125° 26.2′W	3 Feb 06	20	353	5	4579	1006
411	8° 3.5′N	124° 58.7′W	3 Feb 06	1011	41	9	4564	4320
421	10° 0.0′N	124° 24.2′W	4 Feb 06	48	59	16	4633	1002
431	12° 0.0′N	123° 49.0′W	4 Feb 06	1408	67	13	4608	1002

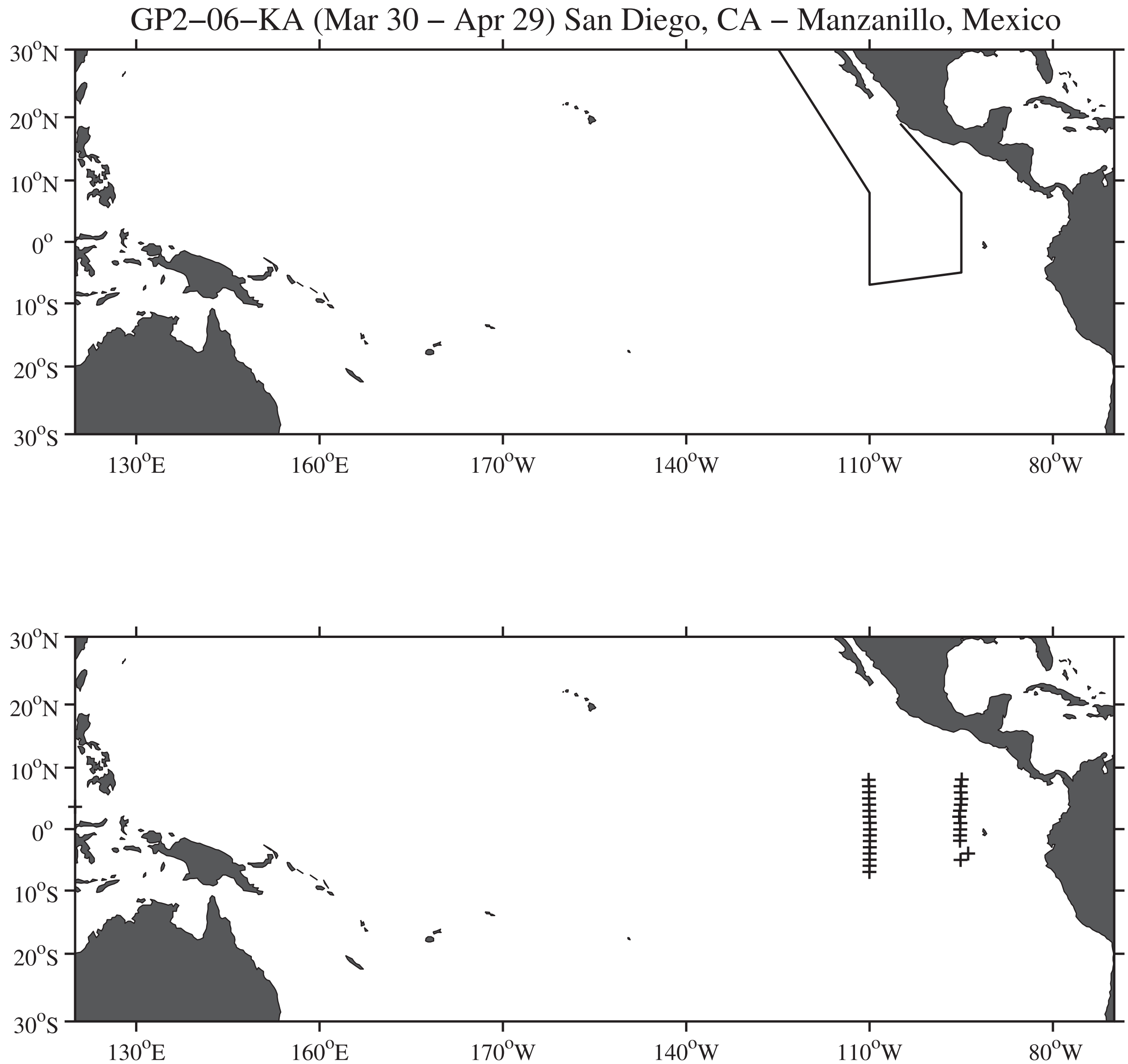
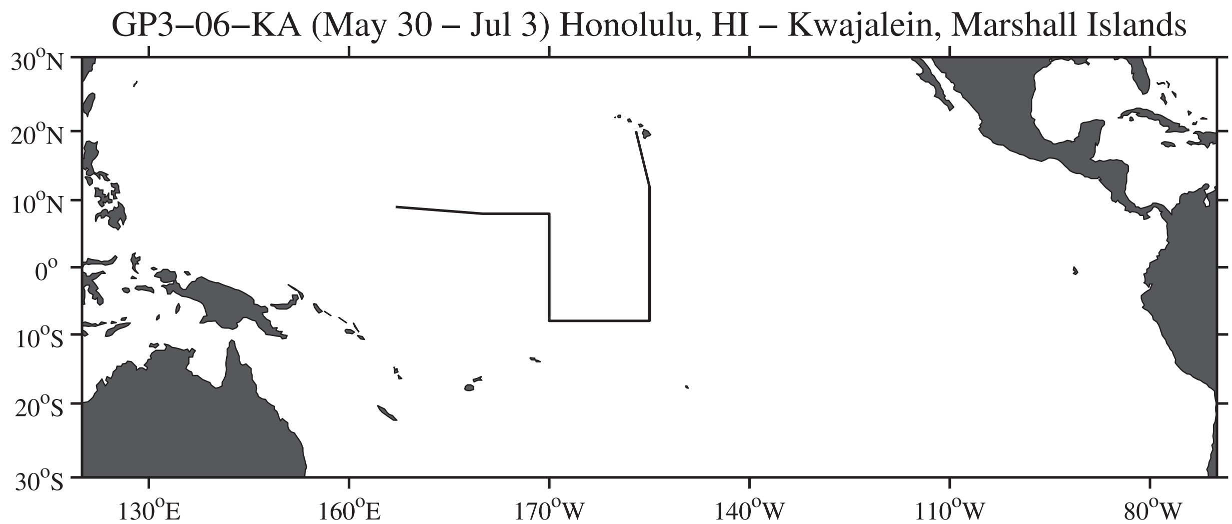


Figure 2j: GP2-06-KA cruise track and station locations.

Table 1j: GP2-06-KA CTD Cast Summary.

Cast #	Latitude	Longitude	Date	Time	W/D T	W/S (kts)	Depth (m)	Cast (db)
11	8° 3.0′N	110° 10.3′W	8 Apr 06	955	106	4	4269	3004
12	8° 3.0′N	110° 10.3′W	8 Apr 06	955	106	4	4269	2001
21	7° 0.5′N	110° 7.0′W	9 Apr 06	410	52	7	3680	1001
31	6° 0.3′N	110° 6.0′W	9 Apr 06	1059	41	9	3819	1002
41	5° 0.5′N	110° 6.5′W	10 Apr 06	33	78	9	3916	1004
51	4° 0.4′N	110° 3.6′W	10 Apr 06	730	86	6	3903	1003
61	2° 59.9′N	110° 2.0′W	10 Apr 06	1429	166	12	3866	1002
71	2° 2.6′N	110° 1.8′W	10 Apr 06	2310	184	6	3763	1002
81	1° 0.7′N	109° 57.7′W	11 Apr 06	633	33	2	3785	1003
91	0° 3.1′S	109° 56.5′W	11 Apr 06	1340	274	3	3807	1001
101	1° 0.2′S	109° 58.2′W	12 Apr 06	1327	221	1	3940	1002
111	1° 58.1′S	109° 59.5′W	12 Apr 06	2027	100	4	3909	1003
121	2° 59.5′S	109° 59.4′W	13 Apr 06	422	113	8	3818	1002
131	4° 0.0′S	110° 0.3′W	13 Apr 06	1116	96	4	3680	1001
141	5° 0.0′S	109° 59.6′W	13 Apr 06	1811	96	6	3615	1004
151	5° 59.4′S	110° 1.3′W	14 Apr 06	106	121	11	3425	1001
161	6° 59.6′S	110° 2.4′W	14 Apr 06	820	131	21	3580	1003
171	5° 2.9′S	95° 7.0′W	18 Apr 06	1142	121	7	3869	3002
181	4° 0.0′S	93° 53.8′W	19 Apr 06	709	145	9	3627	1002
191	1° 55.1′S	95° 13.2′W	21 Apr 06	1947	129	4	2870	1000
201	1° 0.8′S	95° 13.4′W	22 Apr 06	304	94	7	2848	1002
211	0° 3.4′S	95° 11.2′W	22 Apr 06	1145	107	5	3357	3001
221	0° 59.5′N	95° 8.5′W	23 Apr 06	556	170	9	3463	1002
231	2° 1.1′N	95° 21.6′W	23 Apr 06	1545	185	4	2898	1002
241	3° 0.1′N	95° 13.8′W	23 Apr 06	2305	229	2	2712	1001
251	4° 0.2′N	95° 6.1′W	24 Apr 06	549	200	3	3460	1003
261	4° 57.0′N	95° 0.2′W	24 Apr 06	1249	198	4	3503	1002
271	5° 59.9′N	95° 4.5′W	25 Apr 06	40	250	5	3710	1002
281	6° 59.2′N	95° 8.3′W	25 Apr 06	733	245	3	3651	1001
291	8° 5.3′N	94° 55.7′W	25 Apr 06	2352	212	13	3627	3002



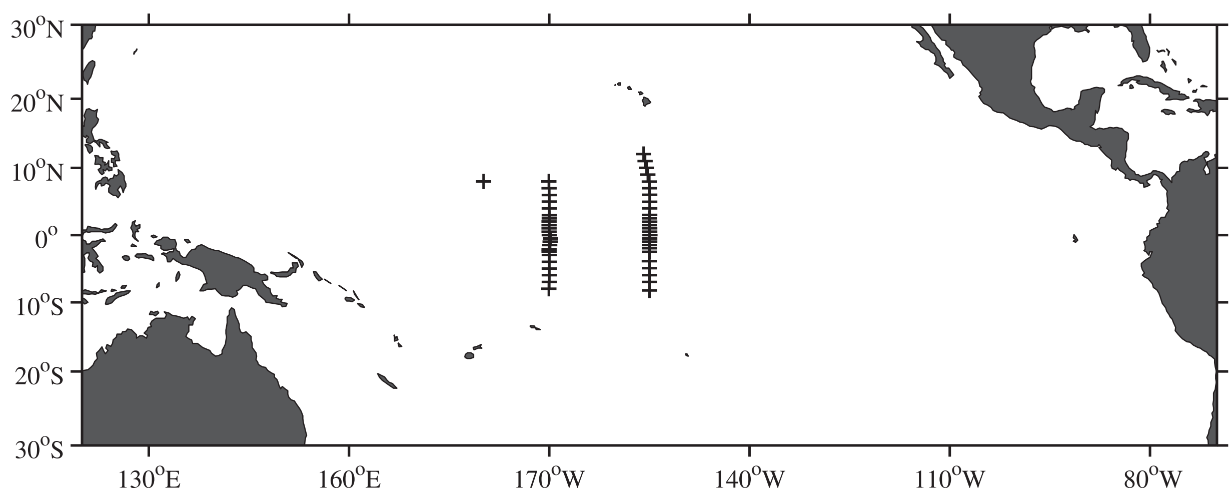


Figure 2k: GP3-06-KA cruise track and station locations.

Table 1k: GP3-06-KA CTD Cast Summary.

Cast #	Latitude	Longitude	Date	Time	W/D T	W/S (kts)	Depth (m)	Cast (db)
11	12° 1.2′N	155° 51.9′W	2 Jun 06	625	71	19	5211	1003
21	11° 0.9′N	155° 39.2′W	2 Jun 06	1355	52	21	5191	1011
31	10° 0.5′N	155° 26.1′W	2 Jun 06	2109	140	13	5328	1003
41	9° 0.5′N	155° 13.6′W	3 Jun 06	503	57	18	5274	1011
51	7° 59.3′N	155° 1.8′W	3 Jun 06	1358	77	14	5202	3000
61	7° 0.6′N	154° 58.8′W	3 Jun 06	2300	46	9	4564	1003
71	6° 0.3′N	154° 57.0′W	4 Jun 06	631	67	12	4828	1002
81	4° 58.7′N	154° 56.4′W	4 Jun 06	1428	63	15	4596	1005
91	3° 59.5′N	154° 56.2′W	5 Jun 06	716	55	7	4709	1003
101	3° 0.3′N	154° 58.0′W	5 Jun 06	1350	150	12	4756	1003
111	2° 29.9′N	154° 58.4′W	5 Jun 06	1738	151	10	4835	1002
121	1° 59.2′N	154° 57.8′W	5 Jun 06	2130	146	10	4658	1002
131	1° 30.3′N	154° 58.6′W	6 Jun 06	206	150	8	4643	1001
141	1° 0.5′N	154° 58.1′W	6 Jun 06	558	110	11	4760	1001
151	0° 30.4′N	154° 57.2′W	6 Jun 06	1013	150	10	4733	1001
161	0° 0.0′S	154° 56.0′W	6 Jun 06	1450	111	9	4640	3029
171	0° 29.7′S	154° 57.4′W	7 Jun 06	629	128	16	4882	1001
181	0° 59.6′S	154° 57.4′W	7 Jun 06	1024	112	14	4740	1000
191	1° 29.9′S	154° 59.4′W	7 Jun 06	1431	103	16	4838	1000
201	1° 57.9′S	155° 0.0′W	7 Jun 06	1827	106	17	4990	1002
211	2° 29.5′S	154° 59.8′W	7 Jun 06	2238	98	14	4866	1003
221	3° 54.7′S	155° 0.7′W	8 Jun 06	912	83	14	3126	1002
231	4° 57.3′S	154° 58.8′W	8 Jun 06	1627	94	20	5094	1002
241	5° 59.5′S	154° 58.2′W	9 Jun 06	1121	149	15	5150	1002
251	6° 59.3′S	154° 59.8′W	9 Jun 06	1813	84	17	5214	1002
262	8° 14.8′S	154° 59.7′W	10 Jun 06	401	107	15	5324	3001
271	8° 0.0′S	170° 2.9′W	19 Jun 06	1523	94	6	5388	4005
281	7° 0.0′S	170° 0.4′W	20 Jun 06	228	125	6	4737	1006
291	6° 0.2′S	170° 0.3′W	20 Jun 06	947	135	14	4800	1001
301	4° 59.8′S	170° 0.7′W	20 Jun 06	1717	122	12	5427	1003
311	4° 0.1′S	170° 0.0′W	21 Jun 06	807	112	17	5582	1002
321	2° 59.6′S	170° 0.7′W	21 Jun 06	1505	79	19	5065	1002
331	2° 30.3′S	170° 0.9′W	21 Jun 06	1904	74	17	5585	1000
341	2° 9.4′S	170° 2.0′W	22 Jun 06	523	69	20	4949	1001
351	1° 30.2′S	169° 55.8′W	22 Jun 06	1046	74	15	5122	1001
361	0° 59.7′S	169° 52.0′W	22 Jun 06	1434	68	16	5160	1002
371	0° 29.7′S	169° 48.3′W	22 Jun 06	1835	73	17	5141	1001
381	0° 0.0′S	169° 59.8′W	23 Jun 06	1036	114	13	5306	4701
391	0° 30.0′N	170° 1.4′W	24 Jun 06	1331	91	15	5410	1001
401	1° 0.2′N	170° 1.6′W	24 Jun 06	1718	106	13	5452	1003
411	1° 30.0′N	170° 1.4′W	24 Jun 06	2106	98	15	5505	1003
421	2° 1.8′N	170° 1.5′W	25 Jun 06	650	99	14	5392	3002
431	2° 30.3′N	170° 0.5′W	26 Jun 06	112	112	16	5341	1002
441	2° 59.1′N	170° 0.2′W	26 Jun 06	437	101	13	5458	1002
451	4° 0.2′N	169° 59.5′W	26 Jun 06	1124	88	19	5837	1001
461	5° 0.8′N	170° 0.2′W	26 Jun 06	1832	92	23	5097	1002
471	5° 59.8′N	170° 0.8′W	27 Jun 06	940	74	19	5554	1001
481	7° 0.1′N	170° 2.0′W	27 Jun 06	1622	91	14	5833	1003
491	8° 0.8′N	170° 3.5′W	28 Jun 06	117	73	19	5258	3003
501	8° 0.8′N	179° 50.6′W	30 Jun 06	1051	62	19	5917	1001

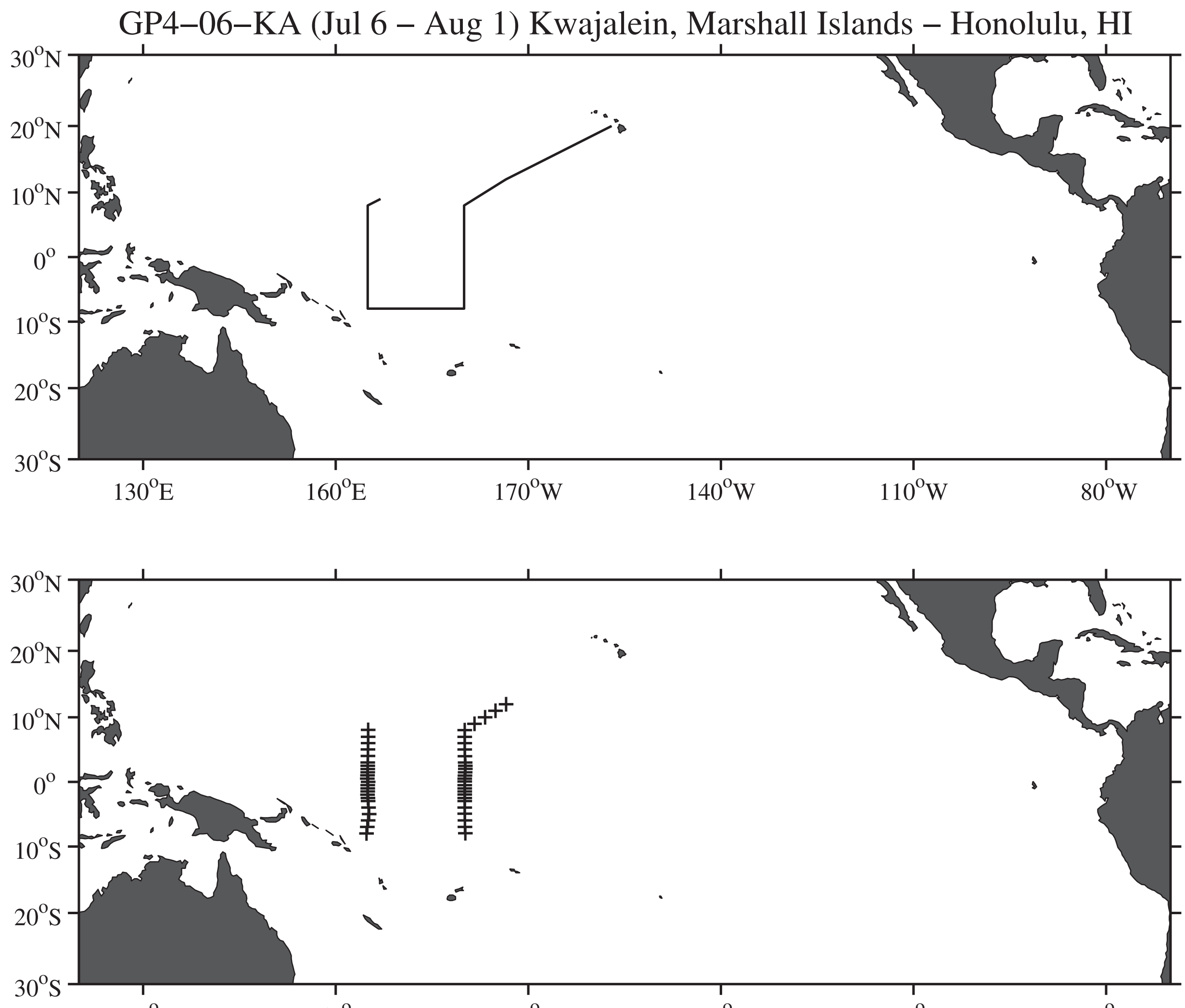


Figure 2l: GP4-06-KA cruise track and station locations.

Table 1l: GP4-06-KA CTD Cast Summary.

Cast #	Latitude		Longitude		Date	Time	W/D T	W/S (kts)	Depth (m)	Cast (db)
11	8°	3.3′N	165°	3.1′E	8 Jul 06	423	89	17	5224	1832
21	7°	0.3′N	165°	3.2′E	8 Jul 06	1236	107	13	5085	1002
31	6°	0.6′N	165°	2.4′E	8 Jul 06	1928	114	10	4916	1007
41	5°	2.9′N	165°	1.2′E	9 Jul 06	209	164	10	4789	1001
51	4°	0.9′N	165°	0.7′E	9 Jul 06	935	155	8	4495	1004
61	3°	0.2′N	165°	0.2′E	9 Jul 06	1624	124	7	4258	1001
71	2°	30.0′N	165°	0.0′E	9 Jul 06	2021	53	7	4123	1002
81	2°	0.4′N	164°	59.6′E	10 Jul 06	616	54	10	4173	1001
91	1°	30.0′N	164°	58.9′E	10 Jul 06	1057	42	14	4267	1001
101	1°	0.1′N	164°	57.8′E	10 Jul 06	1501	80	8	4333	1001
111	0°	31.2′N	164°	56.5′E	10 Jul 06	1907	48	9	4371	1002
121	0°	0.3′S	165°	3.2′E	11 Jul 06	712	52	6	4385	4003
131	0°	29.6′S	165°	0.4′E	12 Jul 06	506	141	6	4435	1003
141	1°	0.0′S	164°	59.8′E	12 Jul 06	928	111	8	4654	1001
151	1°	29.9′S	164°	59.4′E	12 Jul 06	1359	125	8	4458	1002
161	1°	59.1′S	164°	57.9′E	12 Jul 06	1808	145	5	4692	1003
171	2°	29.7′S	165°	1.4′E	13 Jul 06	205	159	14	2592	1002
181	2°	59.6′S	165°	3.4′E	13 Jul 06	621	166	13	4203	1001
191	3°	59.2′S	165°	7.9′E	13 Jul 06	1334	144	19	3393	1002
201	4°	59.8′S	165°	12.5′E	14 Jul 06	244	110	22	2522	1003
211	5°	59.9′S	165°	3.2′E	14 Jul 06	1027	192	16	3600	1000
221	6°	59.6′S	164°	55.1′E	14 Jul 06	1730	156	16	3719	1002
231	7°	59.8′S	164°	48.4′E	15 Jul 06	913	147	19	3895	3501
241	7°	57.9′S	179°	48.4′W	19 Jul 06	1433	83	10	5547	4501
251	7°	0.1′S	179°	51.2′W	20 Jul 06	818	101	13	4974	1000
261	6°	0.1′S	179°	52.2′W	20 Jul 06	1457	134	8	5596	1002
271	4°	57.2′S	179°	54.2′W	21 Jul 06	630	119	11	5610	1001
281	4°	0.1′S	179°	54.4′W	21 Jul 06	1328	78	7	5986	1001
291	2°	59.8′S	179°	54.7′W	21 Jul 06	1951	77	7	5704	1002
301	2°	30.2′S	179°	54.7′W	21 Jul 06	2338	138	5	5585	1002
311	1°	58.8′S	179°	53.8′W	22 Jul 06	336	45	6	5530	1003
321	1°	29.9′S	179°	54.6′W	22 Jul 06	725	43	6	5234	1001
331	1°	0.0′S	179°	54.7′W	22 Jul 06	1120	71	5	5351	1000
341	0°	30.1′S	179°	54.6′W	22 Jul 06	1450	75	7	4738	1003
351	0°	3.0′N	179°	54.3′W	23 Jul 06	332	111	10	5288	4502
361	0°	30.3′N	179°	53.2′W	23 Jul 06	837	142	10	4919	1001
371	0°	59.9′N	179°	51.4′W	23 Jul 06	1204	137	11	5228	1004
381	1°	29.8′N	179°	49.4′W	23 Jul 06	1546	117	9	5557	1002
391	2°	1.6′N	179°	47.5′W	24 Jul 06	258	110	11	5385	1003
401	2°	29.9′N	179°	48.7′W	24 Jul 06	705	116	13	5310	1002
411	3°	0.1′N	179°	49.5′W	24 Jul 06	1052	99	12	6032	1003
421	3°	59.6′N	179°	51.9′W	24 Jul 06	1722	58	10	5649	1003
431	5°	1.5′N	179°	53.5′W	25 Jul 06	102	87	8	5482	1001
441	6°	0.3′N	179°	54.1′W	25 Jul 06	708	31	14	5540	1001
451	6°	59.8′N	179°	53.1′W	25 Jul 06	1332	44	15	5779	1001
461	8°	1.4′N	179°	54.0′W	25 Jul 06	2131	92	12	5968	4505
471	9°	0.1′N	178°	22.0′W	26 Jul 06	1058	61	13	5908	1000
481	10°	0.1′N	176°	44.3′W	26 Jul 06	2229	52	12	6477	1004
491	11°	0.2′N	175°	6.4′W	27 Jul 06	1012	90	12	4603	1000
501	12°	0.4′N	173°	27.8′W	27 Jul 06	2205	85	15	5592	1002

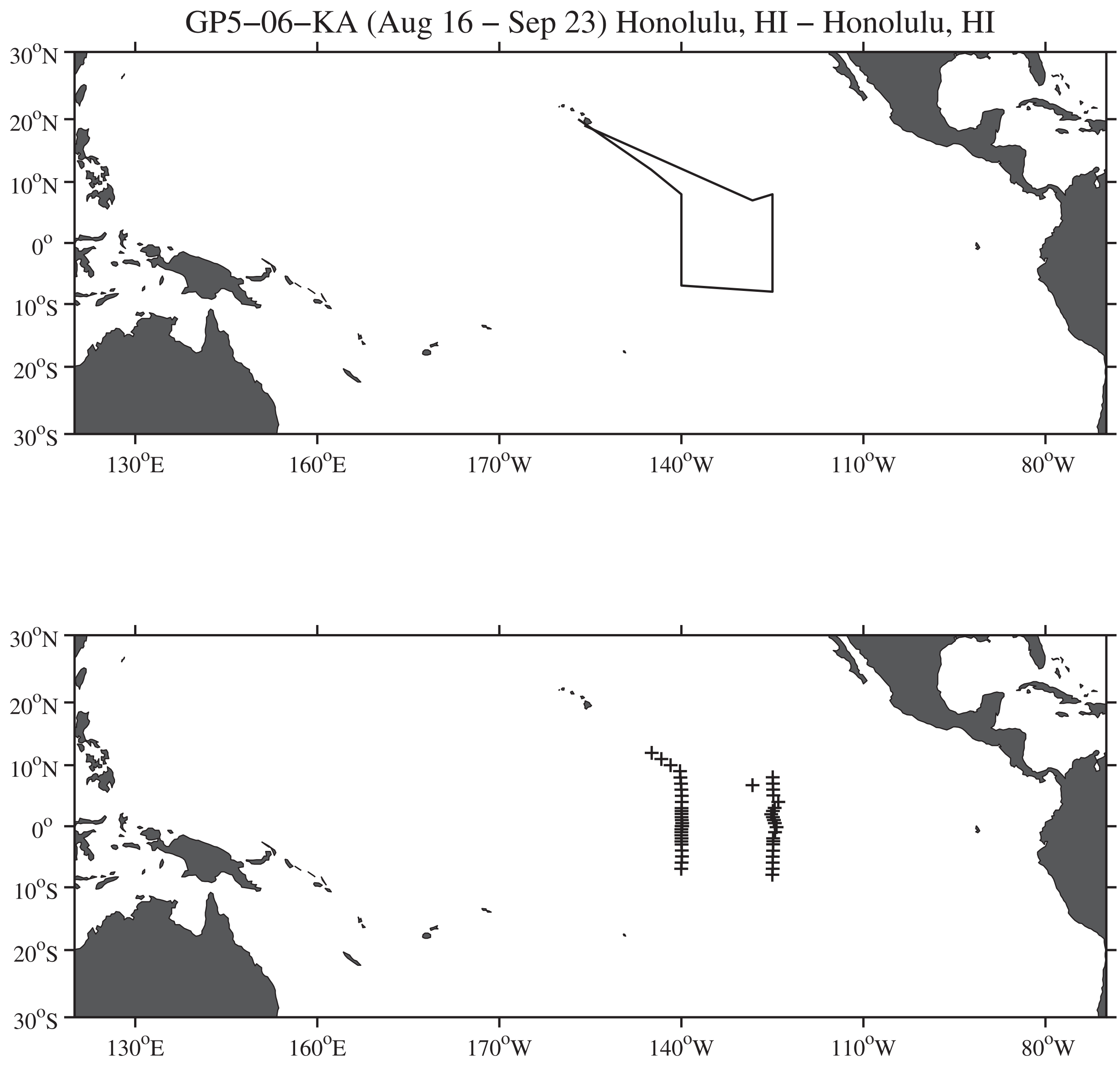


Figure 2m: GP5-06-KA cruise track and station locations.

Table 1m: GP5-06-KA CTD Cast Summary.

Cast #	Latitude	Longitude	Date	Time	W/D T	W/S (kts)	Depth (m)	Cast (db)
1	6° 45.6′N	128° 18.3′W	25 Aug 06	723	17	78	4400	1004
11	8° 2.6′N	124° 57.2′W	26 Aug 06	728	16	84	4660	1005
21	7° 0.3′N	124° 56.2′W	26 Aug 06	1536	17	71	4604	1003
31	6° 0.4′N	124° 54.3′W	26 Aug 06	2245	14	79	4410	4001
42	5° 4.4′N	124° 51.1′W	27 Aug 06	1015	18	68	4393	1002
51	4° 0.4′N	124° 2.6′W	28 Aug 06	739	16	56	4504	1005
61	3° 0.4′N	124° 37.5′W	28 Aug 06	1630	17	26	4581	1002
71	2° 30.5′N	124° 54.8′W	28 Aug 06	2340	9	50	4584	1004
81	1° 58.5′N	125° 12.3′W	29 Aug 06	454	15	23	4607	1000
91	1° 30.4′N	124° 56.1′W	30 Aug 06	555	10	0	4649	1001
101	1° 0.5′N	124° 46.7′W	30 Aug 06	1003	9	36	4636	1001
111	0° 31.1′N	124° 36.8′W	30 Aug 06	1434	12	37	4449	4002
121	0° 8.9′S	124° 20.3′W	31 Aug 06	411	12	33	4825	1005
131	0° 59.3′S	124° 34.6′W	31 Aug 06	1200	15	5	4725	1010
141	2° 0.2′S	124° 52.9′W	31 Aug 06	2037	16	41	4685	1010
151	2° 29.3′S	124° 52.4′W	1 Sep 06	159	16	25	4578	698
161	2° 59.8′S	124° 53.2′W	1 Sep 06	539	105	13	4702	1003
171	4° 0.9′S	124° 54.0′W	1 Sep 06	2018	16	27	4462	1003
181	5° 0.1′S	124° 57.3′W	2 Sep 06	332	17	19	4535	1003
191	5° 59.4′S	124° 57.1′W	2 Sep 06	1043	12	16	4519	1001
201	6° 59.6′S	124° 58.0′W	2 Sep 06	1813	17	18	4485	4004
211	7° 58.7′S	125° 0.5′W	3 Sep 06	412	19	39	4576	1002
221	6° 59.6′S	140° 1.5′W	11 Sep 06	828	17	10	4192	1004
231	6° 0.2′S	139° 58.4′W	11 Sep 06	1520	19	74	4213	1001
261	4° 57.9′S	139° 54.0′W	11 Sep 06	2250	15	20	4349	1001
271	3° 59.9′S	139° 56.3′W	12 Sep 06	550	20	20	4514	1003
282	3° 0.1′S	139° 59.1′W	12 Sep 06	1236	13	14	4426	1002
291	2° 30.2′S	140° 0.1′W	12 Sep 06	1641	12	29	4377	1001
301	2° 0.3′S	139° 59.1′W	13 Sep 06	543	24	25	4239	1006
311	1° 30.1′S	140° 0.5′W	13 Sep 06	1029	16	24	4337	1003
321	0° 59.6′S	140° 0.4′W	13 Sep 06	1419	20	49	4269	1001
331	0° 30.0′S	140° 0.2′W	13 Sep 06	1820	6	24	4295	4001
341	0° 2.6′N	139° 57.8′W	14 Sep 06	947	13	34	4352	203
351	0° 0.4′N	139° 52.0′W	14 Sep 06	2159	10	22	4347	1002
361	0° 30.0′N	139° 53.3′W	15 Sep 06	241	14	41	4338	1002
371	1° 0.2′N	139° 55.6′W	15 Sep 06	648	13	9	4346	1001
381	1° 29.9′N	139° 57.7′W	15 Sep 06	1123	14	18	4166	1002
391	2° 1.6′N	139° 58.8′W	15 Sep 06	1552	18	55	4368	1001
401	2° 30.0′N	139° 58.3′W	16 Sep 06	556	17	55	4405	1001
411	2° 59.9′N	139° 58.4′W	16 Sep 06	947	15	54	4294	1001
421	3° 59.7′N	139° 57.2′W	16 Sep 06	1700	9	43	4312	1001
431	4° 59.6′N	139° 56.4′W	17 Sep 06	804	14	53	4616	1000
441	6° 0.4′N	139° 59.5′W	17 Sep 06	1551	18	36	4822	1029
451	7° 0.0′N	140° 4.8′W	17 Sep 06	2304	13	54	5138	1002
461	8° 0.4′N	140° 9.5′W	18 Sep 06	614	13	53	5201	1001
471	9° 1.8′N	140° 13.8′W	19 Sep 06	249	4	19	4819	4006
481	10° 1.3′N	141° 46.3′W	19 Sep 06	1457	16	28	4133	1003
491	11° 0.5′N	143° 18.3′W	20 Sep 06	104	15	58	5277	1002
501	12° 0.4′N	144° 53.0′W	20 Sep 06	1125	22	60	5236	1001

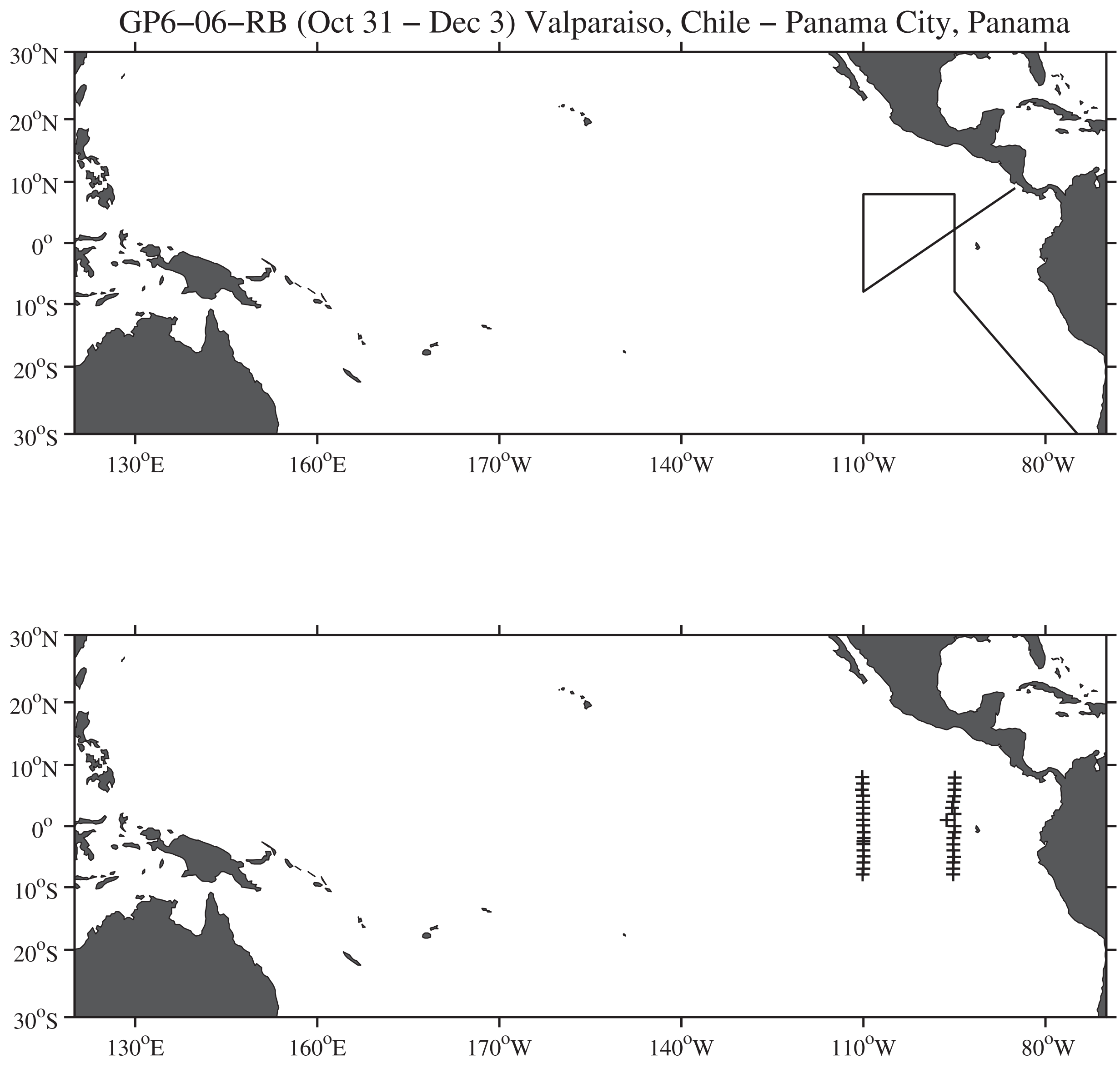


Figure 2n: GP6-06-RB cruise track and station locations.

Table 1n: GP6-06-RB CTD Cast Summary.

Cast #	Latitude	Longitude	Date	Time	W/D T	W/S (kts)	Depth (m)	Cast (db)
11	7° 56.0′S	95° 13.0′W	7 Nov 06	631	140	13	4011	3001
21	7° 0.0′S	95° 12.7′W	8 Nov 06	635	150	10	3857	1001
31	6° 0.0′S	95° 11.9′W	8 Nov 06	1226	155	8	3699	1001
41	5° 3.7′S	95° 4.7′W	8 Nov 06	2220	160	7	3859	1001
51	4° 0.0′S	95° 11.2′W	9 Nov 06	526	130	9	3653	1001
61	3° 0.0′S	95° 11.4′W	9 Nov 06	1119	140	12	3509	1001
71	1° 58.2′S	95° 11.8′W	9 Nov 06	2153	140	6	3400	1001
81	1° 0.1′S	95° 0.0′W	10 Nov 06	408	140	12	3321	1002
91	0° 0.2′S	94° 59.8′W	10 Nov 06	1044	155	8	3326	3002
101	0° 59.9′N	96° 16.9′W	12 Nov 06	34	150	12	3379	1001
111	2° 0.0′N	95° 0.0′W	12 Nov 06	946	160	12	2864	1002
121	3° 0.1′N	95° 25.0′W	13 Nov 06	205	210	11	2832	1001
131	4° 0.0′N	95° 12.7′W	13 Nov 06	741	220	6	3964	1000
141	4° 55.0′N	95° 1.3′W	13 Nov 06	1308	210	8	3514	1001
151	6° 0.0′N	94° 59.9′W	13 Nov 06	1946	220	11	3374	1001
161	7° 0.0′N	94° 59.9′W	14 Nov 06	132	260	8	3680	1001
171	7° 57.5′N	94° 57.3′W	14 Nov 06	740	275	1	3165	3002
181	8° 3.6′N	110° 11.4′W	18 Nov 06	616	190	12	4235	1001
191	7° 0.0′N	110° 6.4′W	18 Nov 06	1313	185	16	3708	1002
201	6° 0.1′N	110° 15.2′W	18 Nov 06	1913	160	16	3800	1002
211	5° 1.2′N	110° 4.1′W	19 Nov 06	104	150	12	4104	1002
221	4° 0.0′N	110° 3.8′W	19 Nov 06	713	160	13	3910	1001
231	3° 0.0′N	110° 3.3′W	19 Nov 06	1312	160	13	3903	1001
241	2° 3.1′N	110° 2.6′W	20 Nov 06	246	160	11	3735	1001
251	1° 0.0′N	110° 2.8′W	20 Nov 06	928	150	10	3811	1001
261	0° 7.8′N	110° 3.3′W	21 Nov 06	955	120	12	3801	3002
271	1° 0.0′S	109° 58.4′W	22 Nov 06	811	110	12	3971	1002
281	1° 58.6′S	109° 59.5′W	22 Nov 06	1930	120	12	3906	1002
291	2° 30.1′S	110° 0.0′W	22 Nov 06	2322	100	10	3932	1001
301	2° 59.9′S	110° 0.0′W	23 Nov 06	227	110	11	3777	1002
311	4° 0.0′S	110° 0.0′W	23 Nov 06	758	120	12	3784	1001
321	4° 59.3′S	109° 59.3′W	24 Nov 06	859	150	12	3608	1002
331	6° 0.0′S	110° 0.0′W	24 Nov 06	2103	140	13	3669	1002
341	6° 59.9′S	110° 0.0′W	25 Nov 06	252	130	17	3471	1002
351	7° 56.5′S	110° 8.6′W	25 Nov 06	854	120	15	3352	3102

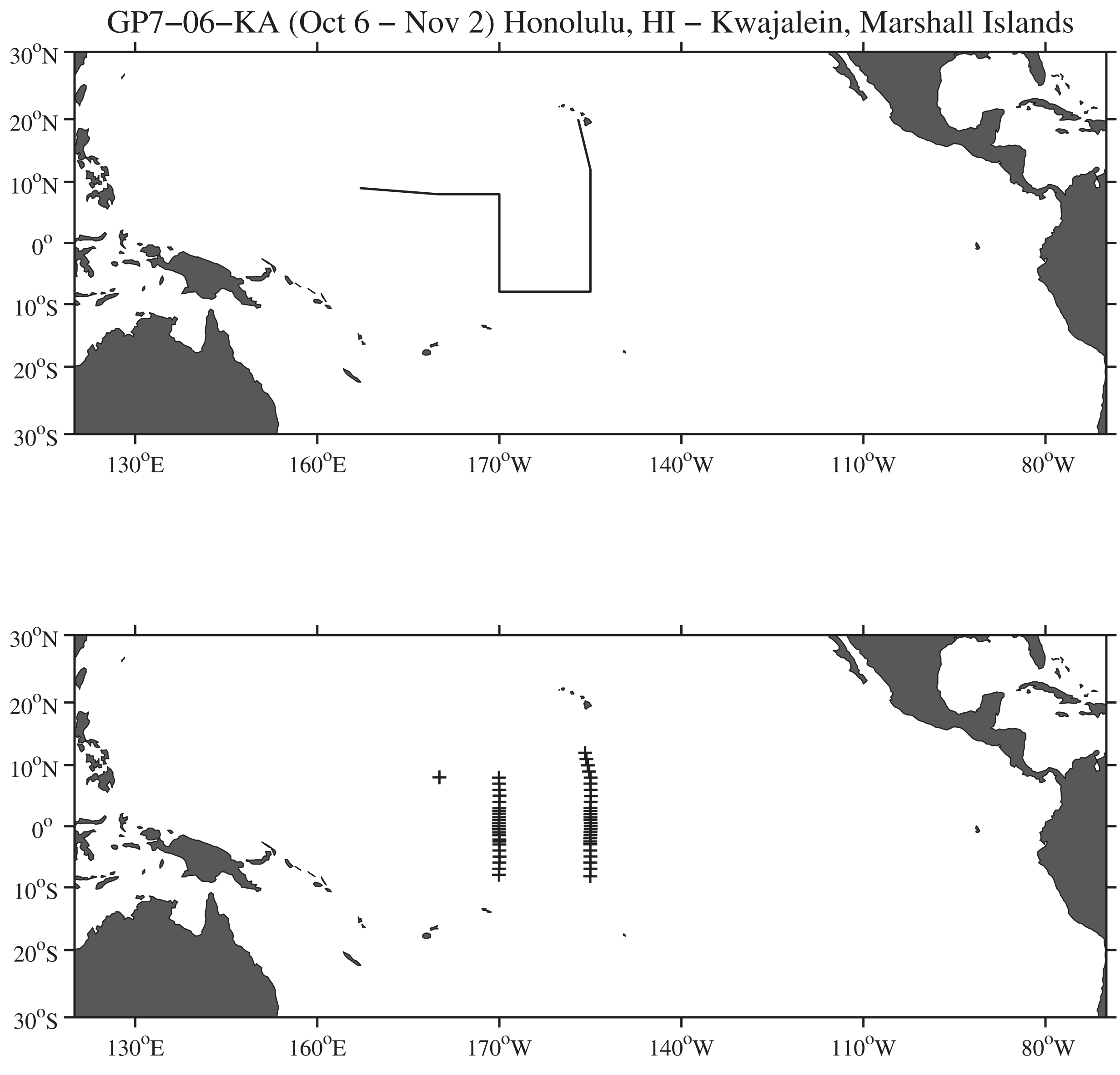


Figure 2o: GP7-06-KA cruise track and station locations.

Table 1o: GP7-06-KA CTD Cast Summary.

Cast #	Latitude		Longitude		Date	Time	W/D T	W/S (kts)	Depth (m)	Cast (db)
11	11°	59.9′N	155°	52.4′W	9 Oct 06	512	6	50	5212	1002
21	10°	59.9′N	155°	39.0′W	9 Oct 06	1236	10	42	5198	1003
31	9°	59.4′N	155°	25.4′W	9 Oct 06	2029	7	99	5369	1002
41	8°	59.5′N	155°	13.0′W	10 Oct 06	416	13	27	5287	1004
51	7°	57.8′N	154°	57.3′W	10 Oct 06	1309	17	67	5280	3001
61	6°	59.7′N	154°	58.2′W	11 Oct 06	745	7	69	4252	1002
71	5°	59.7′N	154°	57.4′W	11 Oct 06	1428	5	29	4831	1002
81	4°	57.6′N	154°	55.4′W	11 Oct 06	2203	15	19	4592	1001
91	3°	59.9′N	154°	57.6′W	12 Oct 06	444	9	19	4685	1001
101	3°	0.1′N	154°	59.1′W	12 Oct 06	1138	7	84	4731	1003
111	2°	30.4′N	154°	59.6′W	12 Oct 06	1549	10	79	4833	1002
121	2°	0.2′N	154°	59.7′W	13 Oct 06	358	3	37	4676	1002
131	1°	27.6′N	154°	59.4′W	13 Oct 06	851	3	84	4635	1002
141	1°	0.1′N	154°	58.5′W	13 Oct 06	1235	3	37	4763	1002
151	0°	30.3′N	154°	57.8′W	13 Oct 06	1637	6	66	4746	1001
161	0°	0.3′S	154°	56.2′W	13 Oct 06	2028	2	74	4639	4002
171	0°	29.6′S	154°	57.8′W	14 Oct 06	311	6	8	4882	1001
181	0°	59.7′S	154°	59.1′W	14 Oct 06	713	7	9	4737	1000
191	1°	29.9′S	154°	59.7′W	14 Oct 06	1119	9	4	4829	1003
201	1°	57.4′S	155°	0.6′W	14 Oct 06	1445	11	33	4588	1001
211	2°	29.9′S	155°	0.7′W	15 Oct 06	528	15	11	4963	1000
221	2°	59.8′S	155°	0.7′W	15 Oct 06	907	20	23	4981	1001
231	3°	59.8′S	155°	0.8′W	15 Oct 06	1652	19	34	1948	1002
241	4°	59.0′S	154°	59.2′W	16 Oct 06	6	20	13	5018	1003
251	5°	59.8′S	155°	0.3′W	16 Oct 06	701	19	91	5243	1001
261	6°	59.5′S	154°	59.8′W	16 Oct 06	1352	17	89	5212	1002
271	8°	14.3′S	155°	1.0′W	17 Oct 06	621	22	78	5256	1003
281	7°	58.4′S	170°	2.7′W	21 Oct 06	301	347	5	5386	3003
291	7°	0.3′S	170°	1.2′W	21 Oct 06	1053	102	1	4657	1002
301	5°	59.8′S	170°	0.7′W	21 Oct 06	1729	146	5	4802	1003
311	5°	0.5′S	169°	57.9′W	22 Oct 06	739	203	4	5436	1001
321	4°	0.4′S	170°	0.3′W	22 Oct 06	1422	107	3	5599	1003
331	3°	0.2′S	170°	0.5′W	22 Oct 06	2048	134	7	5073	1002
341	2°	30.4′S	170°	0.5′W	23 Oct 06	36	130	7	5588	1000
351	2°	11.0′S	169°	59.8′W	23 Oct 06	510	87	8	4964	1001
361	1°	29.6′S	170°	0.9′W	23 Oct 06	1014	114	7	5500	1004
371	1°	0.1′S	170°	1.9′W	23 Oct 06	1354	98	6	5487	1002
381	0°	30.5′S	170°	2.8′W	23 Oct 06	1759	114	5	4635	1002
391	0°	0.6′N	170°	4.0′W	24 Oct 06	35	124	9	5392	4002
401	0°	30.3′N	170°	3.1′W	24 Oct 06	600	141	7	5539	1006
411	1°	0.3′N	170°	2.6′W	24 Oct 06	1014	122	8	5072	1002
421	1°	29.9′N	170°	2.2′W	24 Oct 06	1432	136	9	5514	1002
431	2°	3.7′N	170°	1.6′W	24 Oct 06	1905	195	3	4834	1001
441	2°	29.8′N	170°	1.6′W	24 Oct 06	2303	87	8	5160	1002
451	2°	59.9′N	170°	0.7′W	25 Oct 06	306	151	8	5477	1002
461	3°	59.8′N	170°	0.1′W	25 Oct 06	1026	199	6	5412	1001
471	5°	2.1′N	169°	58.5′W	26 Oct 06	313	239	7	5622	1002
481	5°	59.8′N	170°	0.3′W	26 Oct 06	1023	301	9	5531	1002
491	7°	0.0′N	170°	1.3′W	26 Oct 06	1726	48	4	5331	1001
501	7°	57.5′N	170°	3.4′W	27 Oct 06	929	22	7	5532	4002
511	8°	1.5′N	179°	51.3′W	29 Oct 06	2043	92	18	5924	1024

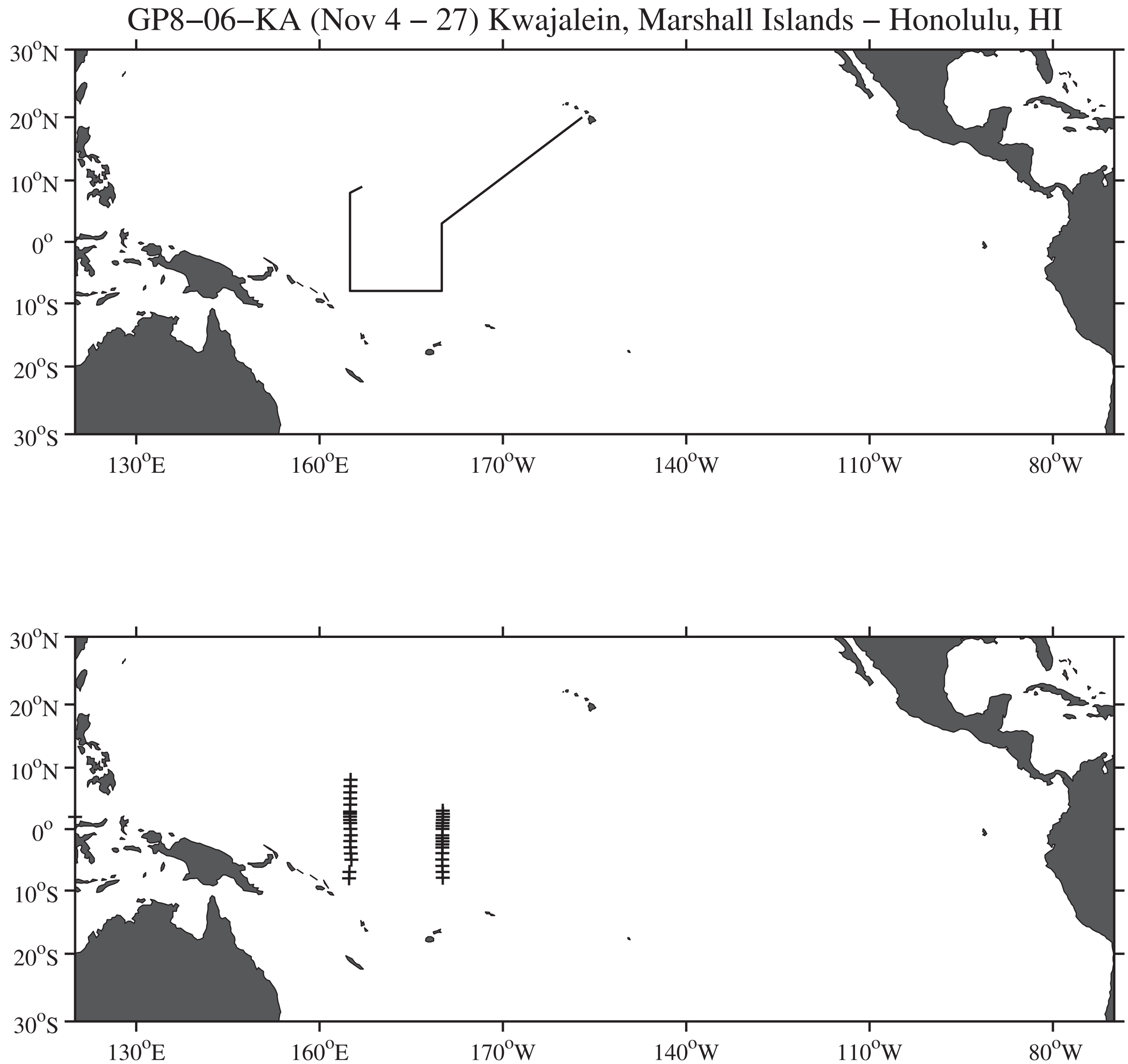


Figure 2p: GP8-06-KA cruise track and station locations.

Table 1p: GP8-06-KA CTD Cast Summary.

Cast #	Latitude	Longitude	Date	Time	W/D T	W/S (kts)	Depth (m)	Cast (db)
11	8° 3.0′N	165° 6.0′E	5 Nov 06	2235	143	10	5168	685
21	7° 0.3′N	165° 3.9′E	6 Nov 06	720	109	10	5165	1001
31	5° 59.9′N	165° 2.2′E	6 Nov 06	1355	91	9		1002
41	5° 0.5′N	165° 1.0′E	7 Nov 06	547	46	14	4775	1003
51	3° 59.4′N	165° 1.0′E	7 Nov 06	1238	37	13	4487	1004
61	2° 52.1′N	164° 59.9′E	7 Nov 06	1948	43	12	4240	1004
71	2° 30.5′N	165° 0.3′E	7 Nov 06	2259	42	7	4117	1001
81	2° 1.0′N	164° 59.4′E	8 Nov 06	351	51	11		1001
91	1° 29.9′N	165° 0.4′E	8 Nov 06	748	124	4	4256	1001
101	0° 59.8′N	165° 1.7′E	8 Nov 06	1132	164	5	4328	1001
111	0° 1.4′N	165° 2.8′E	8 Nov 06	1849	187	8	4407	4003
121	1° 0.0′S	165° 6.2′E	9 Nov 06	1459	163	15		1013
131	1° 58.0′S	165° 1.0′E	10 Nov 06	615	185	15	4464	1002
141	2° 59.9′S	165° 2.9′E	10 Nov 06	1335	199	6	4192	1002
151	3° 59.8′S	165° 7.0′E	10 Nov 06	2030	172	8	3380	1002
161	5° 0.3′S	165° 12.9′E	11 Nov 06	417	64	3	2536	1002
171	7° 0.2′S	164° 54.4′E	11 Nov 06	1621	191	12	3711	1002
181	8° 1.3′S	164° 49.4′E	12 Nov 06	801	121	12	3892	3443
191	7° 56.3′S	179° 50.1′W	16 Nov 06	918	100	6	4817	4002
201	7° 0.3′S	179° 51.7′W	16 Nov 06	1708	24	4	5844	1002
211	6° 0.6′S	179° 53.9′W	17 Nov 06	13	256	5	4458	1002
221	4° 58.1′S	179° 56.3′W	17 Nov 06	911	336	13	2508	1001
231	3° 55.9′S	179° 54.9′W	17 Nov 06	1624	343	9	2508	1001
241	3° 0.3′S	179° 54.0′W	17 Nov 06	2320	317	13		1003
251	2° 30.6′S	179° 54.0′W	18 Nov 06	433	283	16	5590	1001
261	2° 0.8′S	179° 51.6′W	18 Nov 06	951	266	6		4003
271	1° 30.4′S	179° 54.0′W	19 Nov 06	758	259	10	5223	1001
281	1° 0.2′S	179° 53.8′W	19 Nov 06	1219	224	13	5306	1001
291	0° 1.9′N	179° 52.6′W	19 Nov 06	2116	238	16		1001
301	0° 29.8′N	179° 52.9′W	20 Nov 06	159	193	7	4491	1001
311	0° 59.8′N	179° 51.3′W	20 Nov 06	605	114	13	5888	1002
321	1° 29.8′N	179° 49.6′W	20 Nov 06	1020	152	13	4981	1006
331	2° 0.0′N	179° 48.5′W	20 Nov 06	1440	168	8	4417	1001
341	2° 30.0′N	179° 48.7′W	20 Nov 06	1902	150	6	5129	1002
351	3° 0.1′N	179° 50.0′W	20 Nov 06	2309	81	10	5318	1002

Table 2: Station groupings for CTD conductivity calibrations.

Cruise	Station Groupings	Sensor S/N	Standard Seawater	Fitting Routine	Reject Std Dev	Total Points	Percent Points Used	Fit Standard Deviation (mS/cm)	Conductivity Fit Bias (mS/cm)	Pressure Correction Beta	Minimum Fit Slope	Maximum Fit Slope	Salinity Offset (PSS-78)
GP105	1−53	1537	P143	Calcos1	2.8	324	87.4	0.0022	−0.00961		1.0003675	1.0004593	
GP205	1−49**	1537	P143	Calcop0	2.8	287	86.1	0.0019	−0.01315	6.18e−007	1.0005676	1.0005676	
	13−49	524	P143	Calcop1	2.8	206	82.0	0.0018	−0.00447	3.88e−007	0.9999725	1.0000748	
GP305	1−50	524	P143	Calcos1	2.8	304	89.5	0.0021	−0.00738		1.0002269	1.0003410	
GP405	1−50	524	P143	Calcop4	2.8	289	87.9	0.0030	−0.01553	−3.59e−007	1.0005460	1.0007905	
GP505	1−53	354	P145	Calcos1	2.8	285	91.6	0.0030	−0.00990		1.0004974	1.0006994	
GP605	1−32	1180	P145	Calcos2	2.8	200	80.0	0.0014	−0.01026		1.0003376	1.0004570	
GP705	1−19	1467	P145	Calcop0	2.8	79	93.7	0.0049	0.00168	−1.59e−006	1.0005303	1.0005303	
	1−30***	1467	P145	Calcos0	2.8	166	92.2	0.0064	0.00132		1.0005539	1.0005539	
GP805	1−9	354	P145	Calcos1	2.8	45	91.1	0.0051	−0.02186		1.0011832	1.0013698	
	10−15	1537	P145	Calcos0	2.8	39	89.7	0.0026	−0.00082		0.9999623	0.9999623	
GP106	1−43	1537	P145	Calcop1	2.8	279	86.7	0.0016	−0.00372	5.34e−007	0.9999695	1.0000236	
GP206	1−29	1467	P145	Calcos2	2.8	227	78.8	0.0022	0.00048		0.9999005	0.9999636	
GP306	1−50	1467	P145	Calcop1	2.8	294	84.0	0.0017	−0.00239	6.63e−007	0.9999996	1.0000615	
GP406	1−50	1467	P145	Calcos1	2.8	298	84.6	0.0021	−0.00172		1.0000360	1.0001004	
GP506	1−50	1467	P145	Calcos0	2.8	277	88.8	0.0051	−0.00201		1.0002906	1.0002906	
GP606	1−35	3157	P146	Calcos0	2.8	272	92.3	0.0027	−0.00385		1.0001905	1.0001905	−0.005
GP706	1−51	1467	P145/P147	Calcos0	2.8	295	89.2	0.0047	−0.00432		1.0003622	1.0003622	−0.003
GP806	1−35	1467	P145/P147	Calcos0	2.8	181	87.8	0.0036	−0.00751		1.0005433	1.0005433	−0.005*

* For stations 1–18 along 165°E; −0.003 for stations 19–35 along 180°.
** This fit applied to stations 1–12.
*** This fit applied to stations 20–30.

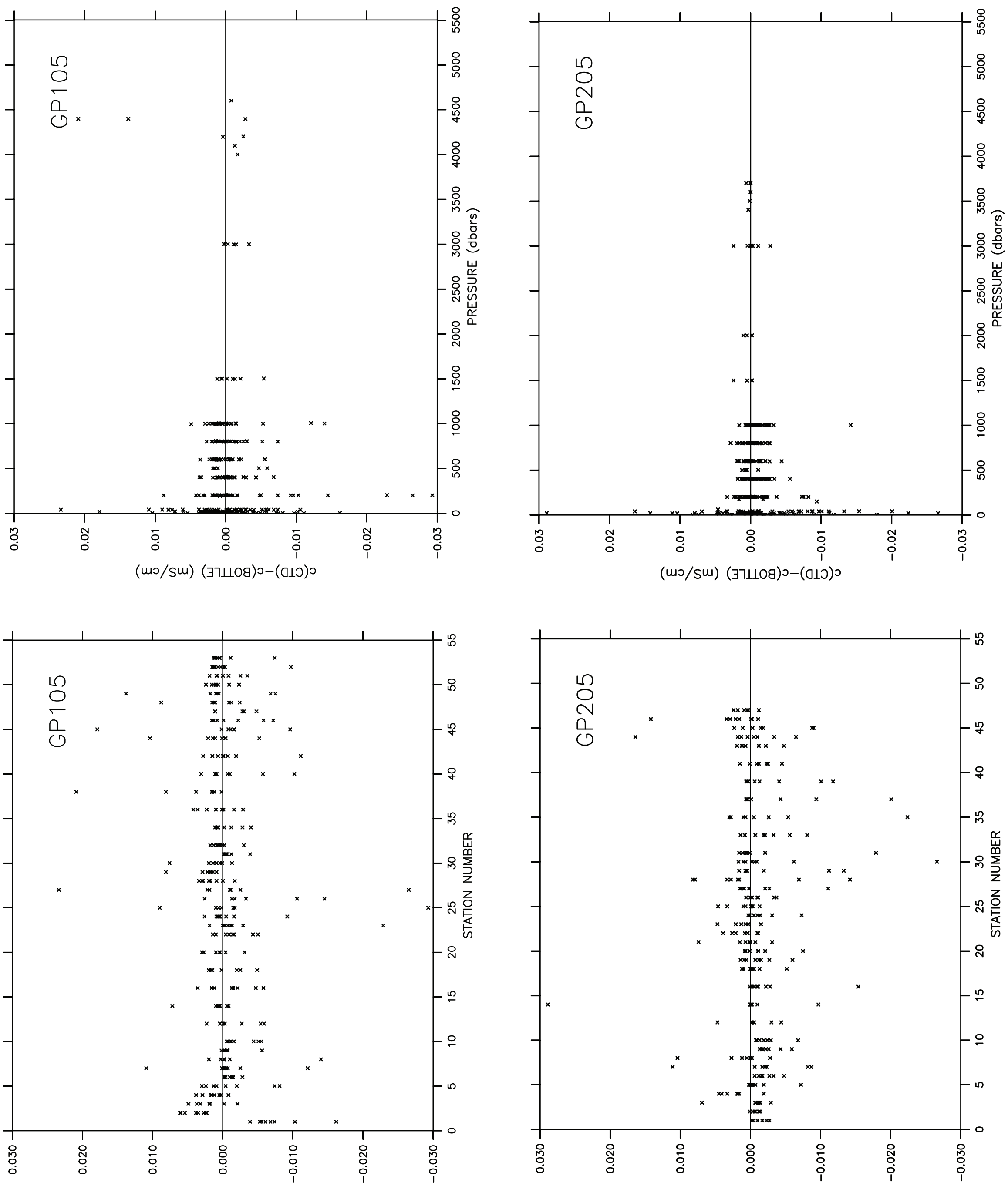


Figure 3a: Calibrated CTD-bottle conductivity differences plotted against station number and pressure for cruises GP1-05-KA (upper panels) and GP2-05-KA (lower panels).

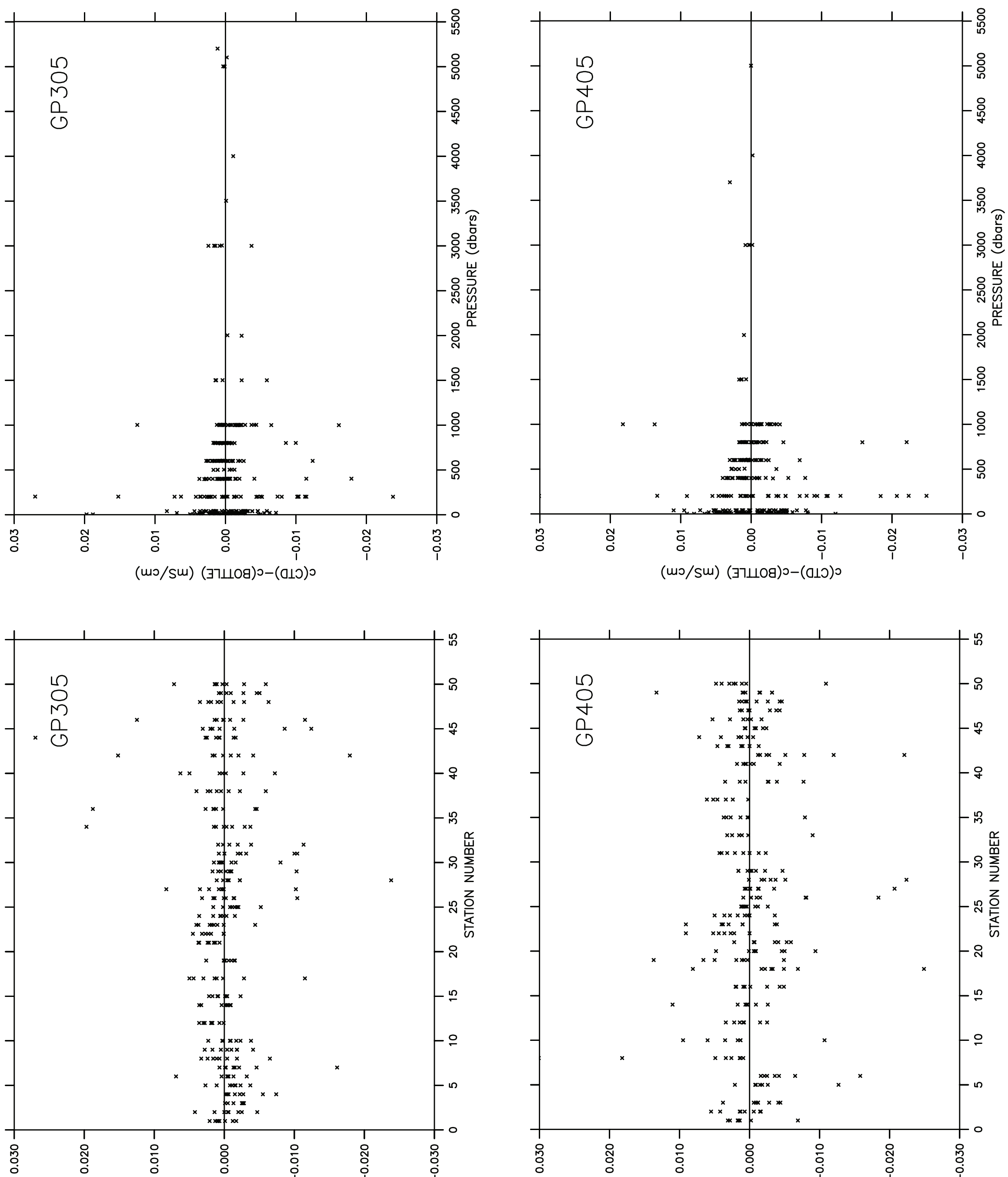


Figure 3b: Calibrated CTD-bottle conductivity differences plotted against station number and pressure for cruises GP3-05-KA (upper panels) and GP4-05-KA (lower panels).

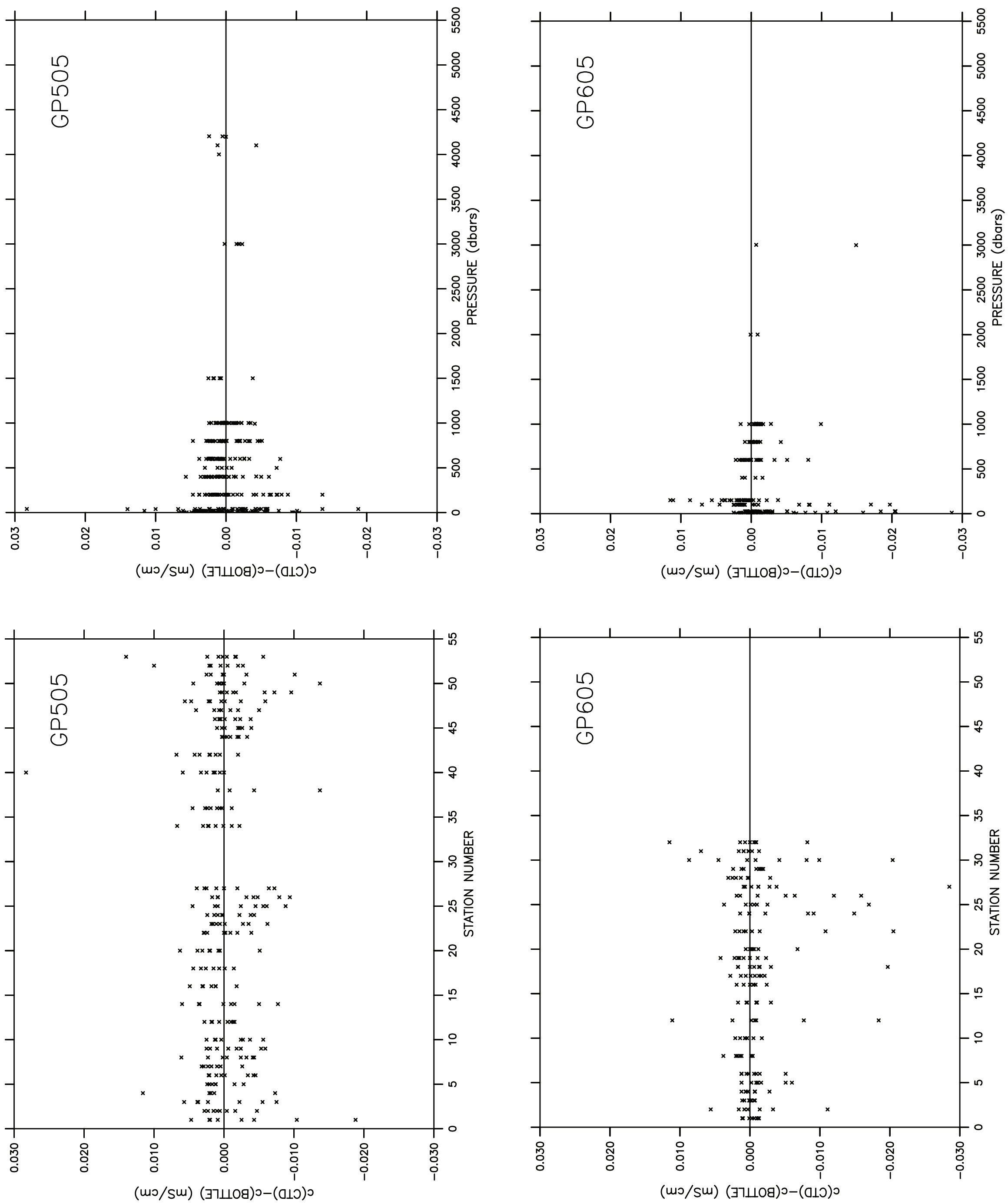


Figure 3c: Calibrated CTD-bottle conductivity differences plotted against station number and pressure for cruises GP5-05-KA (upper panels) and GP6-05-RB (lower panels).

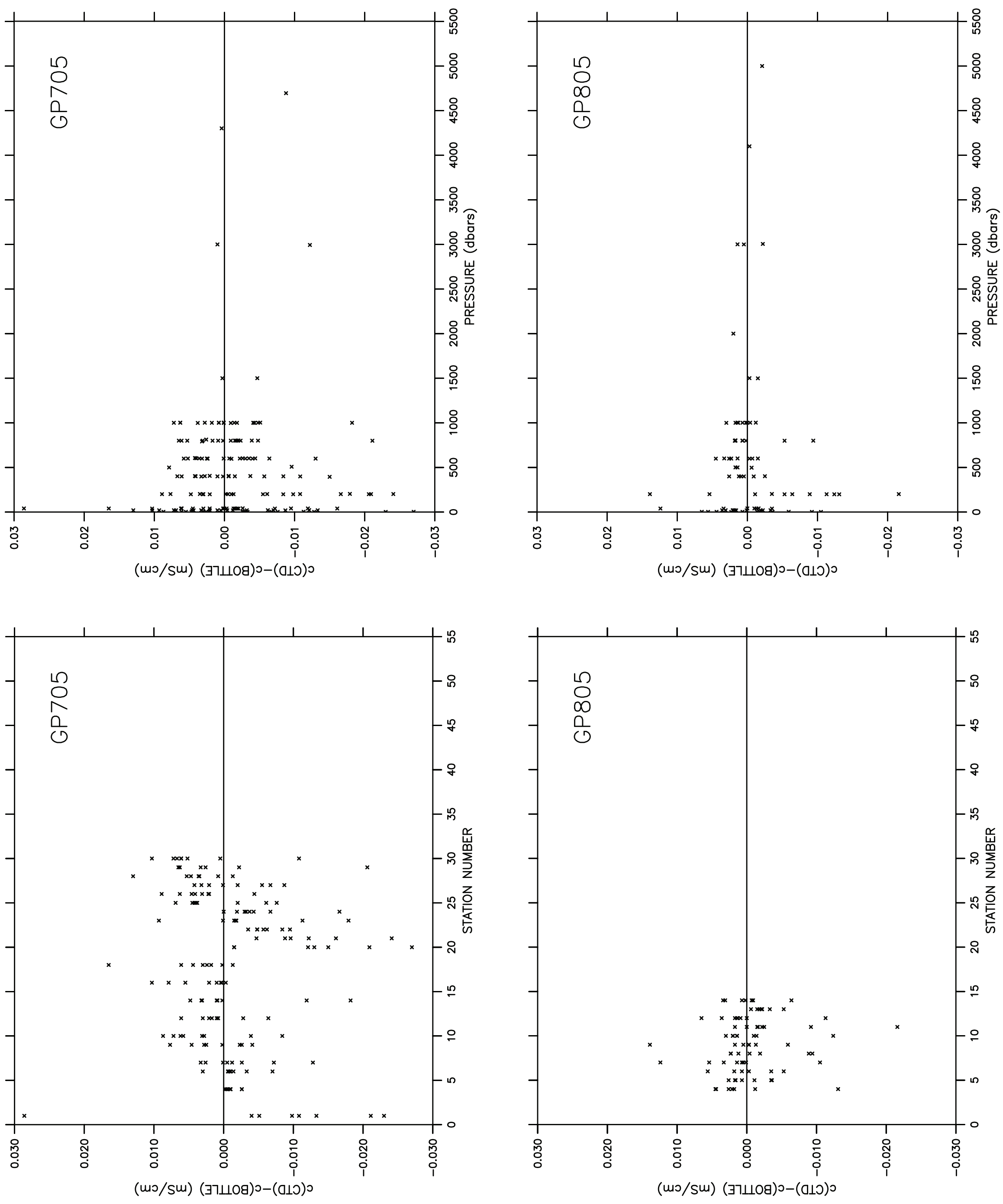


Figure 3d: Calibrated CTD-bottle conductivity differences plotted against station number and pressure for cruises GP7-05-KA (upper panels) and GP8-05-KA (lower panels).

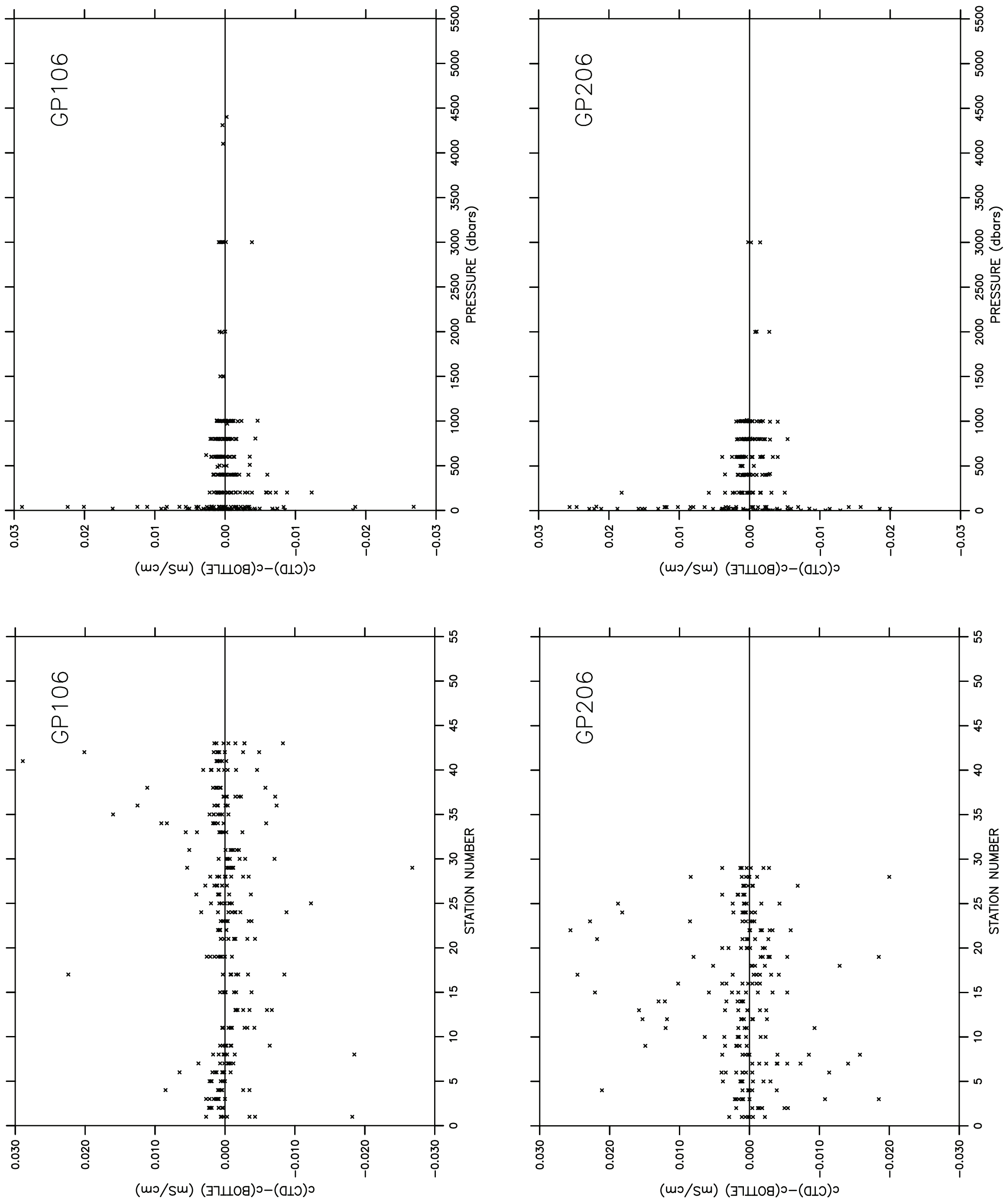


Figure 3e: Calibrated CTD-bottle conductivity differences plotted against station number and pressure for cruises GP1-06-KA (upper panels) and GP2-06-KA (lower panels).

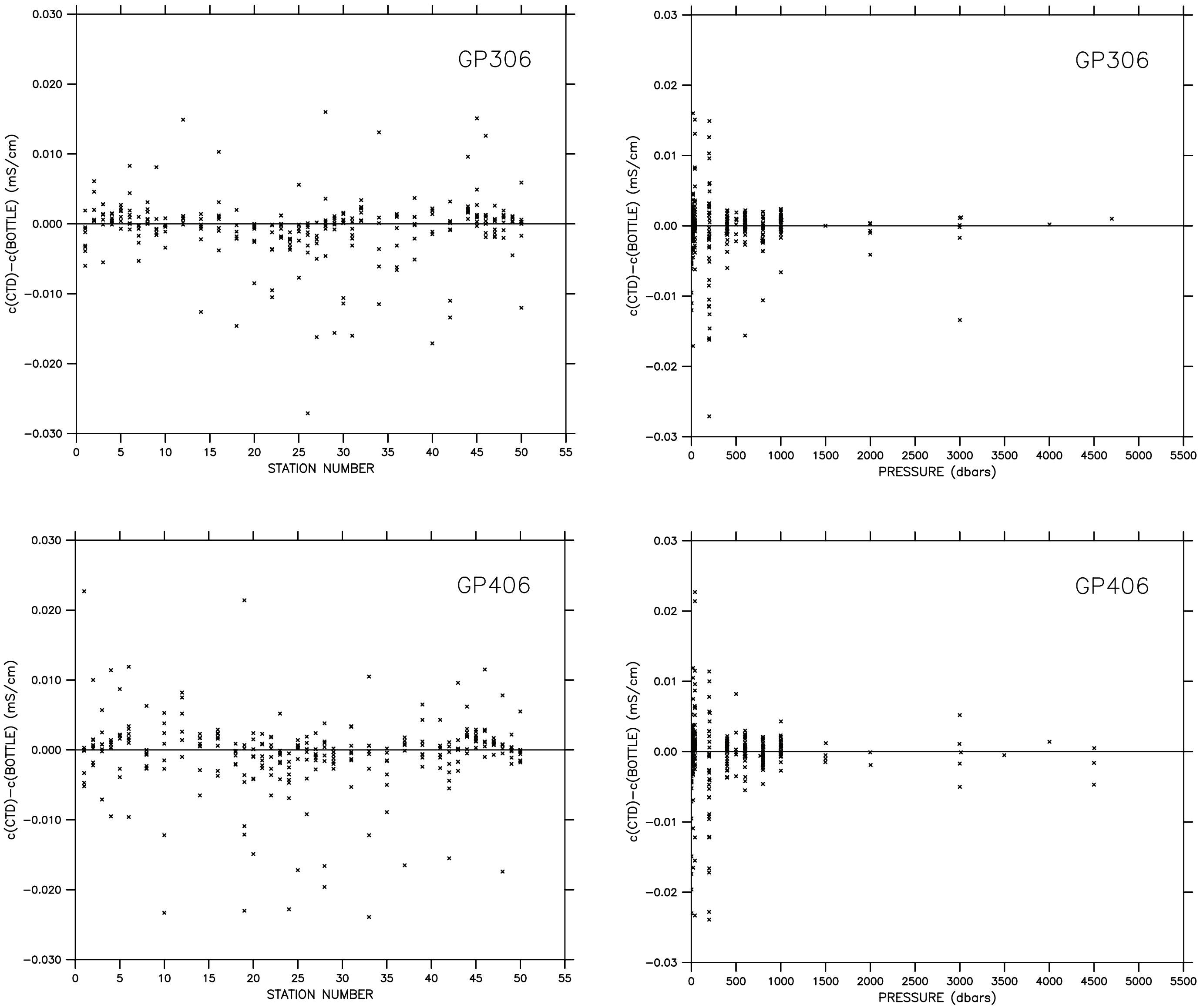


Figure 3f: Calibrated CTD-bottle conductivity differences plotted against station number and pressure for cruises GP3-06-KA (upper panels) and GP4-06-KA (lower panels).

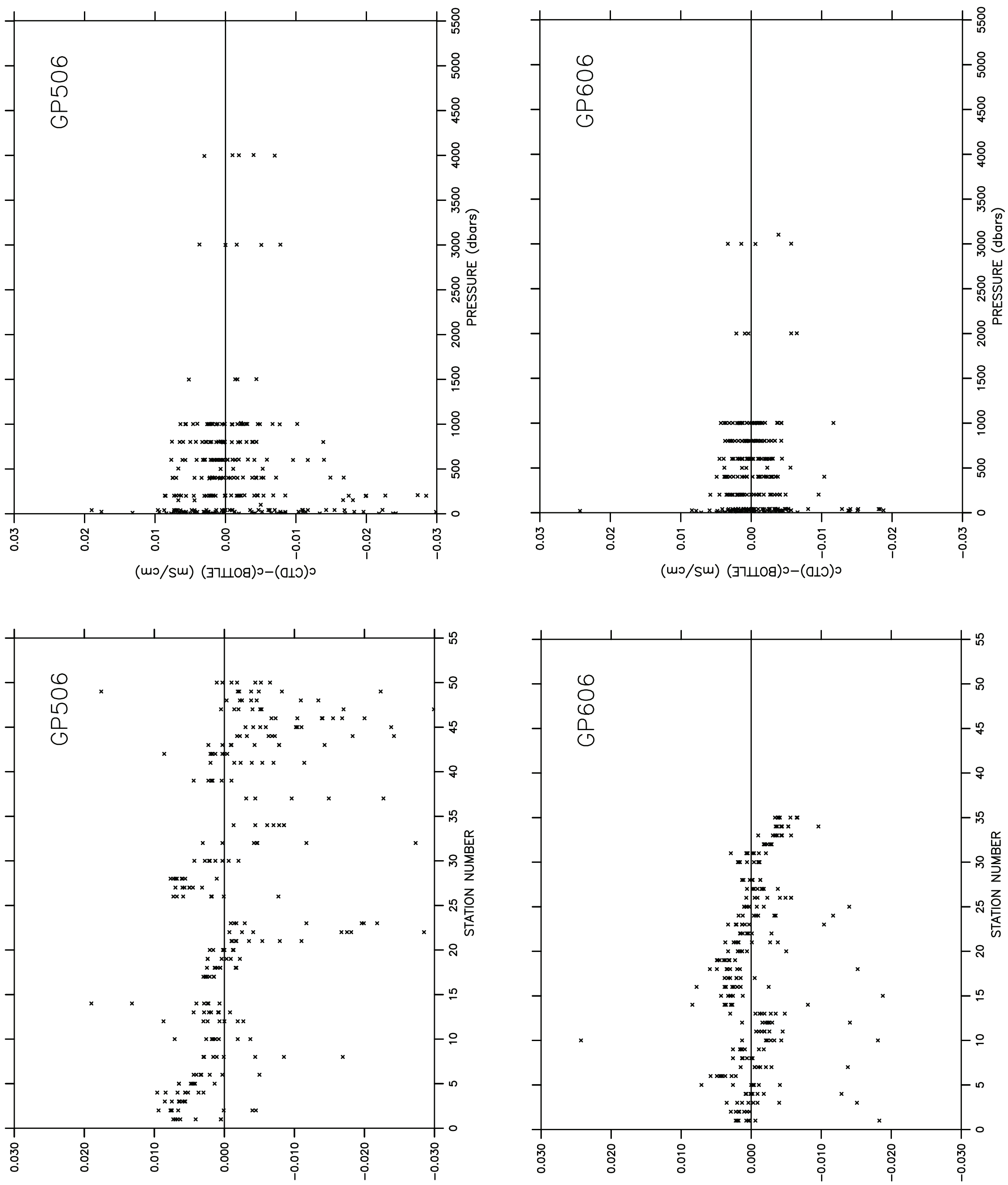


Figure 3g: Calibrated CTD-bottle conductivity differences plotted against station number and pressure for cruises GP5-06-KA (upper panels) and GP6-06-RB (lower panels).

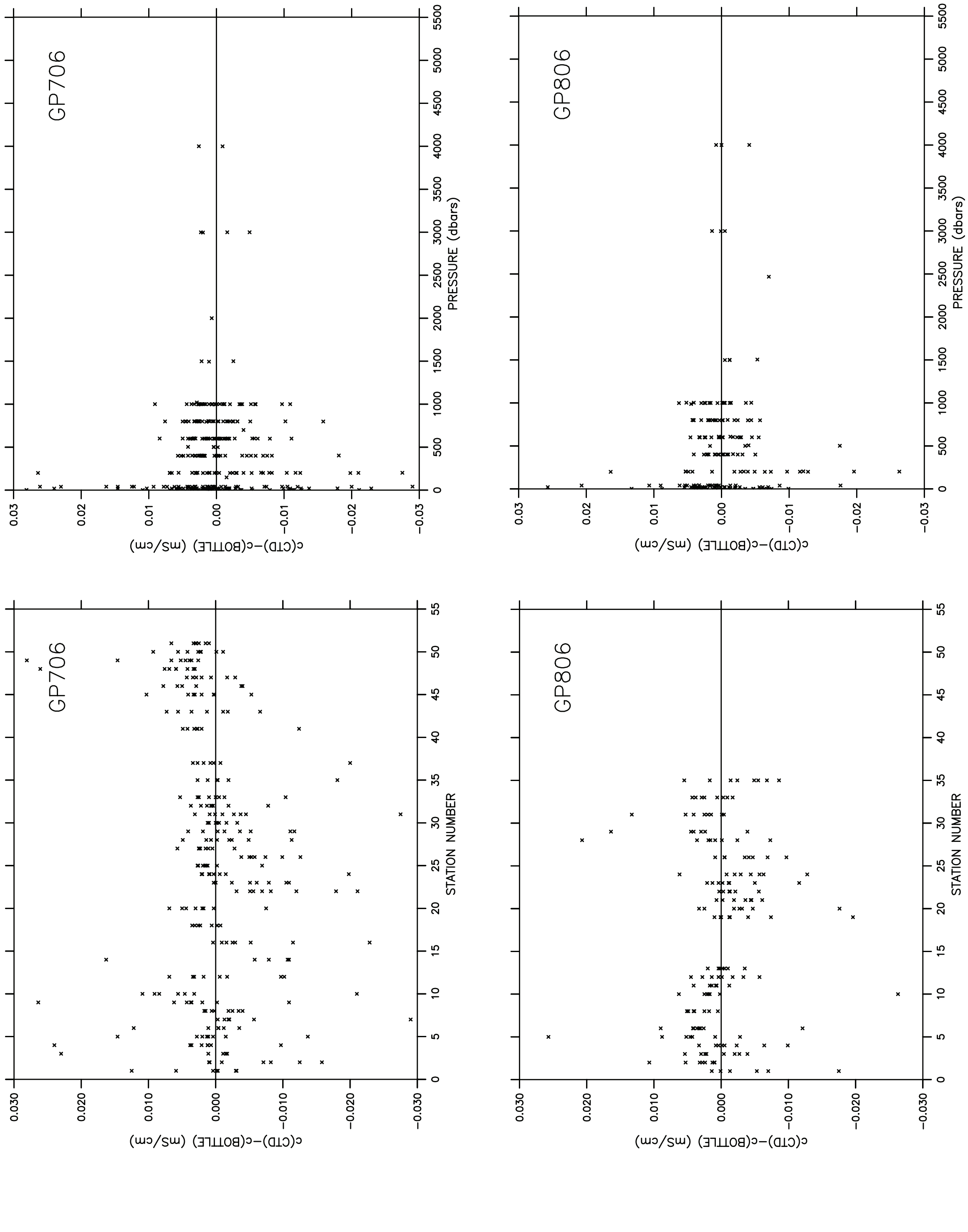


Figure 3h: Calibrated CTD-bottle conductivity differences plotted against station number and pressure for cruises GP7-06-KA (upper panels) and GP8-06-KA (lower panels).

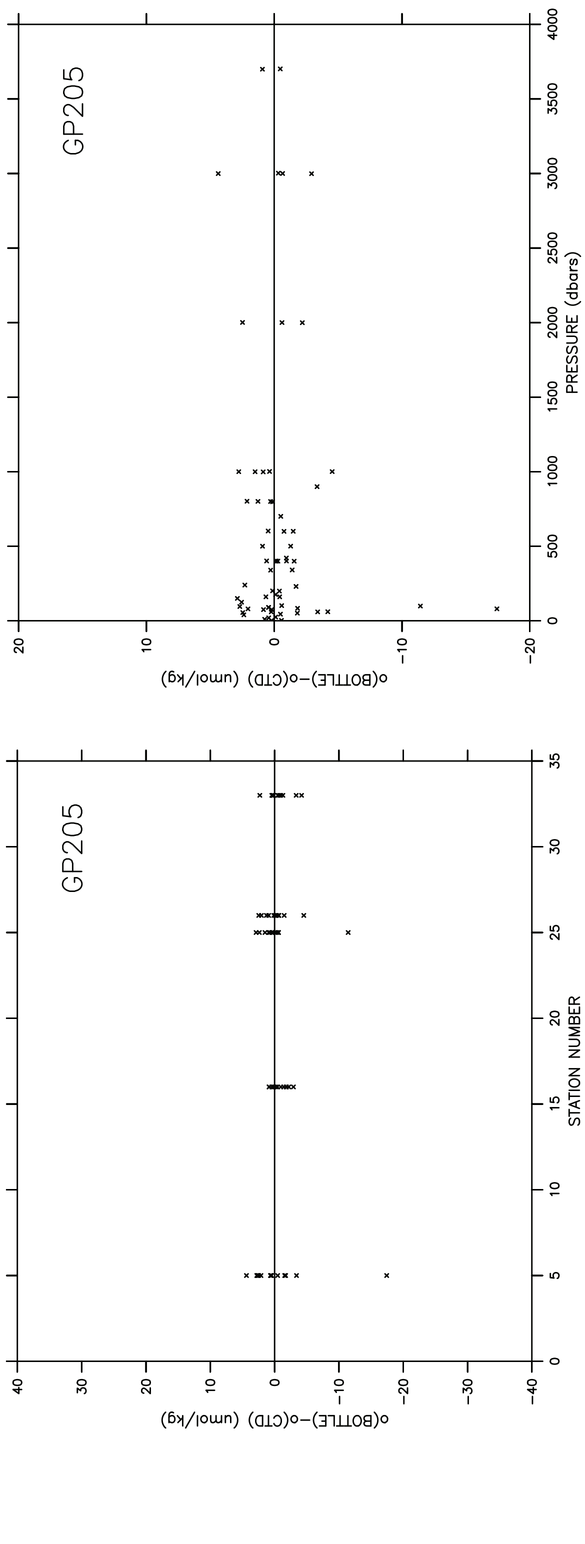


Figure 4: Calibrated CTD-bottle oxygen differences plotted against station number and pressure for cruise GP2-05-KA.

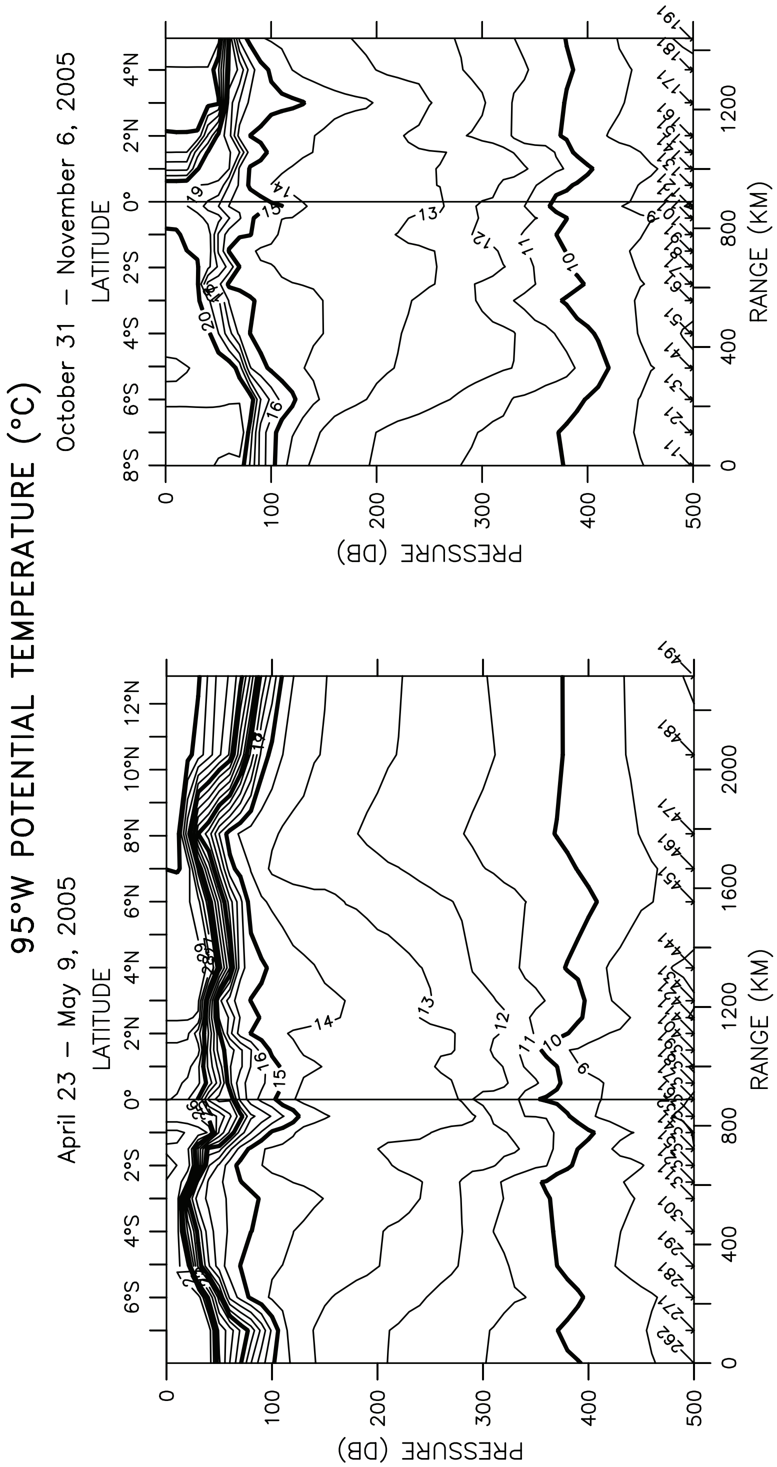


Figure 5: GP2-05-KA spring and GP6-05-RB fall potential temperature (°C) sections along 95°W. Contour intervals are 1°C.

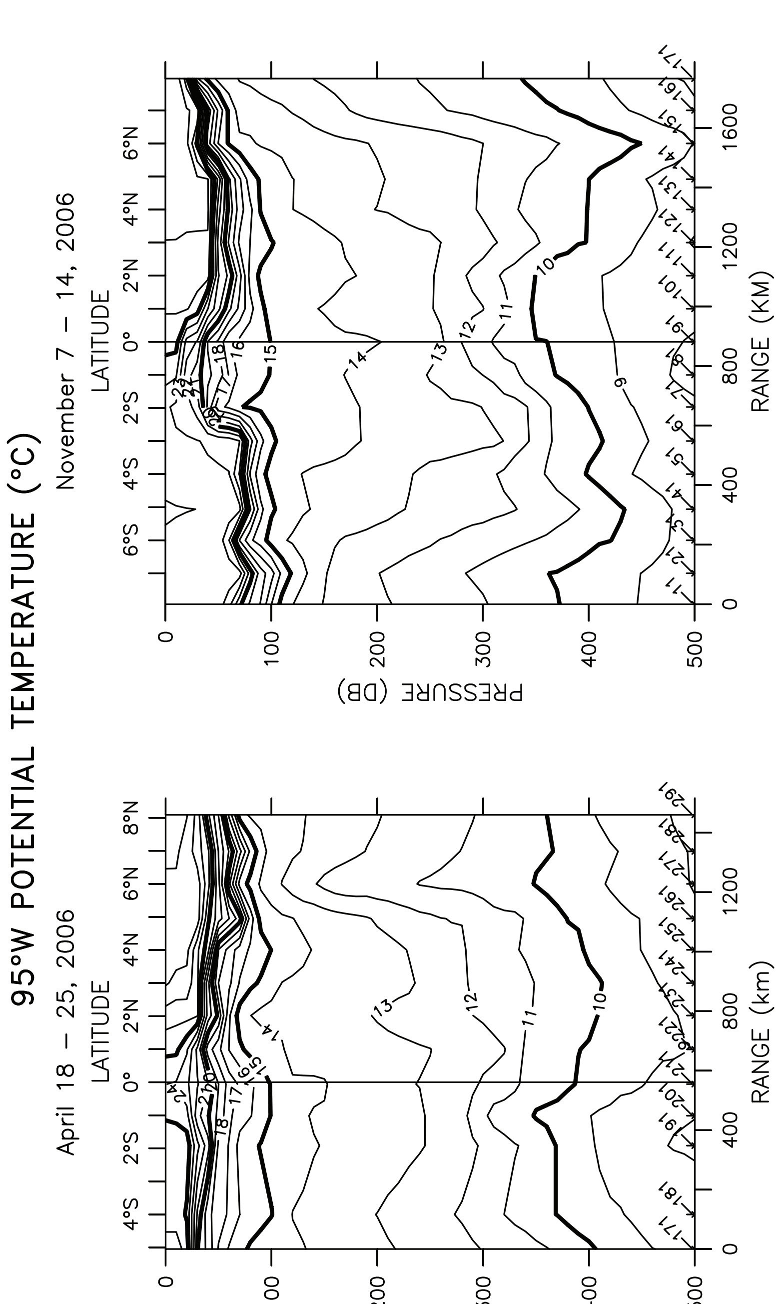


Figure 6: GP2-06-KA spring and GP6-06-RB fall potential temperature (°C) sections along 95°W. Contour intervals are 1°C.

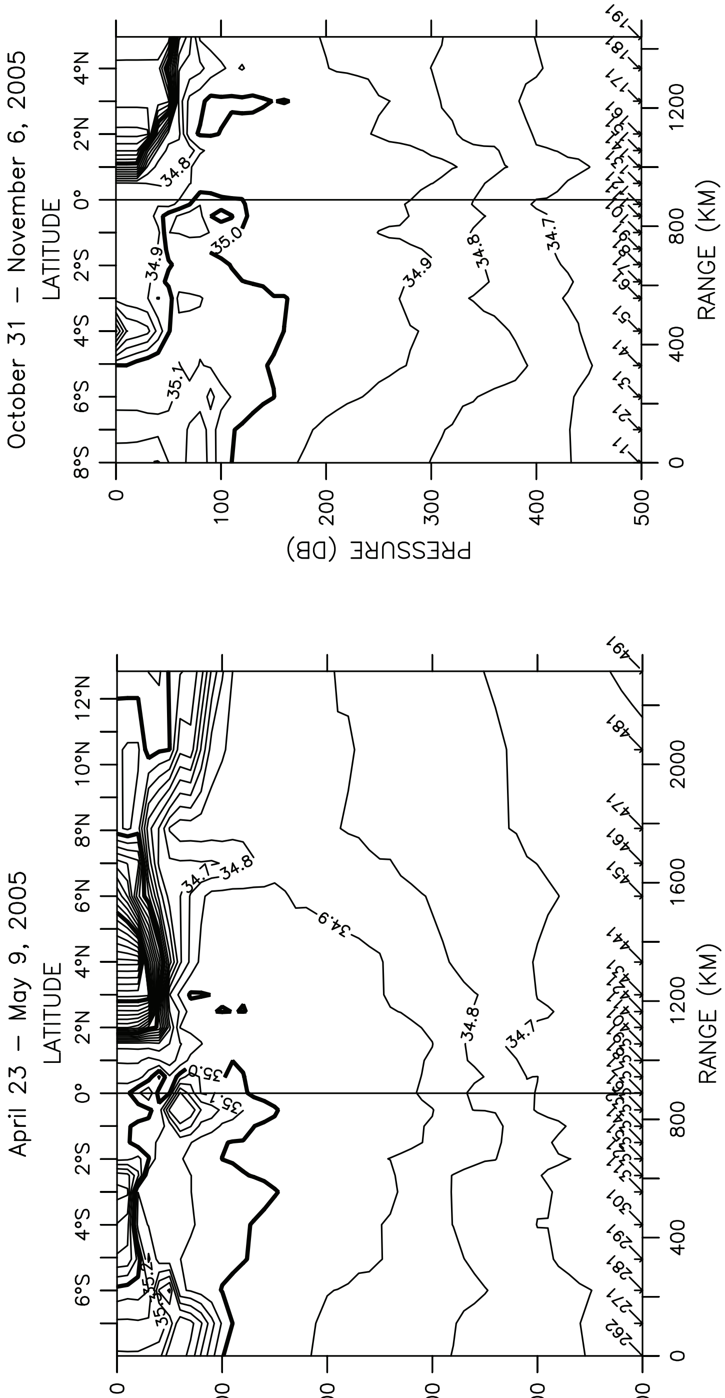


Figure 7: GP2-05-KA spring and GP6-05-RB fall salinity (PSS-78) sections along 95°W. Contour intervals are 0.1.

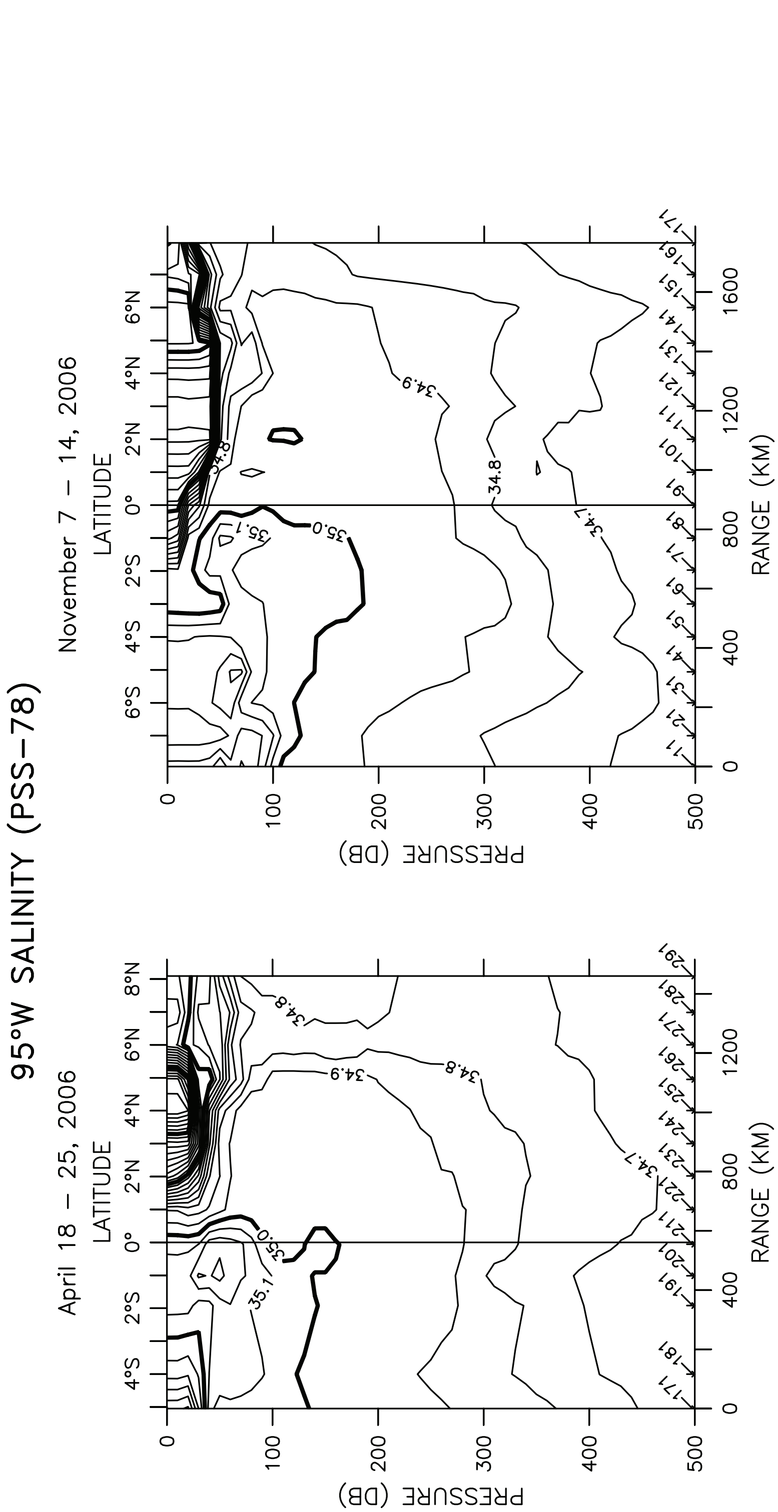


Figure 8: GP2-06-KA spring and GP6-06-RB fall salinity (PSS-78) sections along 95°W. Contour intervals are 0.1.

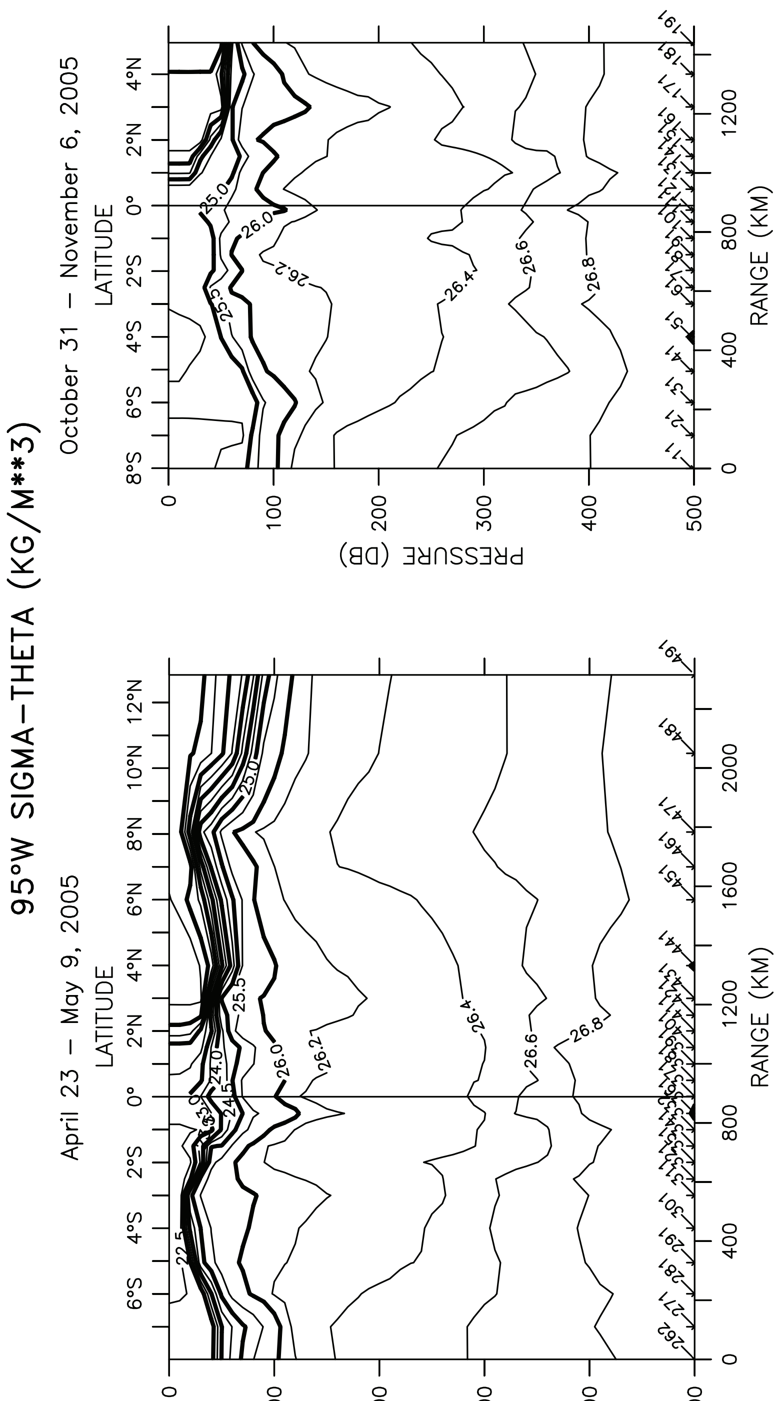


Figure 9: GP2-05-KA spring and GP6-05-RB fall potential density (kg/m^3) sections along 95°W. Contour intervals are 0.5 less than 26.0 and 0.2 greater than 26.0.

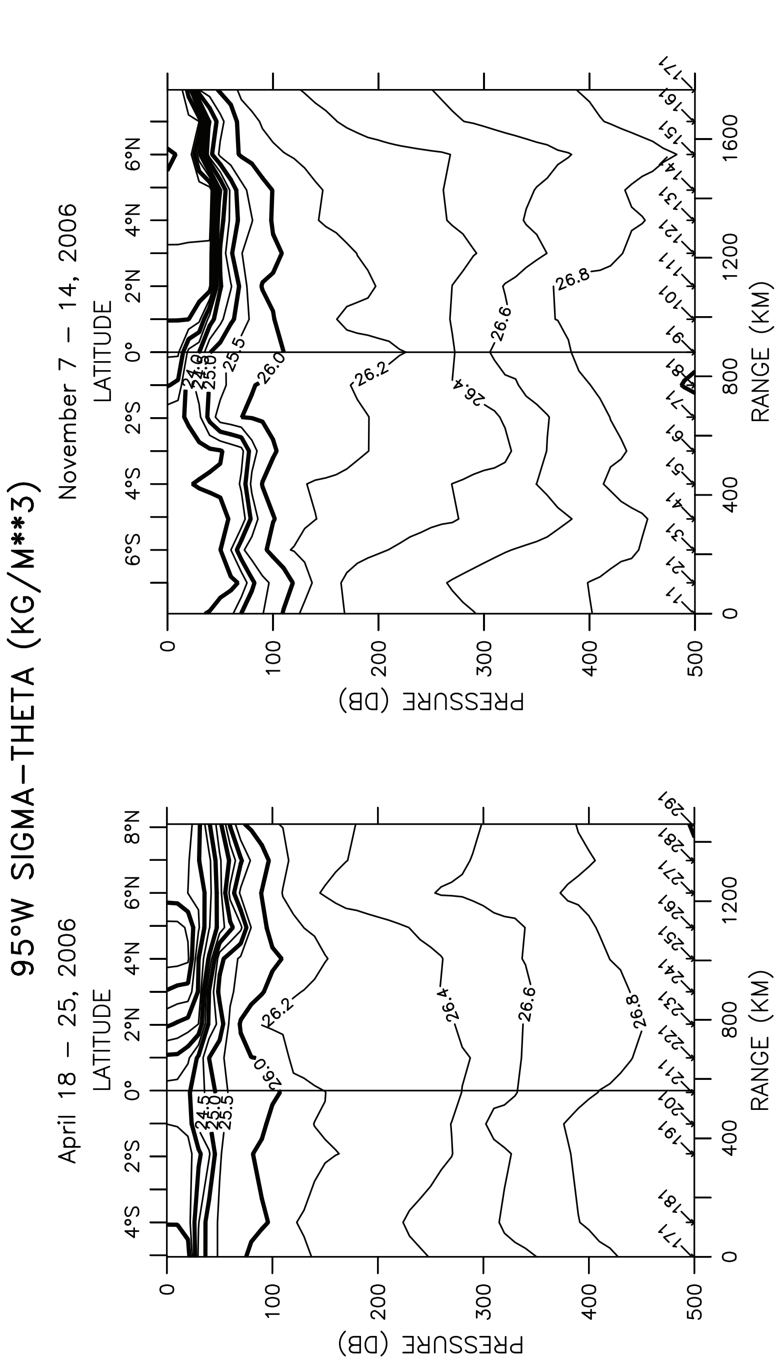


Figure 10: GP2-06-KA spring and GP6-06-RB fall potential density (kg/m^3) sections along 95°W. Contour intervals are 0.5 less than 26.0 and 0.2 greater than 26.0.

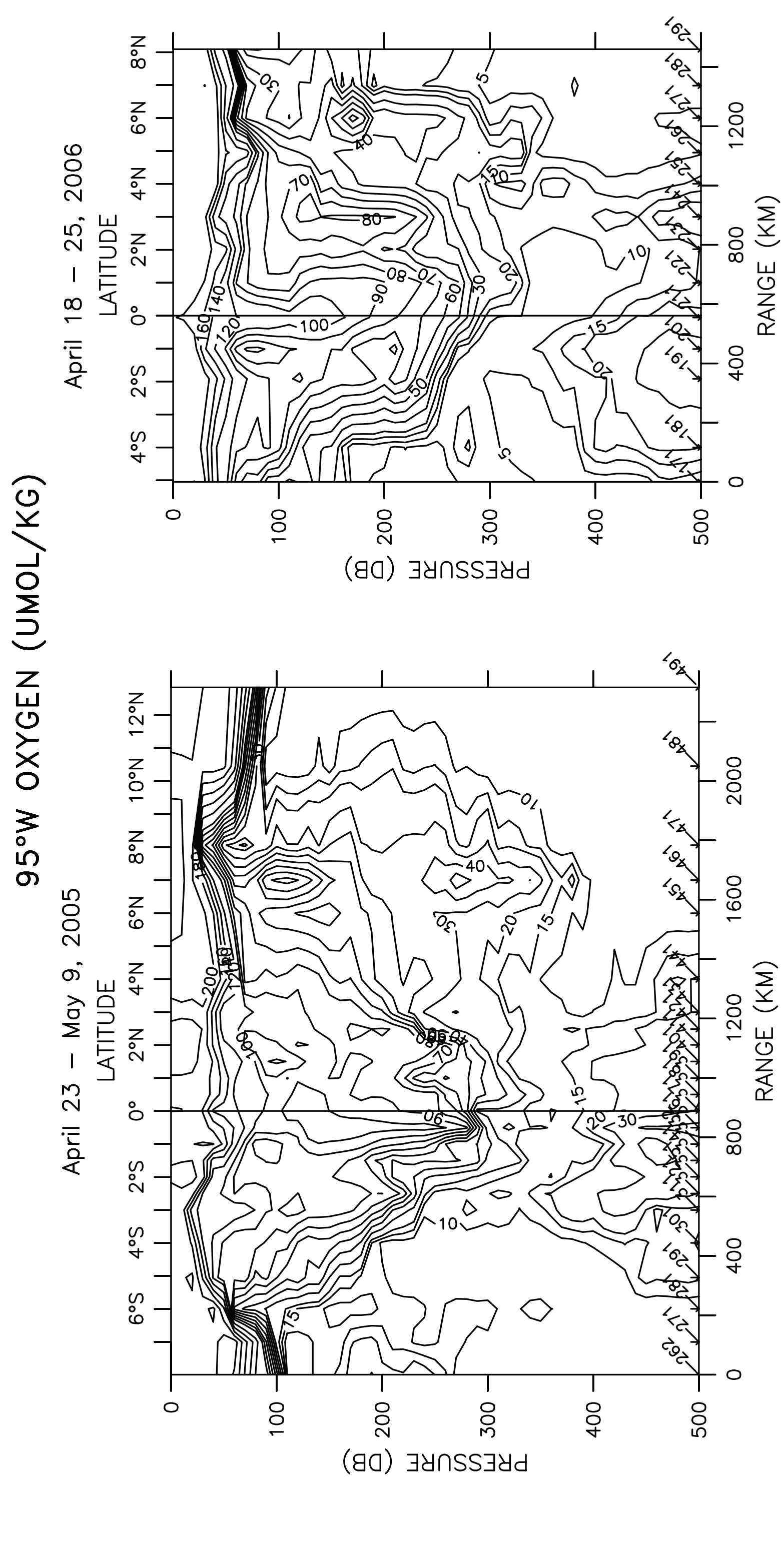


Figure 11: GP2-05-KA spring and GP2-06-KA spring oxygen (μmol/kg) section along 95°W. Contour intervals are 5 less than 10, 10 between 10 and 100, and 20 greater than 100.

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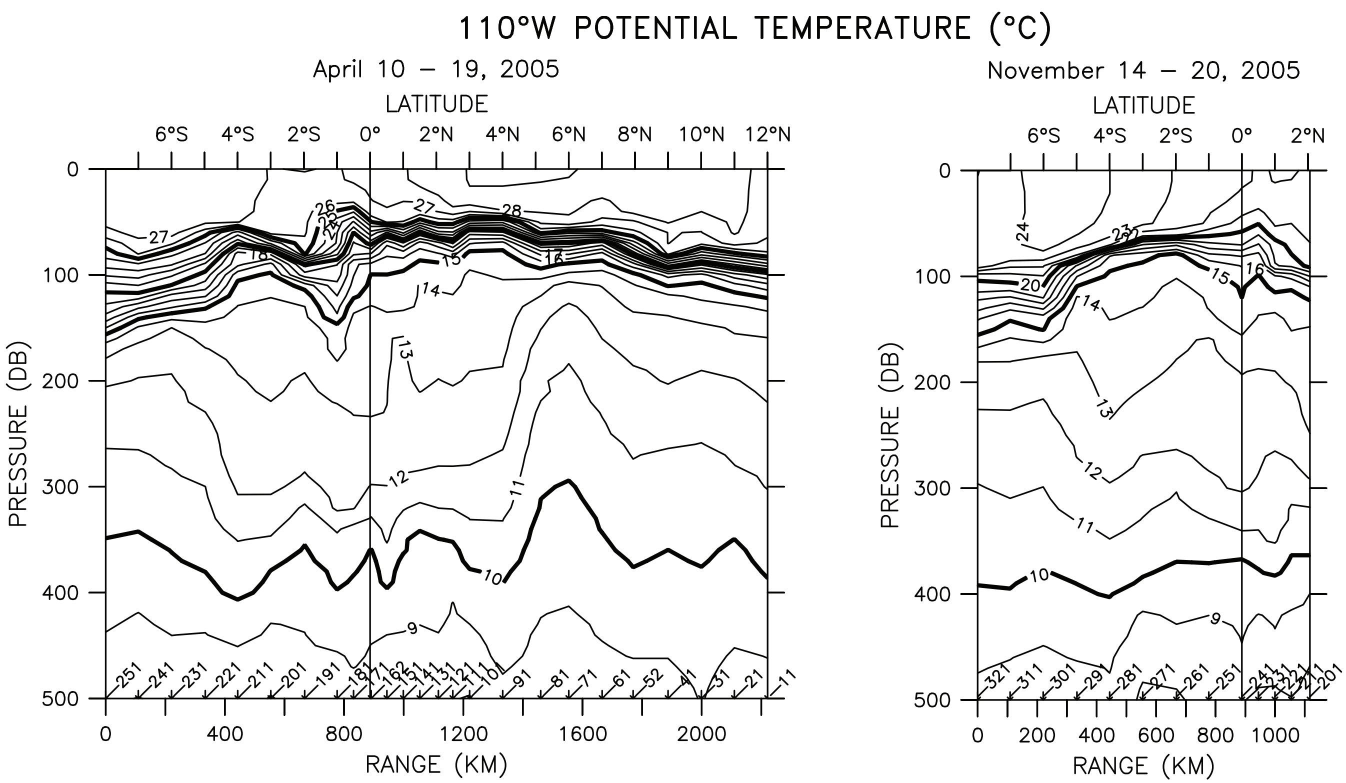

Figure 12: GP2-05-KA spring and GP6-05-RB fall potential temperature (°C) sections along 110°W. Contour intervals are 1°C.

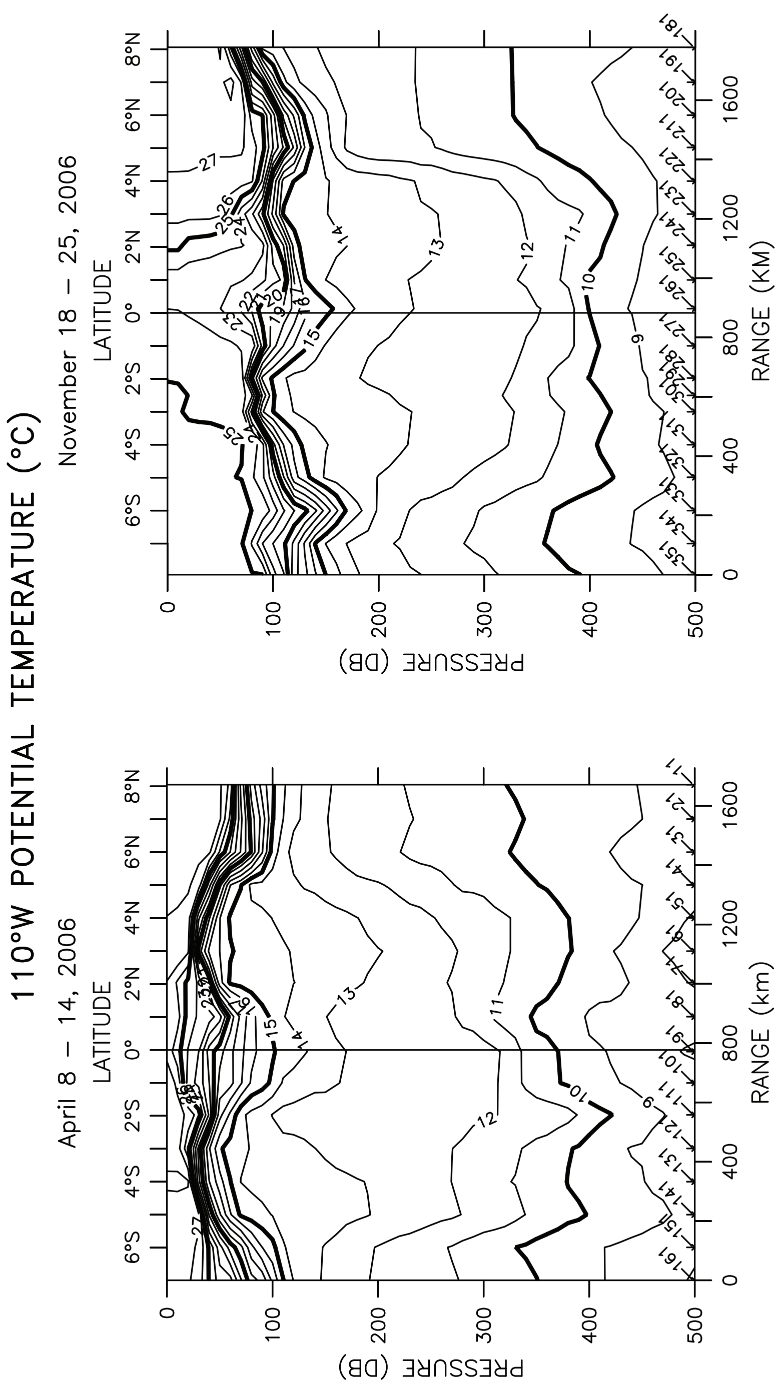

Figure 13: GP2-06-KA spring and GP6-06-RB fall potential temperature (°C) sections along 110°W. Contour intervals are 1°C.

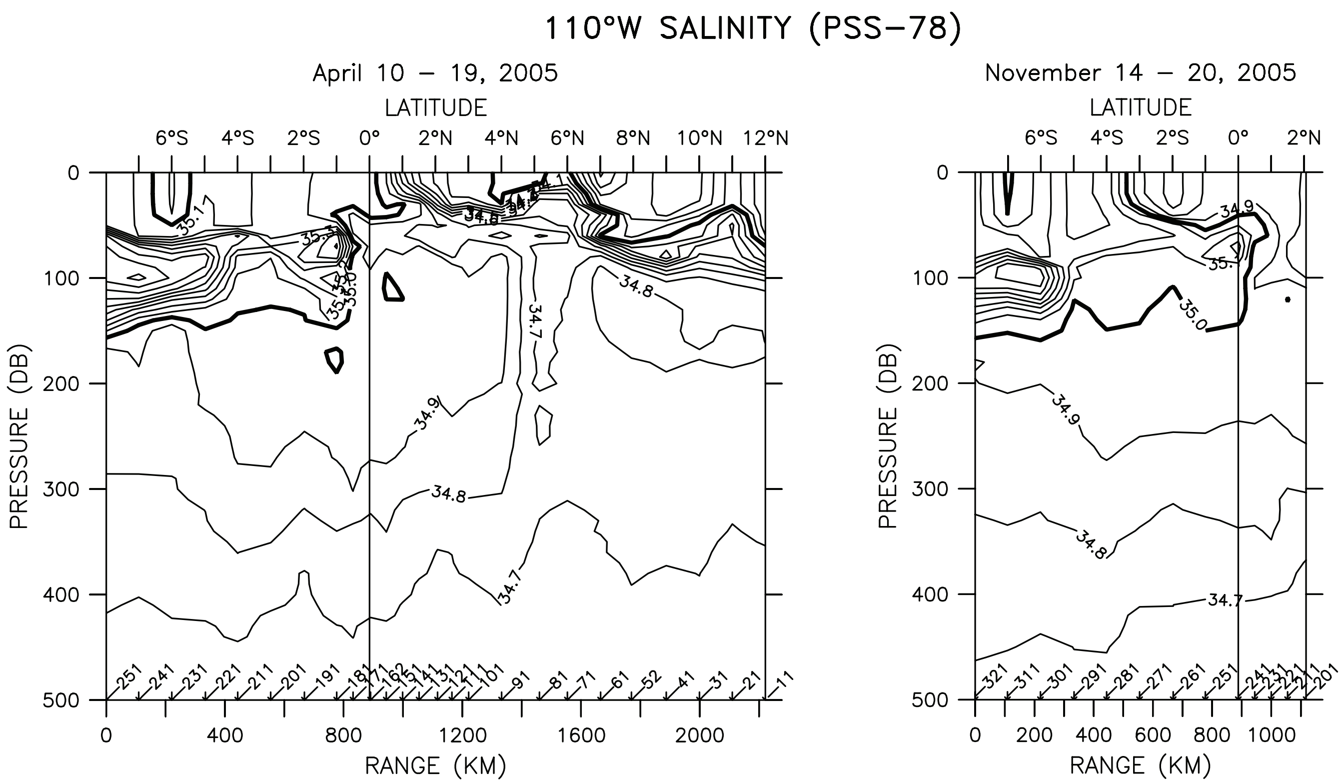

Figure 14: GP2-05-KA spring and GP6-05-RB fall salinity (PSS-78) sections along 110°W. Contour intervals are 0.1.

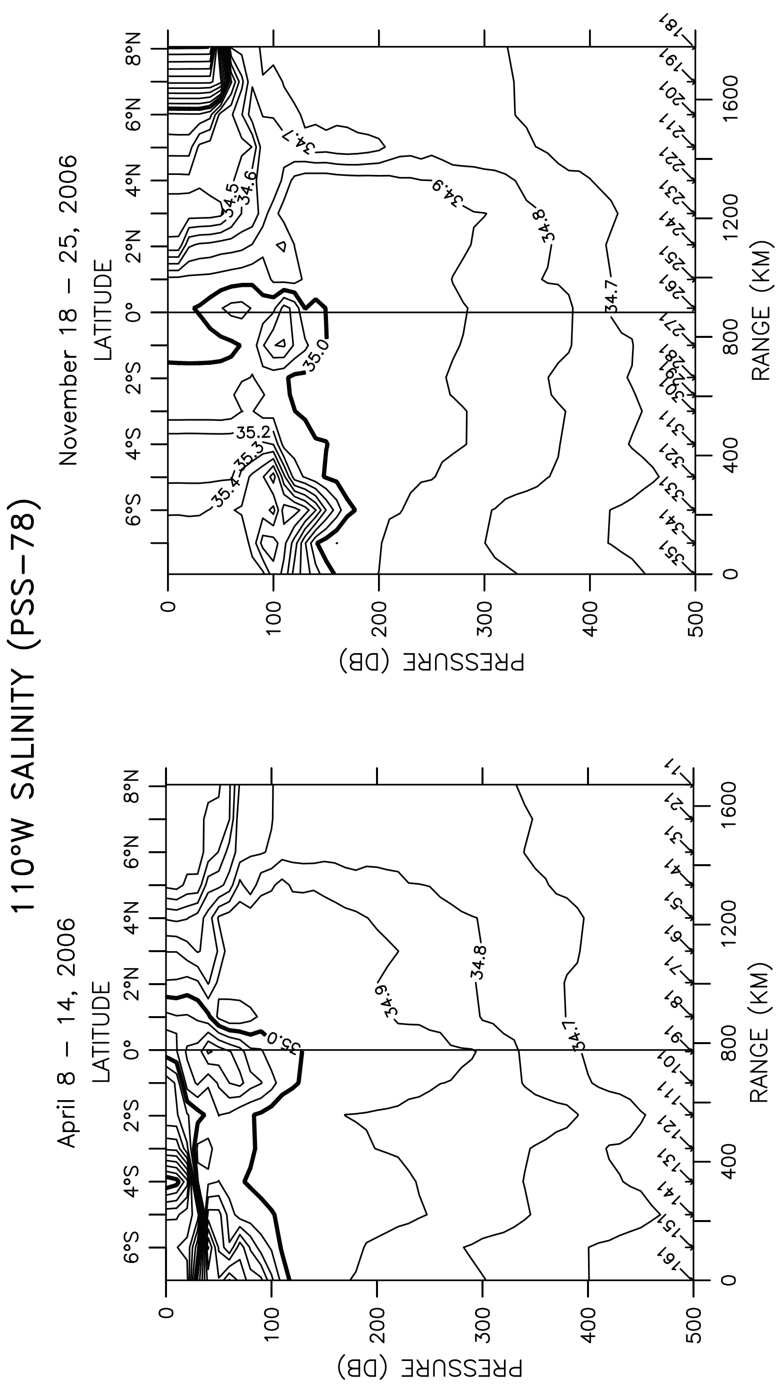

Figure 15: GP2-06-KA spring and GP6-06-RB fall salinity (PSS-78) sections along 110°W. Contour intervals are 0.1.

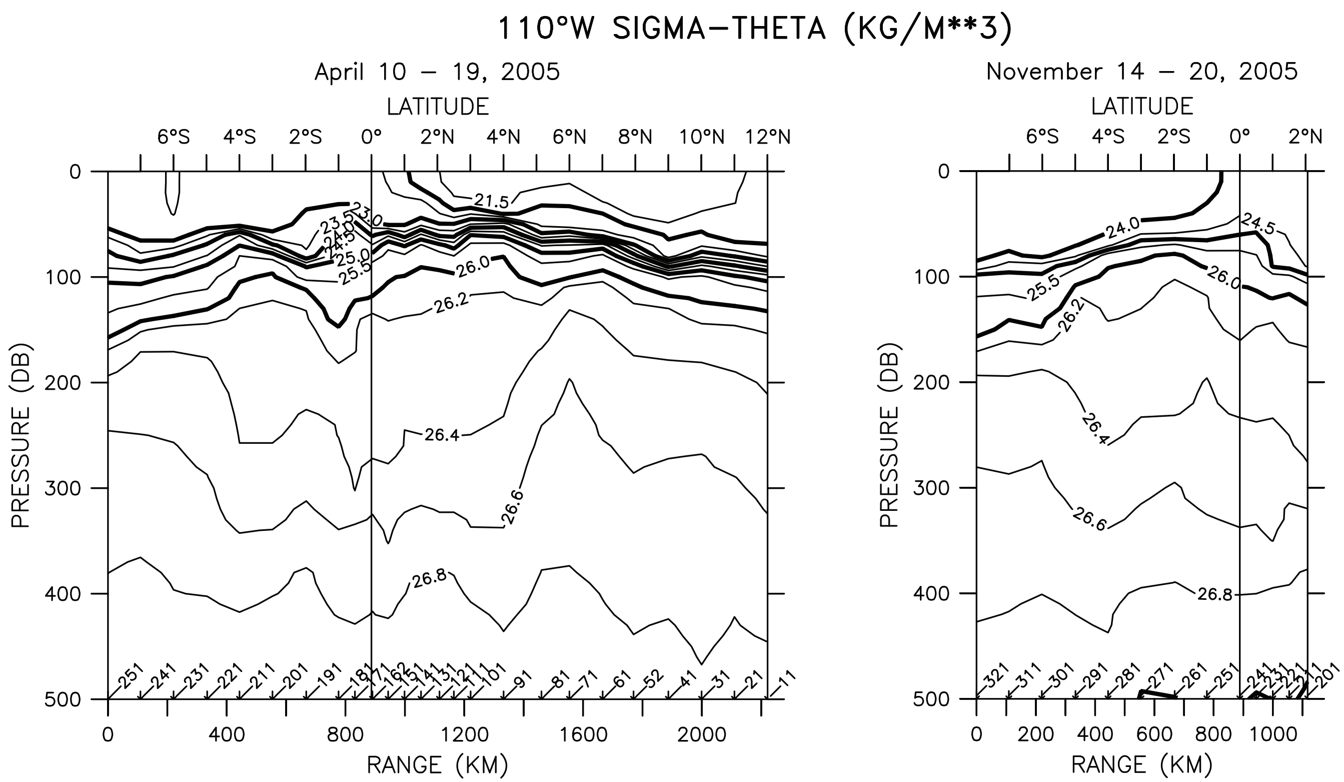

Figure 16: GP2-05-KA spring and GP6-05-RB fall potential density (kg/m^3) sections along 110°W. Contour intervals are 0.5 less than 26.0 and 0.2 greater than 26.0.

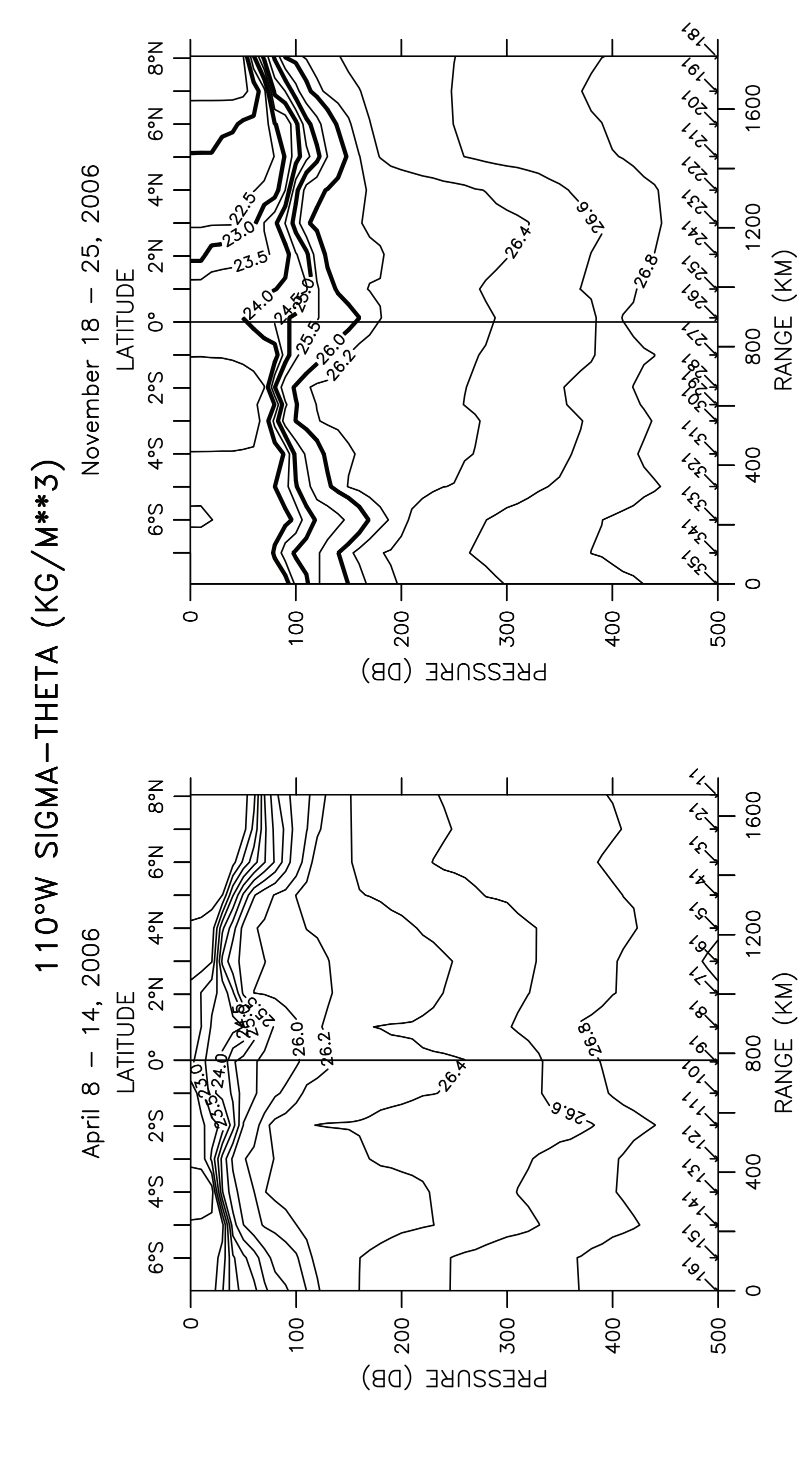

Figure 17: GP2-06-KA spring and GP6-06-RB fall potential density (kg/m^3) sections along 110°W. Contour intervals are 0.5 less than 26.0 and 0.2 greater than 26.0.

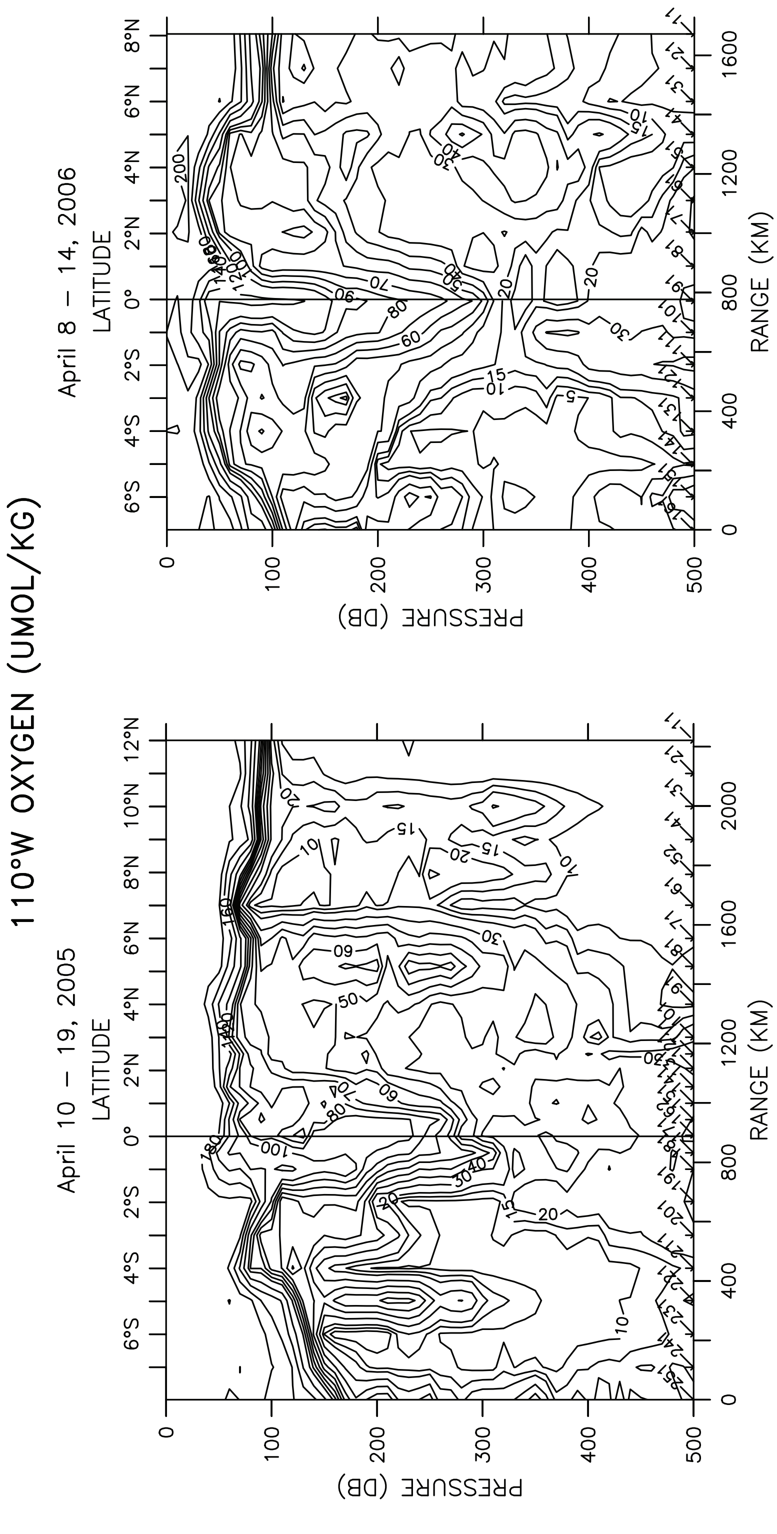

Figure 18: GP2-05-KA spring and GP2-06-KA spring oxygen (μmol/kg) section along 110°W. Contour intervals are 5 less than 10, 10 between 10 and 100, and 20 greater than 100.

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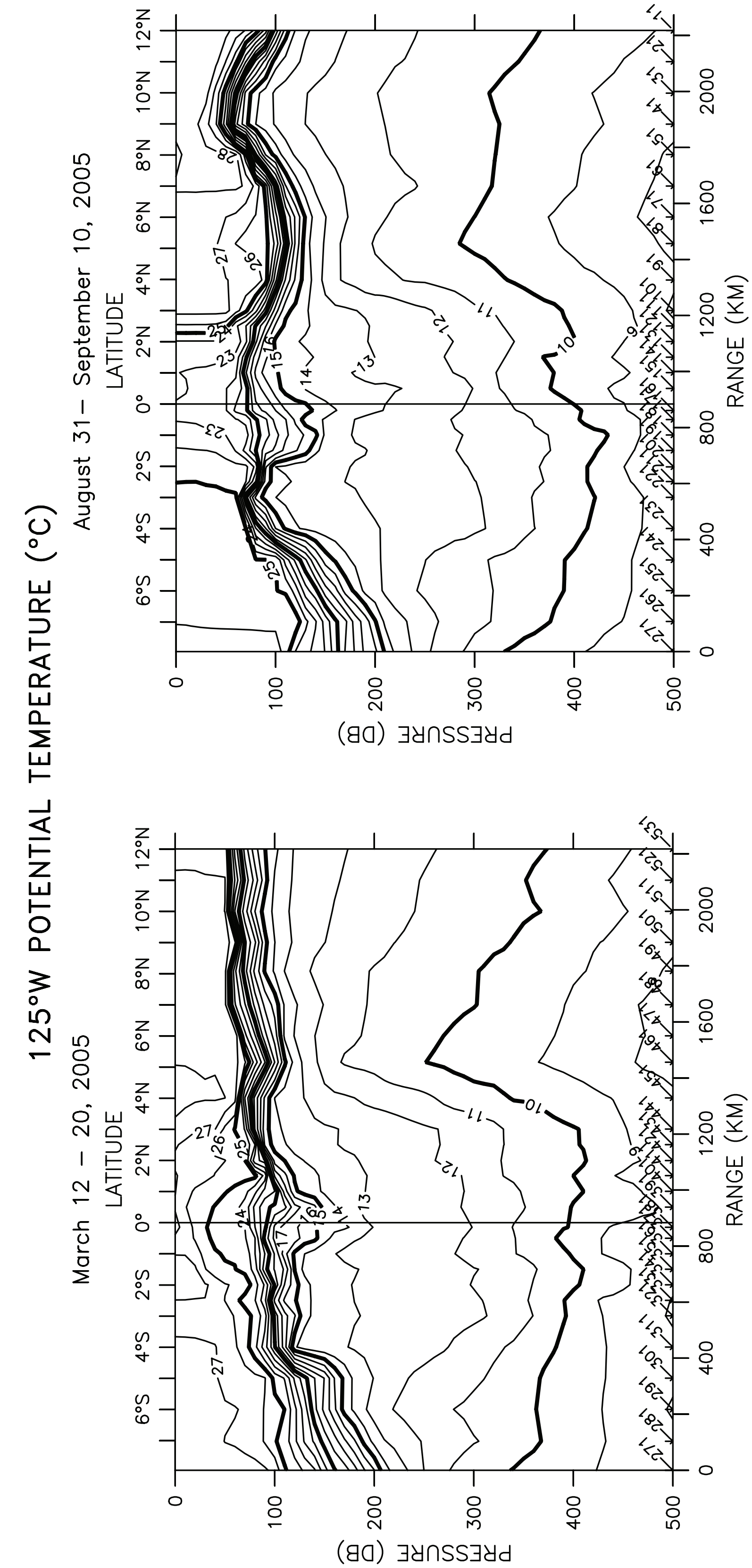

Figure 19: GP1-05-KA spring and GP5-05-KA fall potential temperature (°C) sections along 125°W. Contour intervals are 1°C.

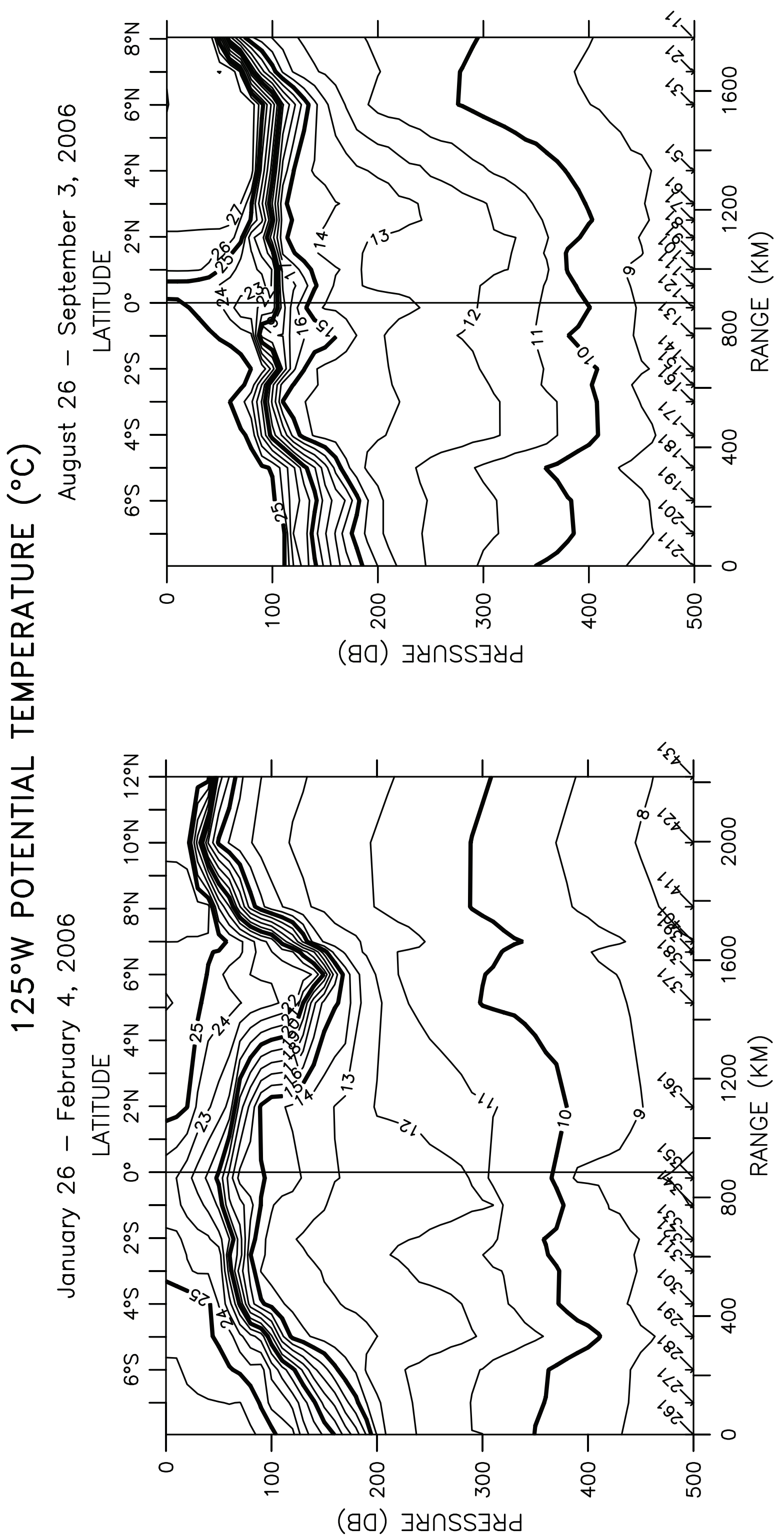

Figure 20: GP1-06-KA winter and GP5-06-KA fall potential temperature (°C) sections along 125°W. Contour intervals are 1°C.

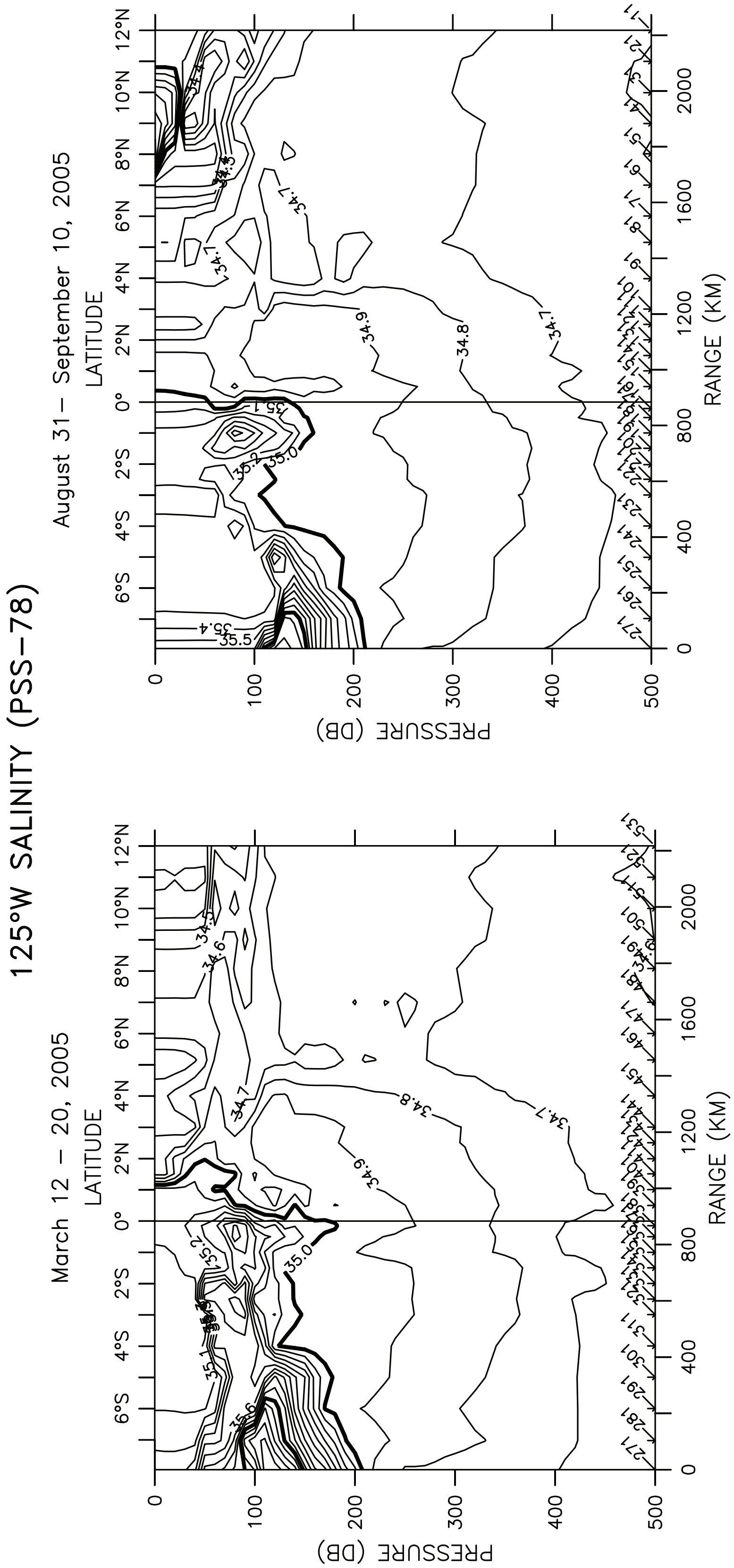

Figure 21: GP1-05-KA spring and GP5-05-KA fall salinity (PSS-78) sections along 125°W. Contour intervals are 0.1.

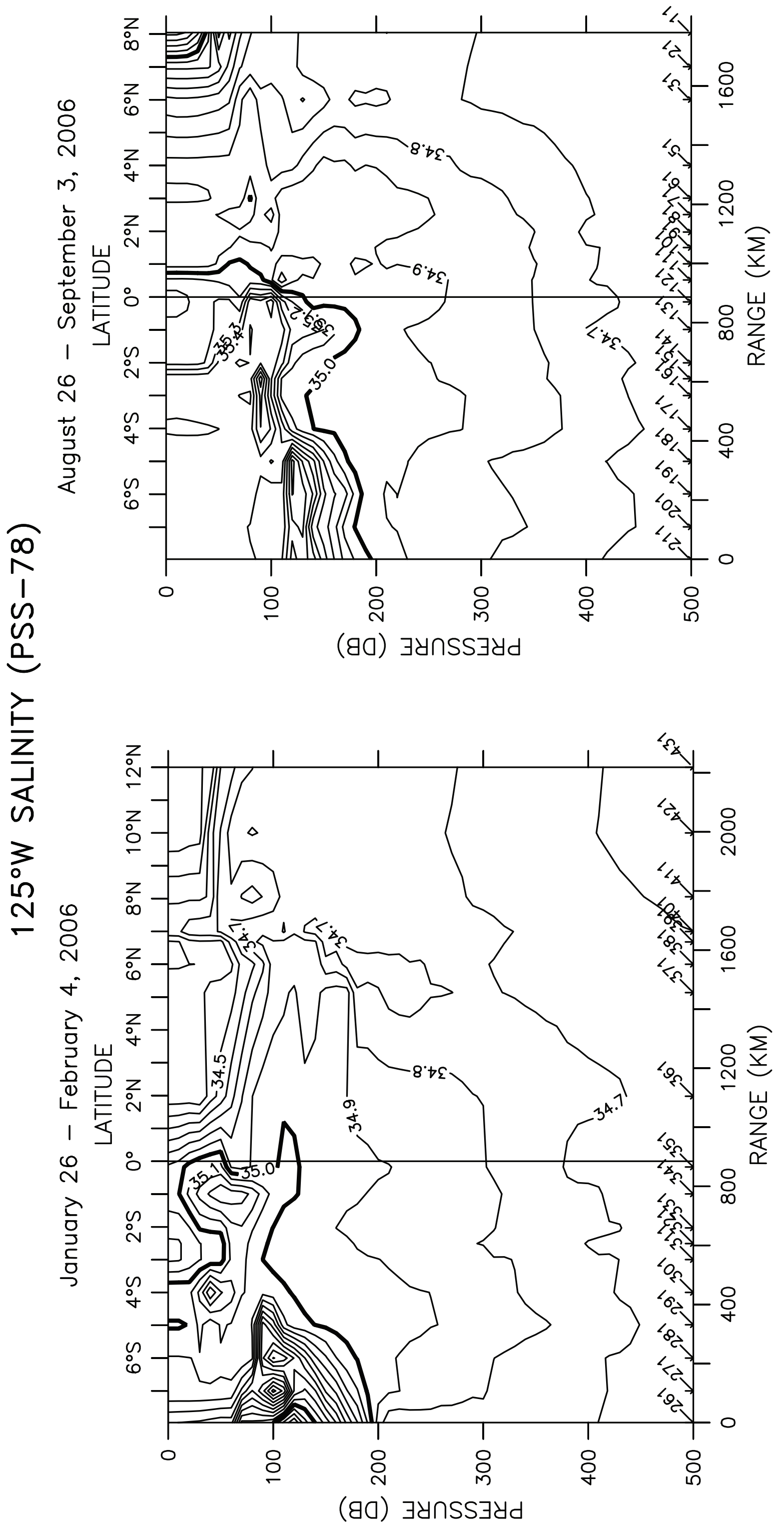

Figure 22: GP1-06-KA winter and GP5-06-KA fall salinity (PSS-78) sections along 125°W. Contour intervals are 0.1.

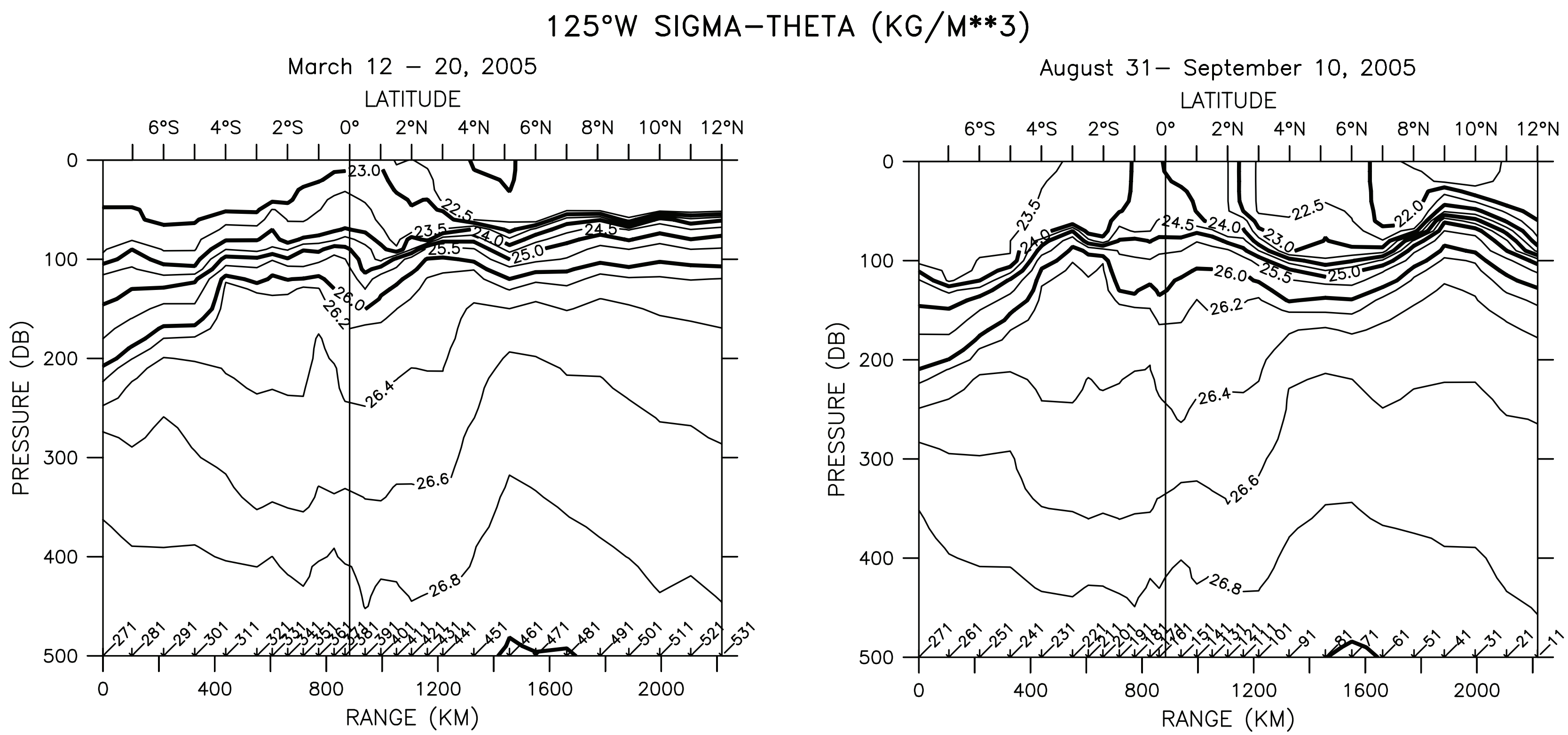

Figure 23: GP1-05-KA spring and GP5-05-KA fall potential density (kg/m^3) sections along 125°W. Contour intervals are 0.5 less than 26.0 and 0.2 greater than 26.0.

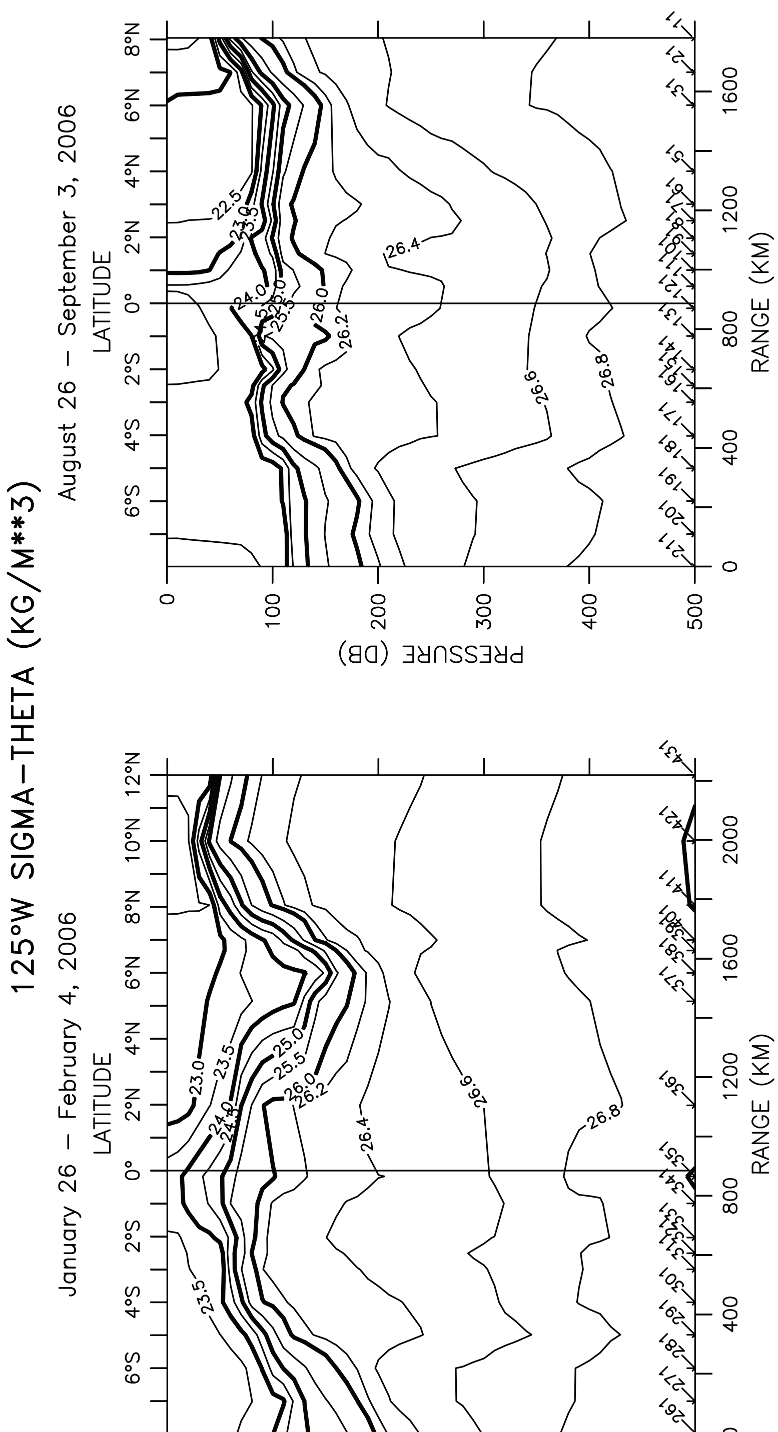

Figure 24: GP1-06-KA winter and GP5-06-KA fall potential density (kg/m^3) sections along 125°W. Contour intervals are 0.5 less than 26.0 and 0.2 greater than 26.0.

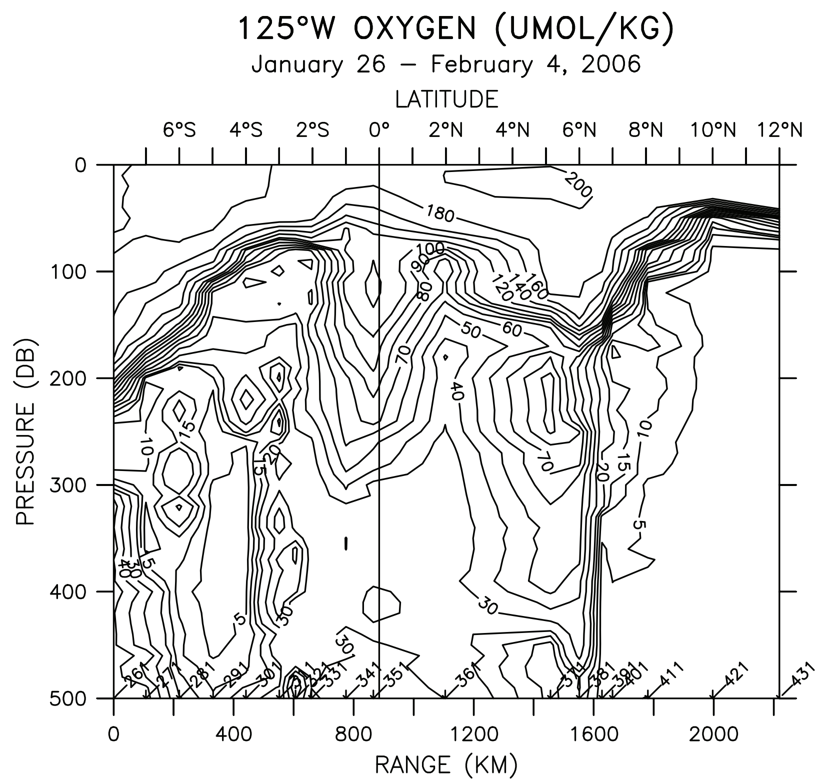

Figure 25: GP1-06-KA winter oxygen (μmol/kg) section along 125°W. Contour intervals are 5 less than 10, 10 between 10 and 100, and 20 greater than 100.

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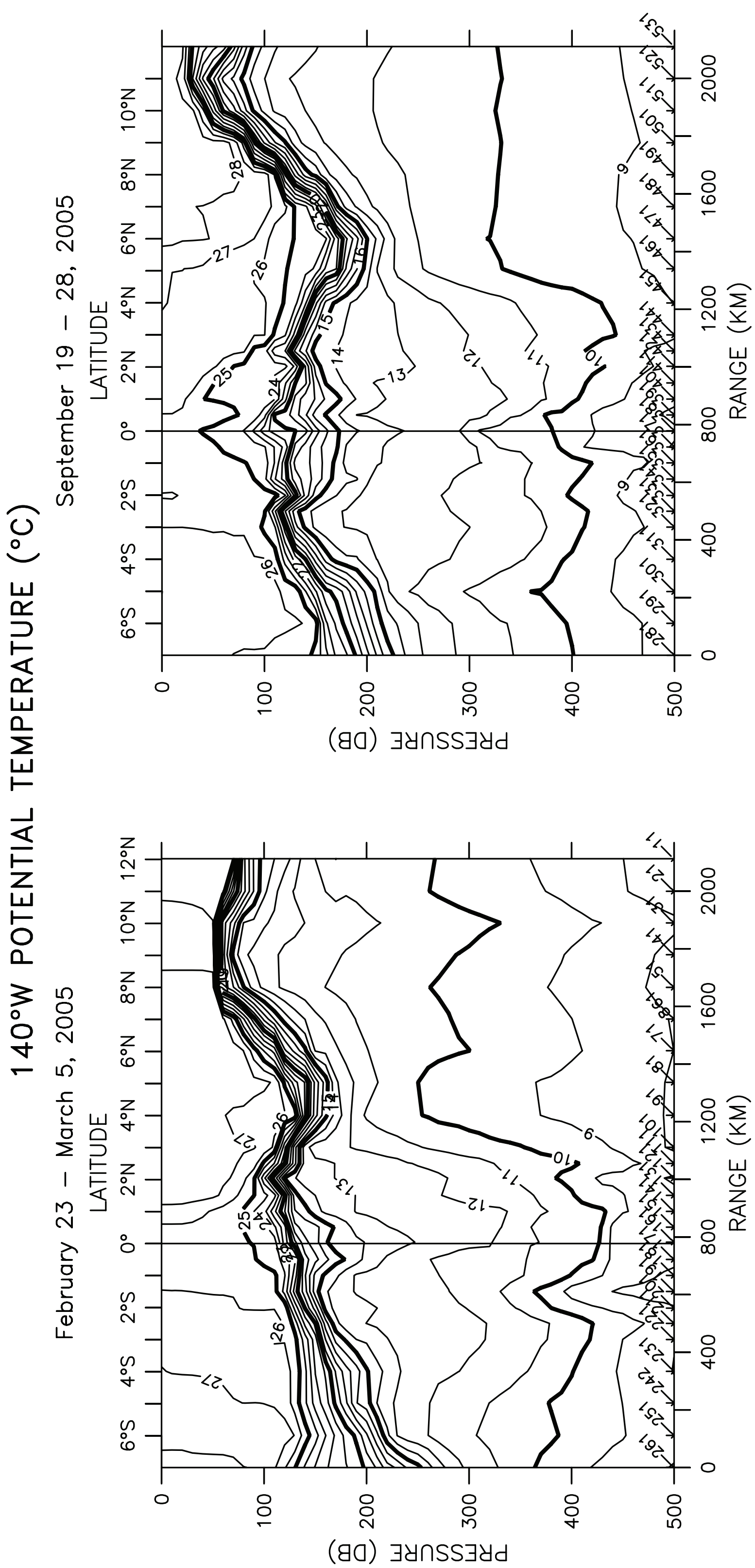

Figure 26: GP1-05-KA winter and GP5-05-KA fall potential temperature (°C) sections along 140°W. Contour intervals are 1°C.

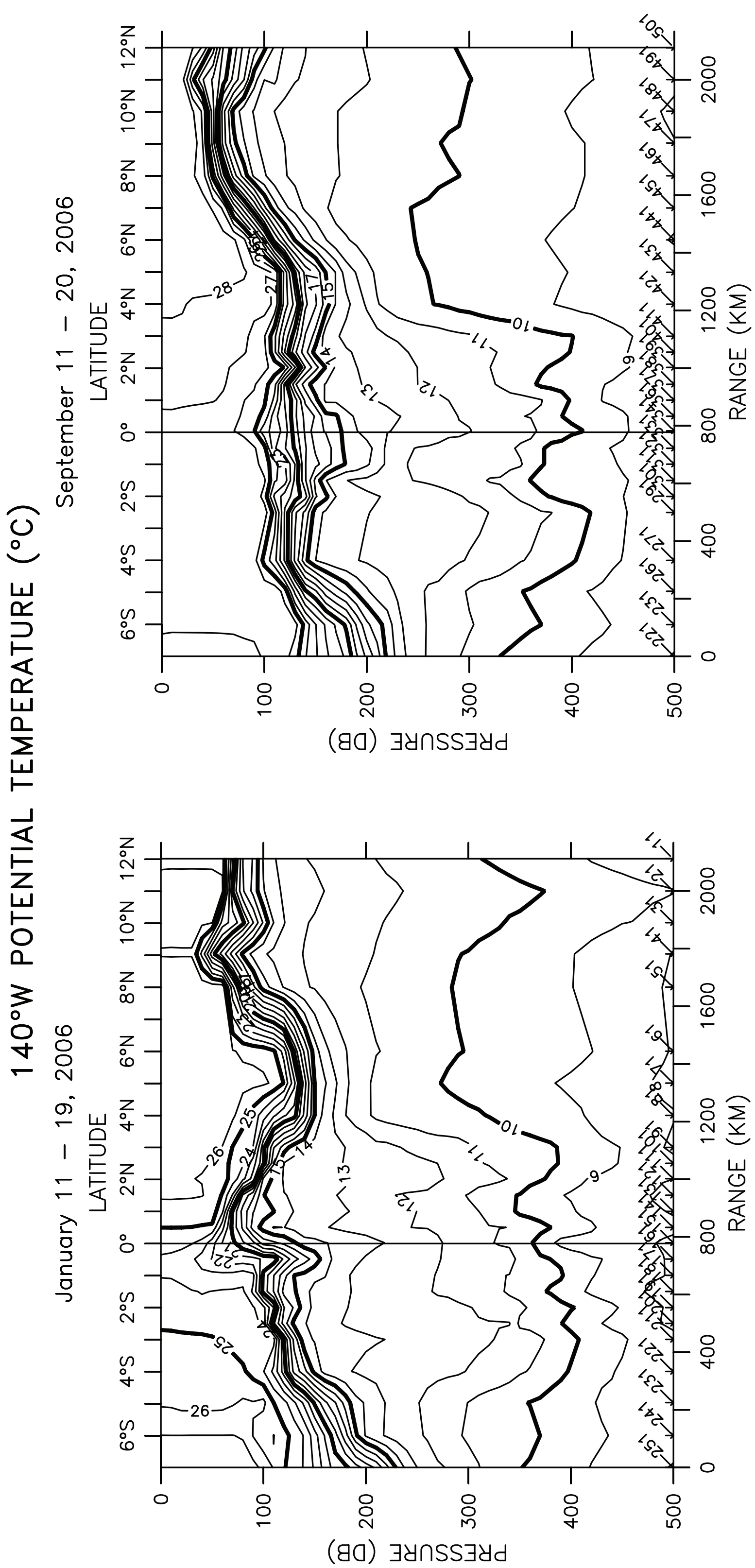

Figure 27: GP1-06-KA winter and GP5-06-KA fall potential temperature (°C) sections along 140°W. Contour intervals are 1°C.

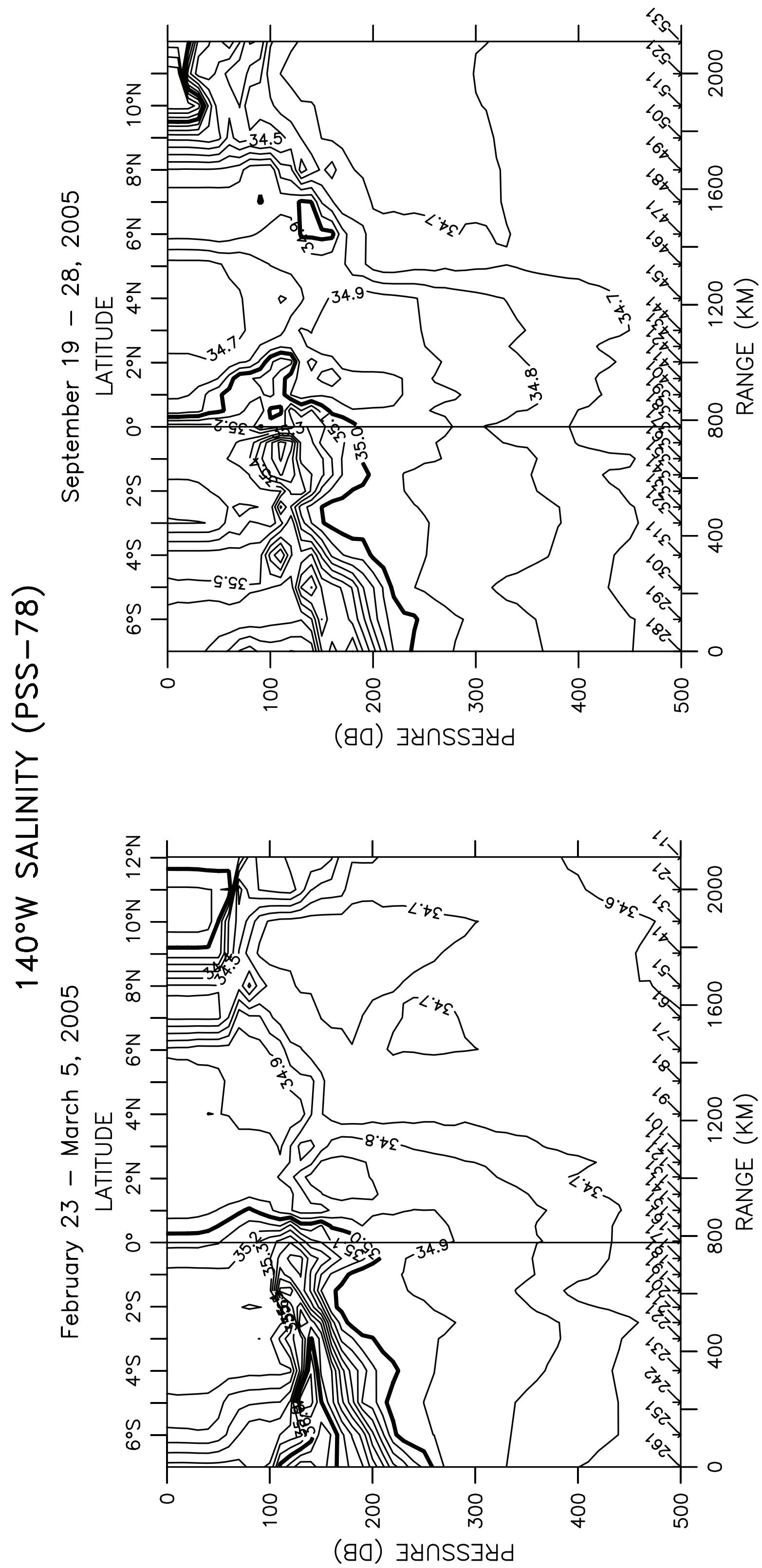

Figure 28: GP1-05-KA winter and GP5-05-KA fall salinity (PSS-78) sections along 140°W. Contour intervals are 0.1.

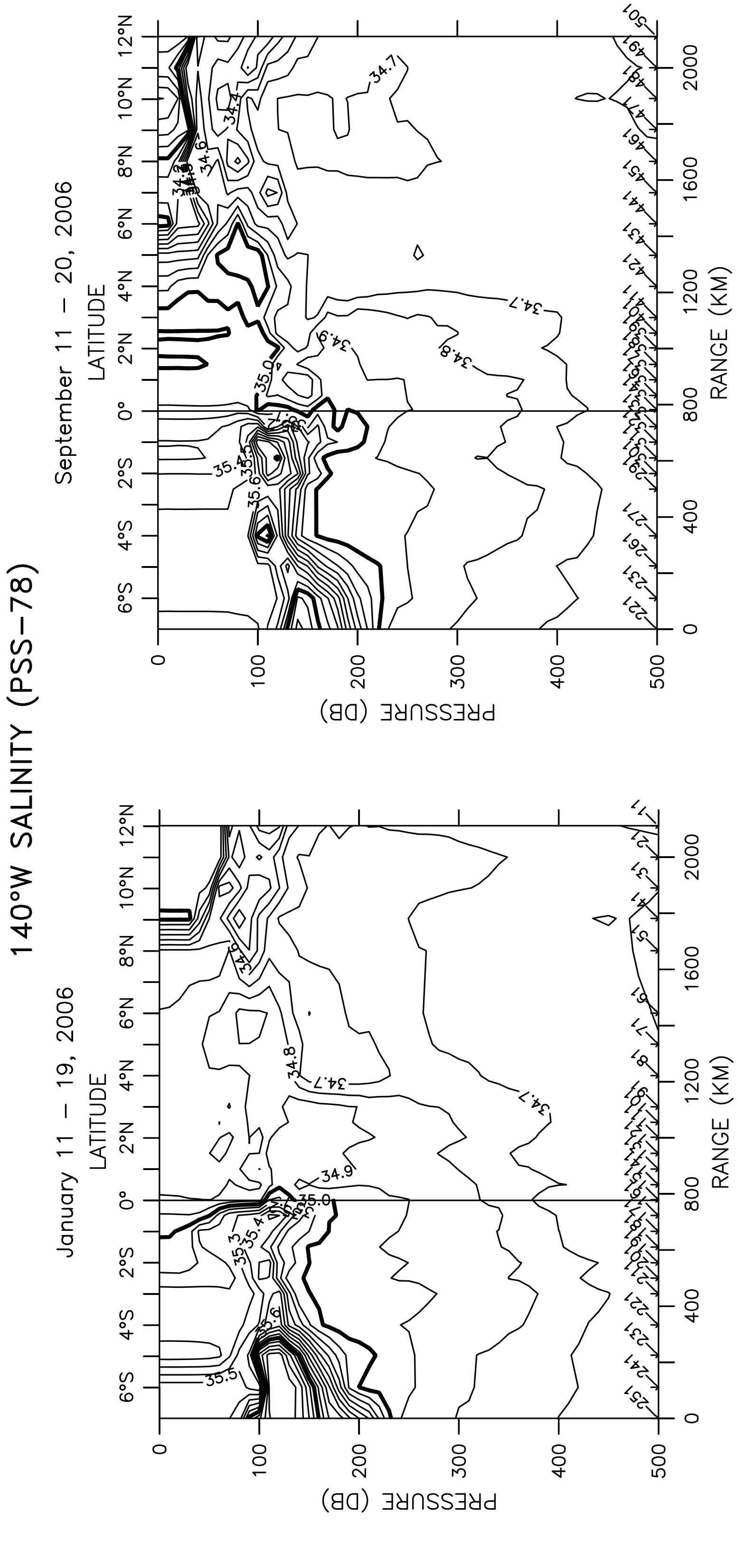

Figure 29: GP1-06-KA winter and GP5-06-KA fall salinity (PSS-78) sections along 140°W. Contour intervals are 0.1.

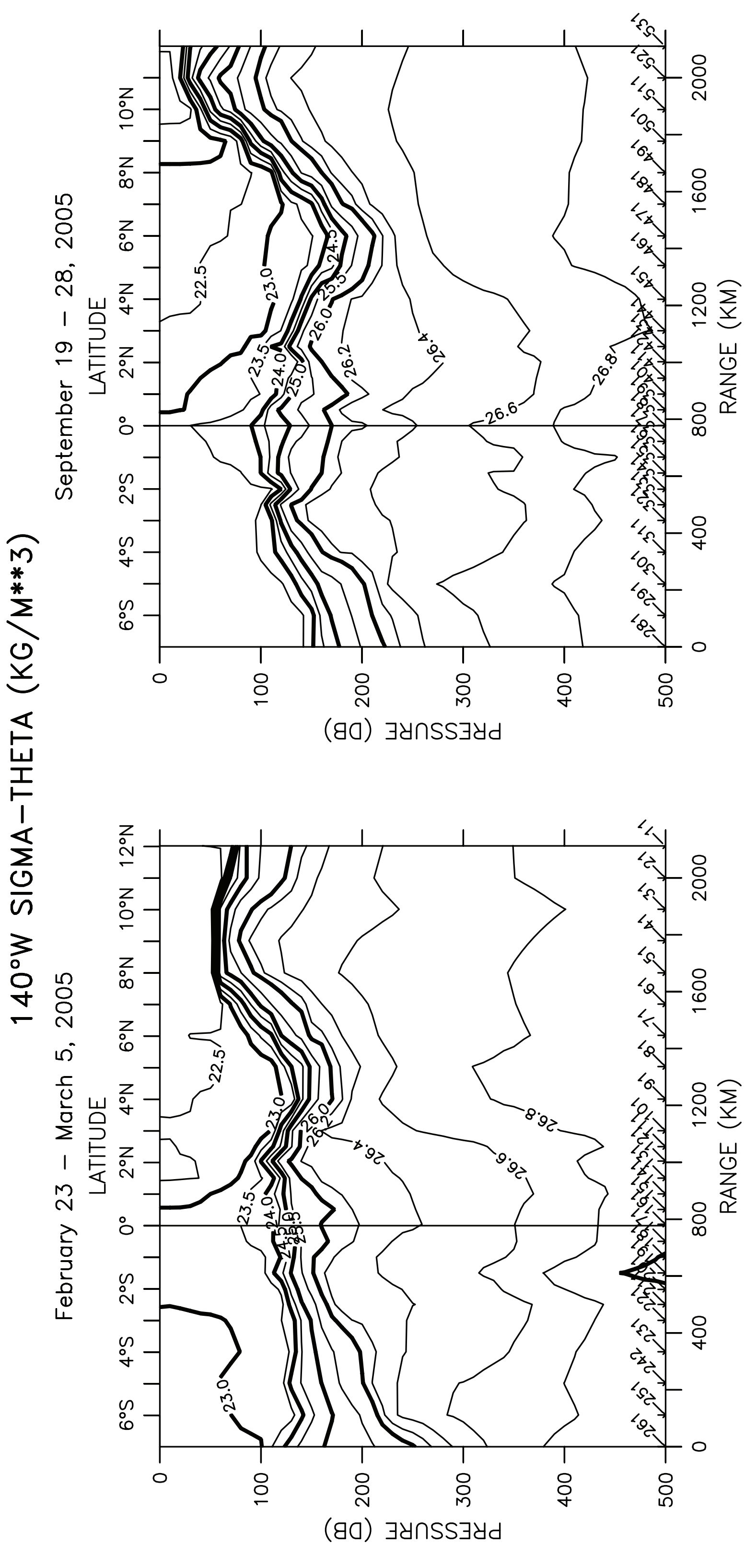

Figure 30: GP1-05-KA winter and GP5-05-KA fall potential density (kg/m^3) sections along 140°W. Contour intervals are 0.5 less than 26.0 and 0.2 greater than 26.0.

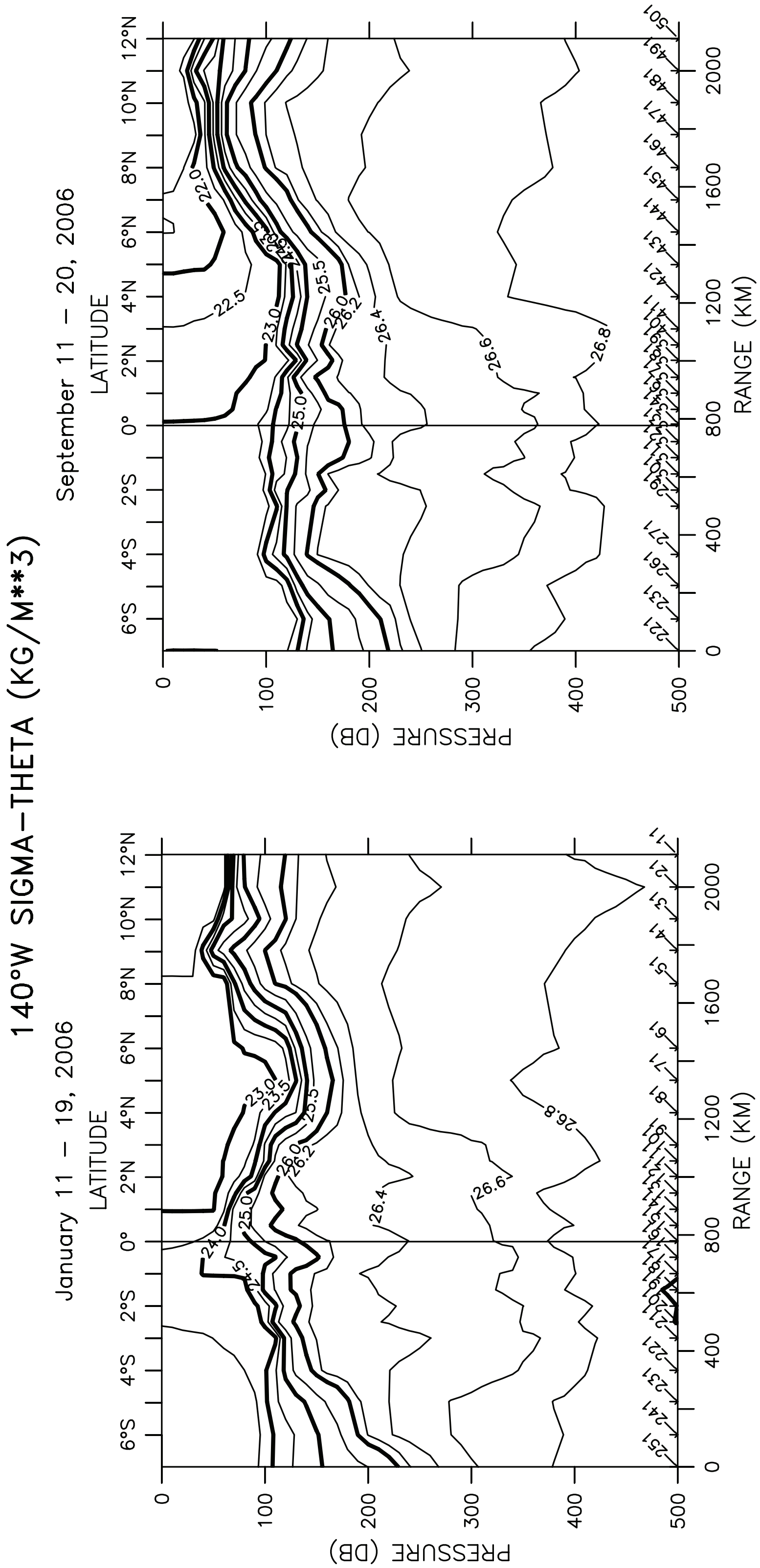

Figure 31: GP1-06-KA winter and GP5-06-KA fall potential density (kg/m^3) sections along 140°W. Contour intervals are 0.5 less than 26.0 and 0.2 greater than 26.0.

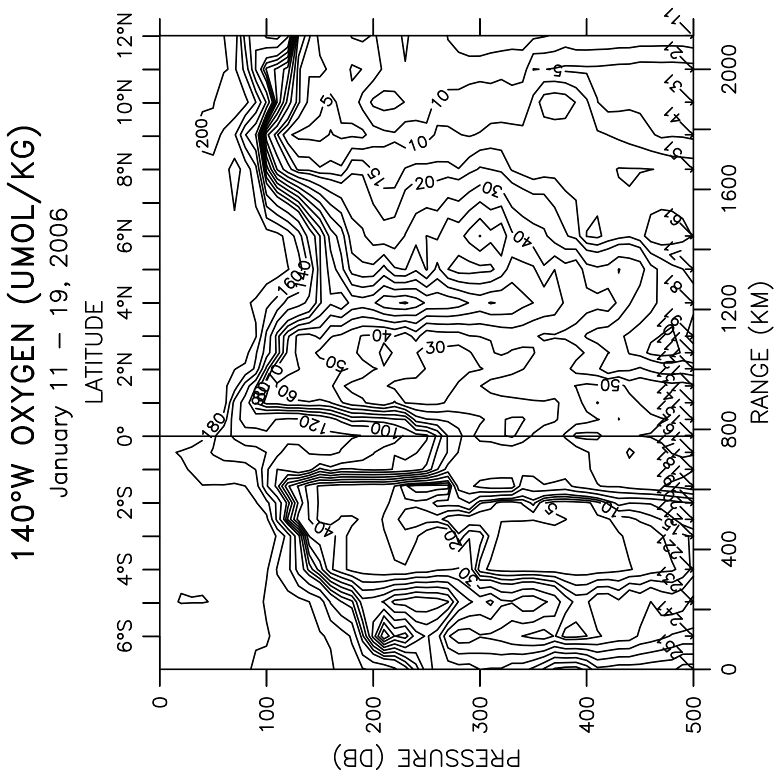

Figure 32: GP1-06-KA winter oxygen (μmol/kg) section along 140°W. Contour intervals are 5 less than 10, 10 between 10 and 100, and 20 greater than 100.

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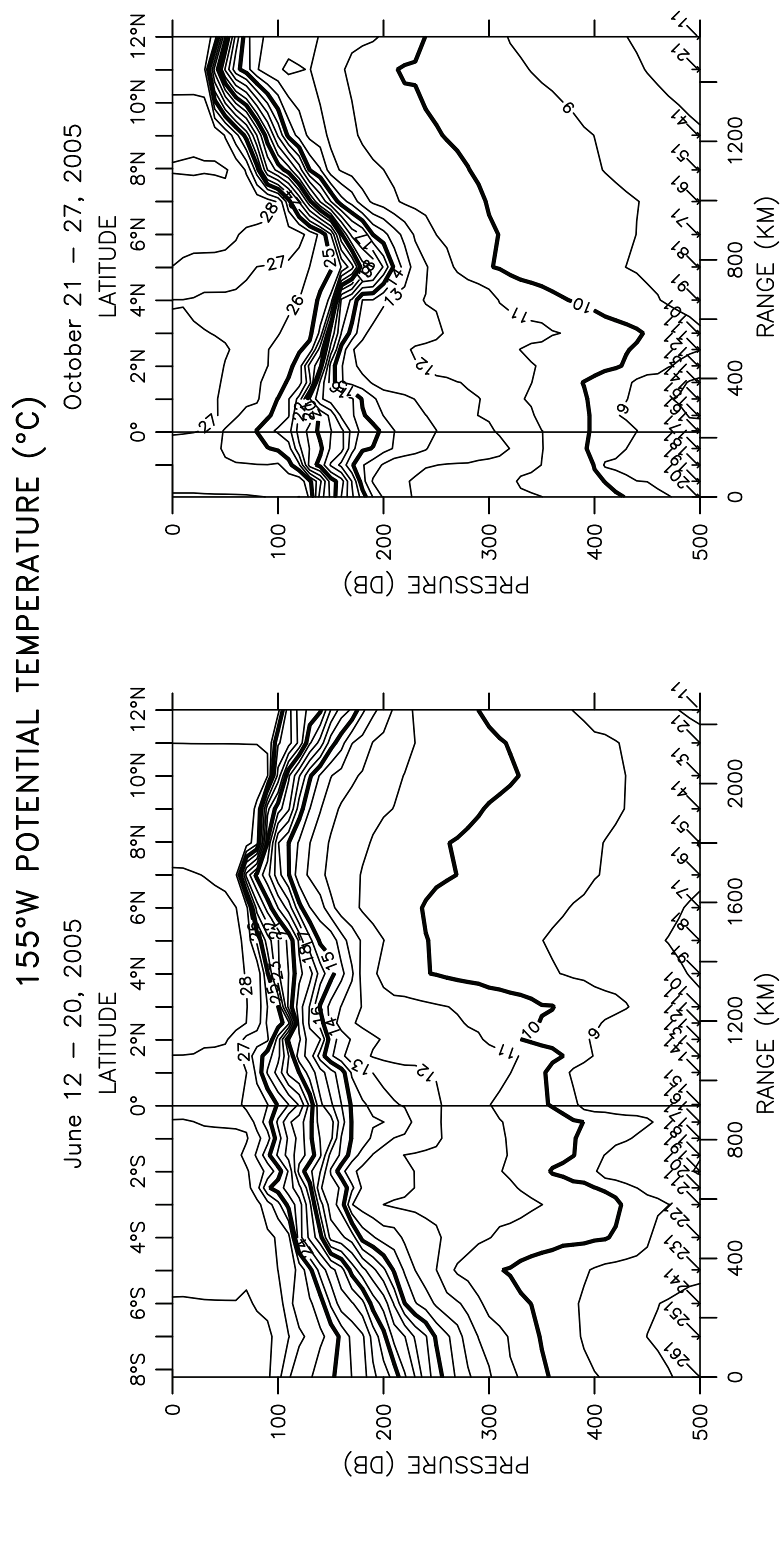

Figure 33: GP3-05-KA summer and GP7-05-KA fall potential temperature (°C) sections along 155°W. Contour intervals are 1°C.

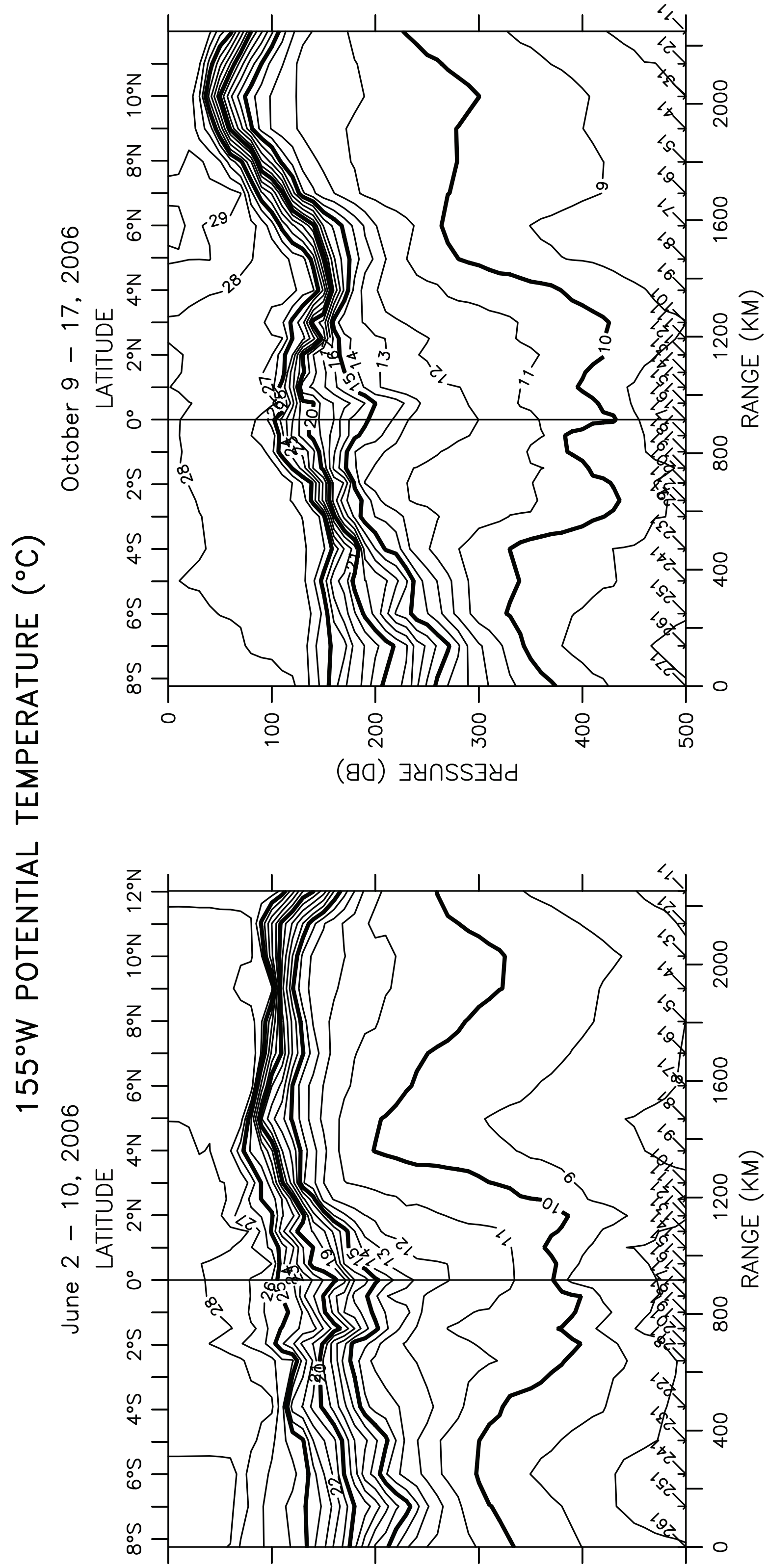

Figure 34: GP3-06-KA summer and GP7-06-KA fall potential temperature (°C) sections along 155°W. Contour intervals are 1°C.

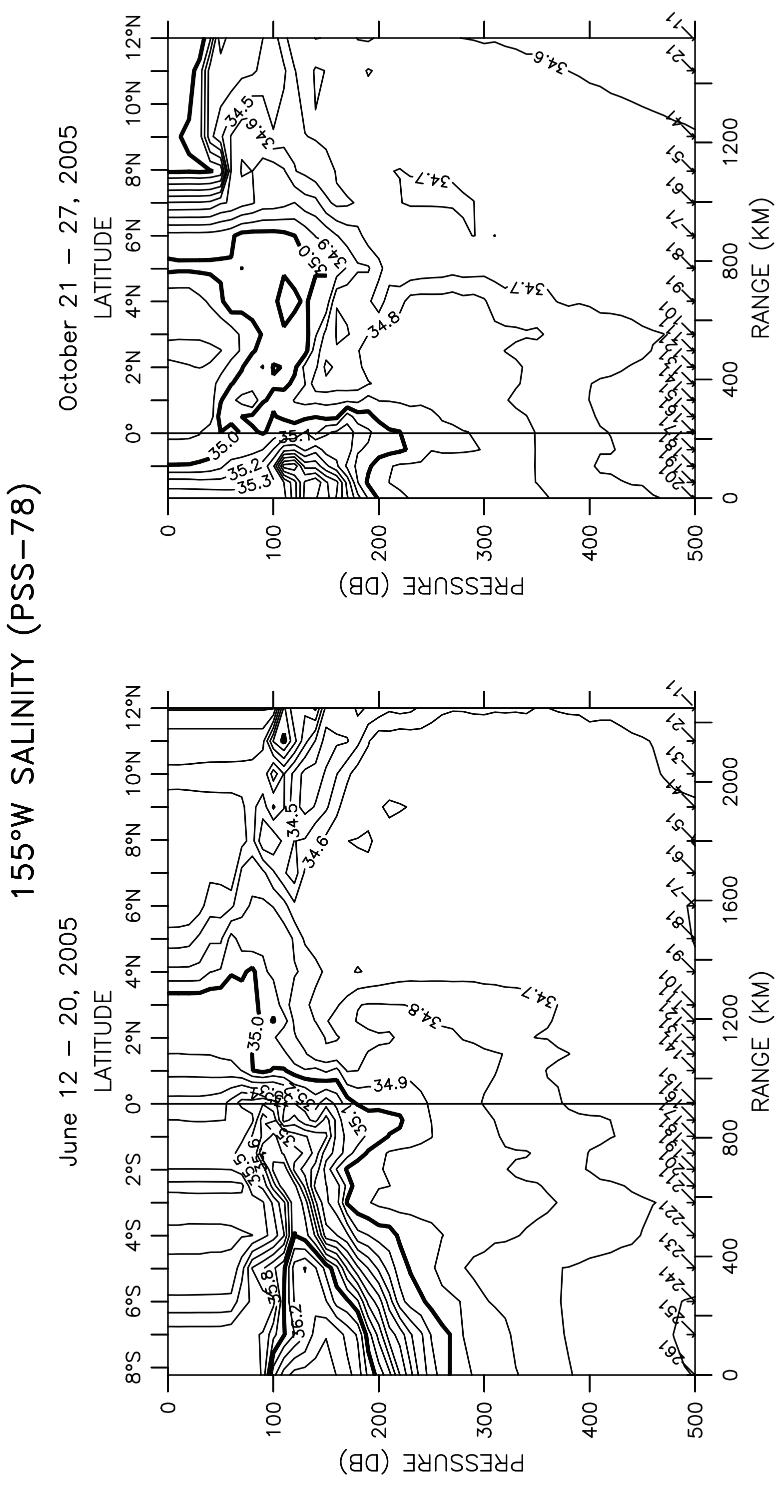

Figure 35: GP3-05-KA summer and GP7-05-KA fall salinity (PSS-78) sections along 155°W. Contour intervals are 0.1.

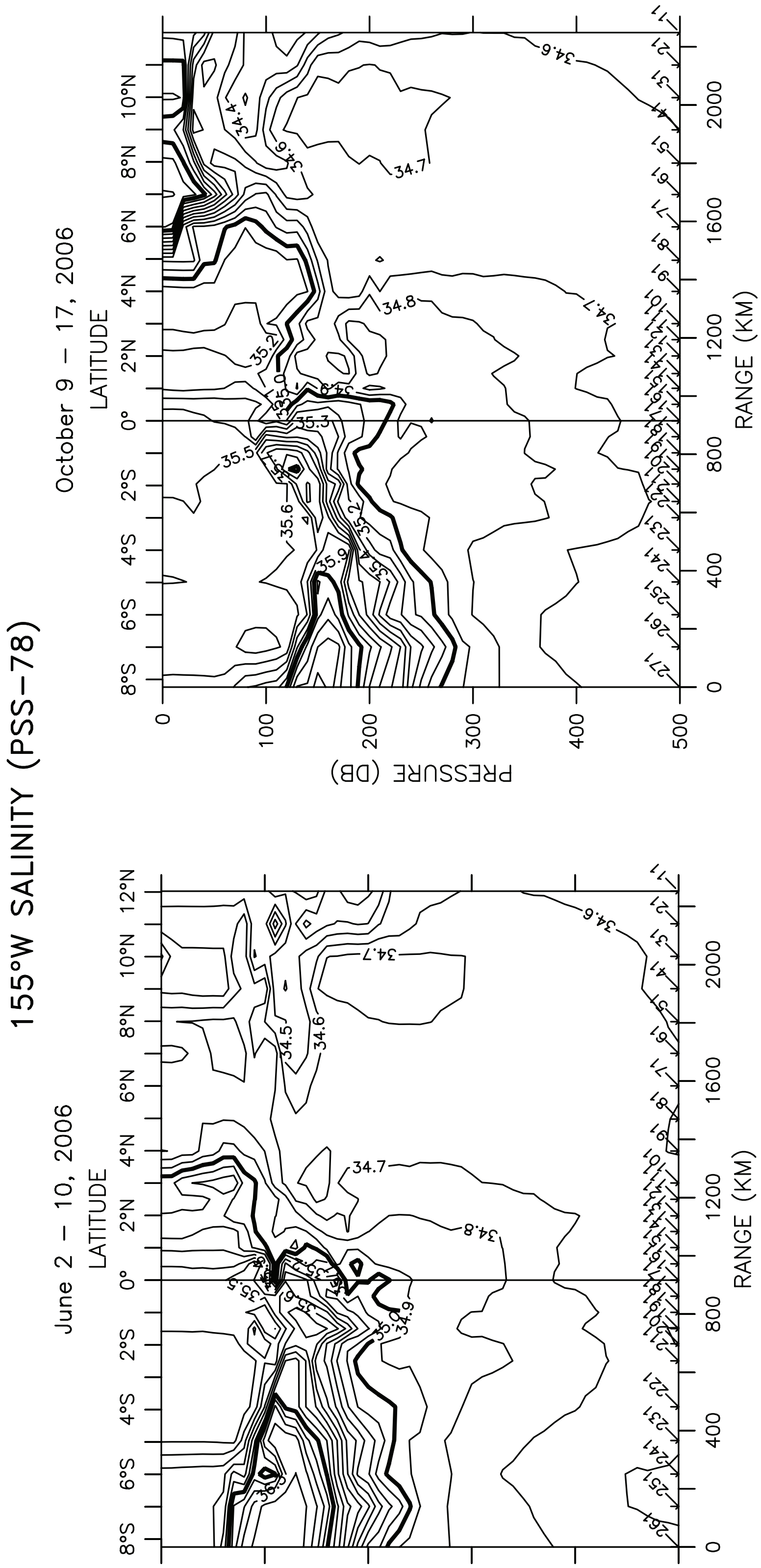

Figure 36: GP3-06-KA summer and GP7-06-KA fall salinity (PSS-78) sections along 155°W. Contour intervals are 0.1.

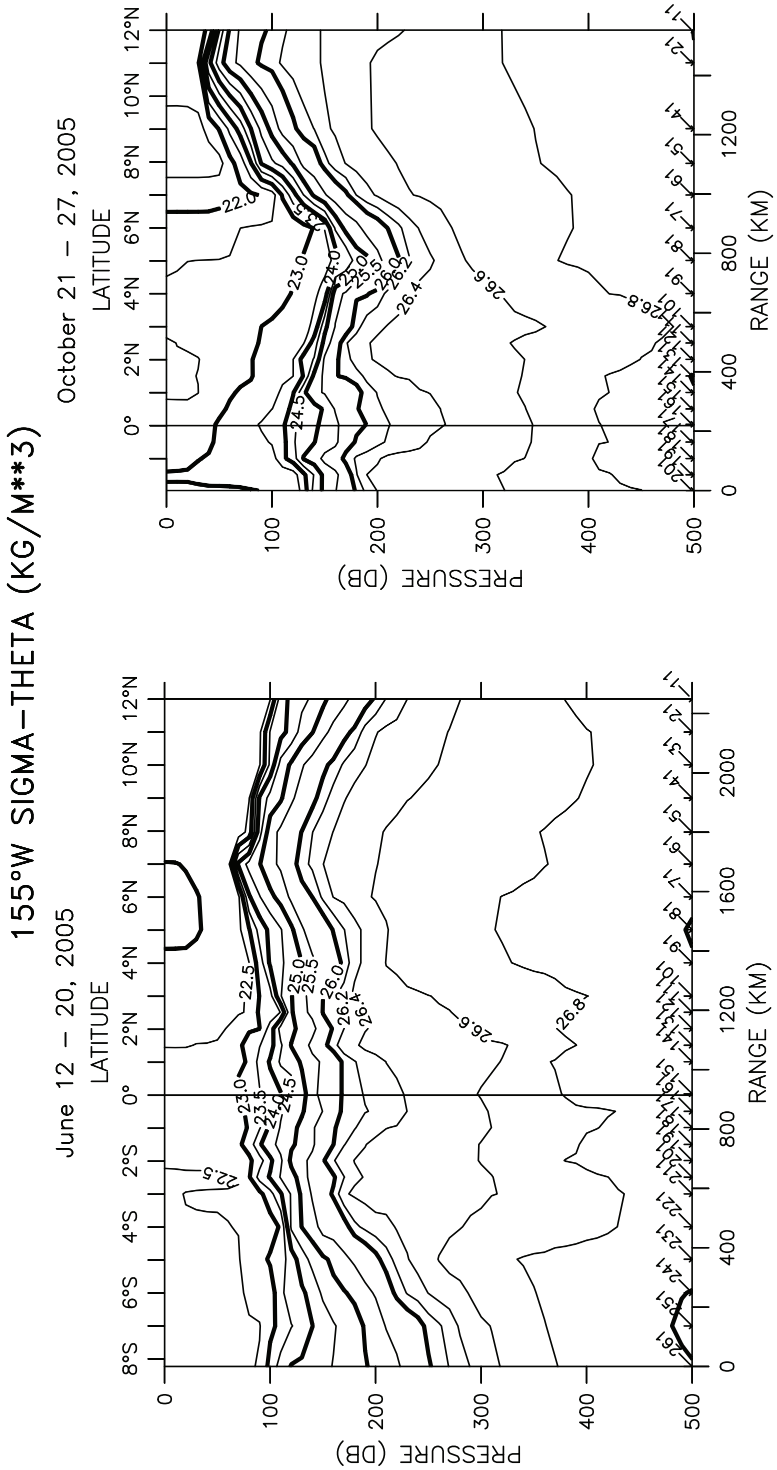

Figure 37: GP3-05-KA summer and GP7-05-KA fall potential density (kg/m^3) sections along 155°W. Contour intervals are 0.5 less than 26.0 and 0.2 greater than 26.0.

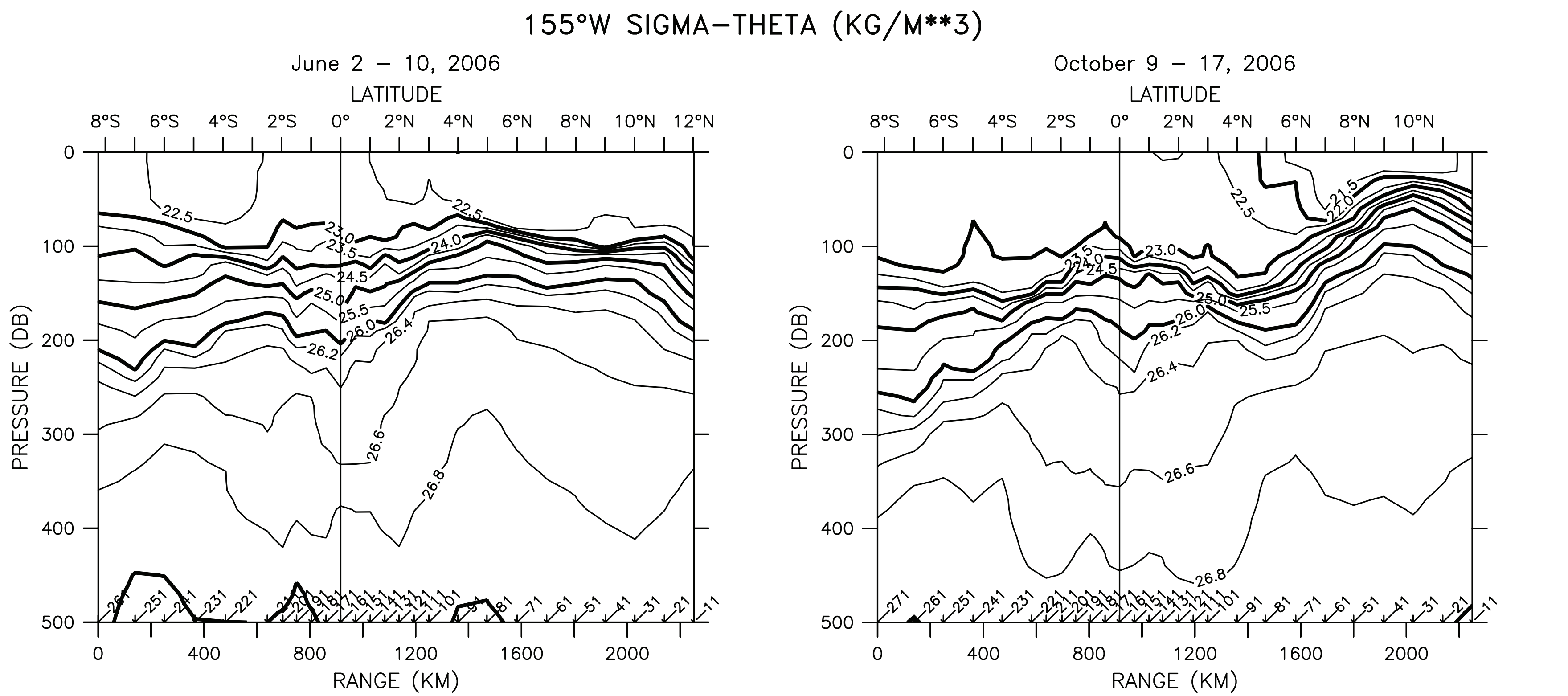

Figure 38: GP3-06-KA summer and GP7-06-KA fall potential density (kg/m^3) sections along 155°W. Contour intervals are 0.5 less than 26.0 and 0.2 greater than 26.0.

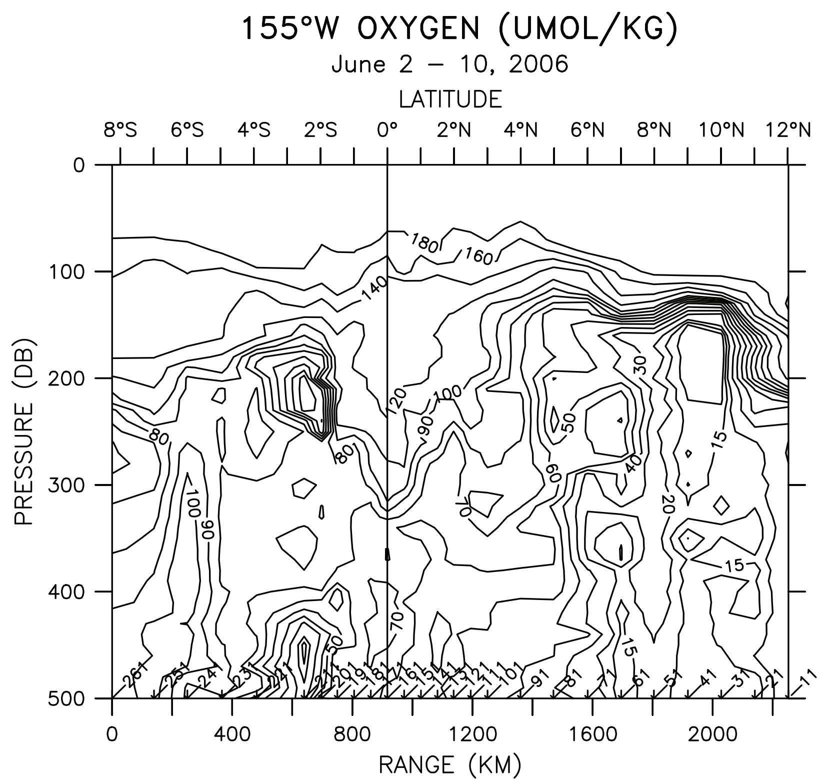

Figure 39: GP3-06-KA summer oxygen (μmol/kg) section along 155°W. Contour intervals are 5 less than 10, 10 between 10 and 100, and 20 greater than 100.

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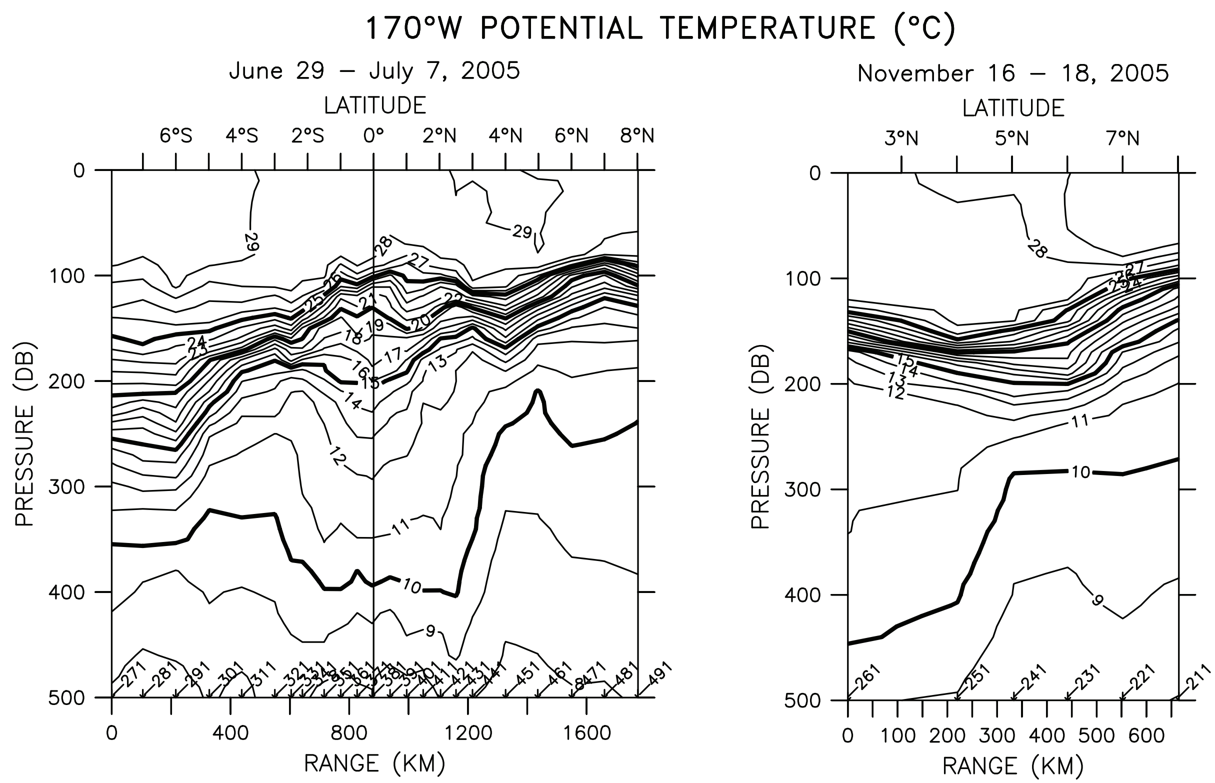

Figure 40: GP3-05-KA summer and GP7-05-KA fall potential temperature (°C) sections along 170°W. Contour intervals are 1°C.

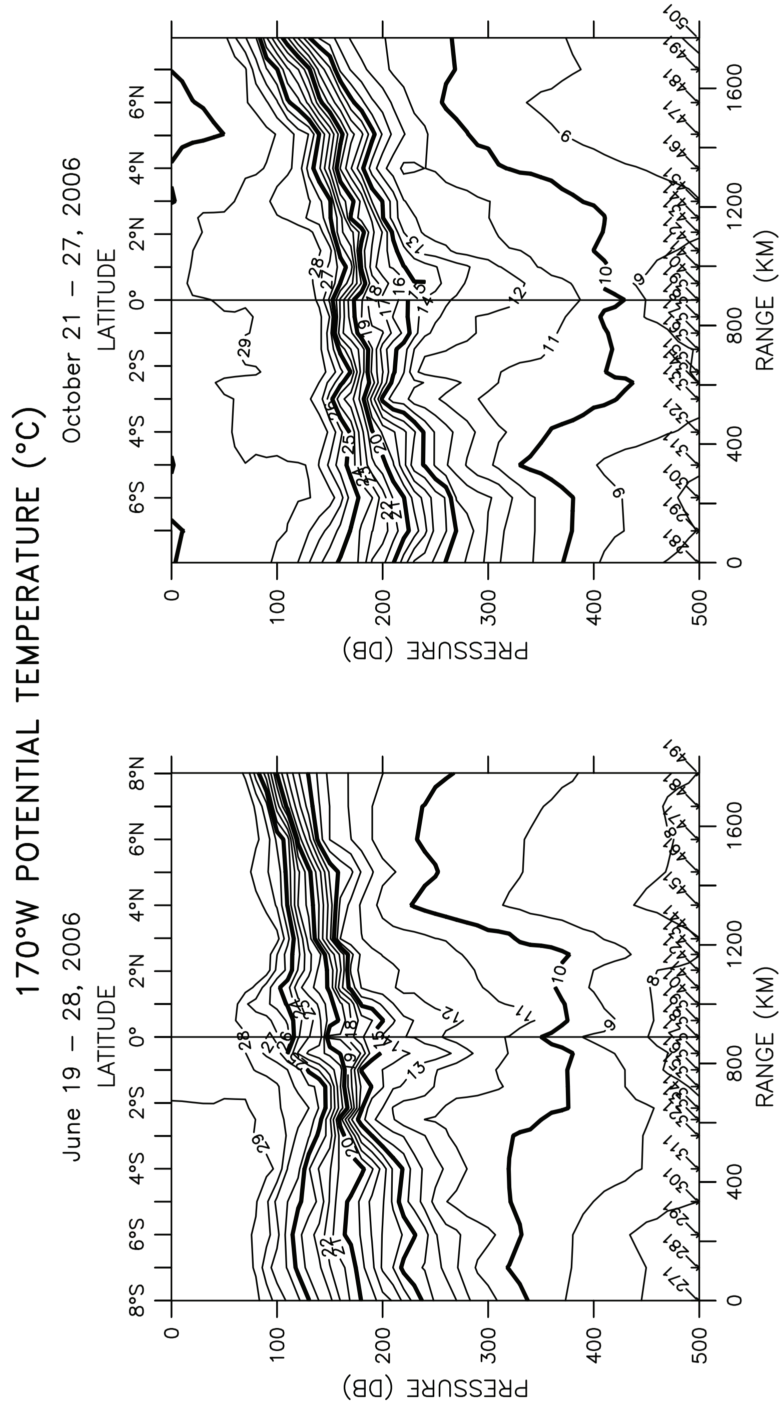

Figure 41: GP3-06-KA summer and GP7-06-KA fall potential temperature (°C) sections along 170°W. Contour intervals are 1°C.

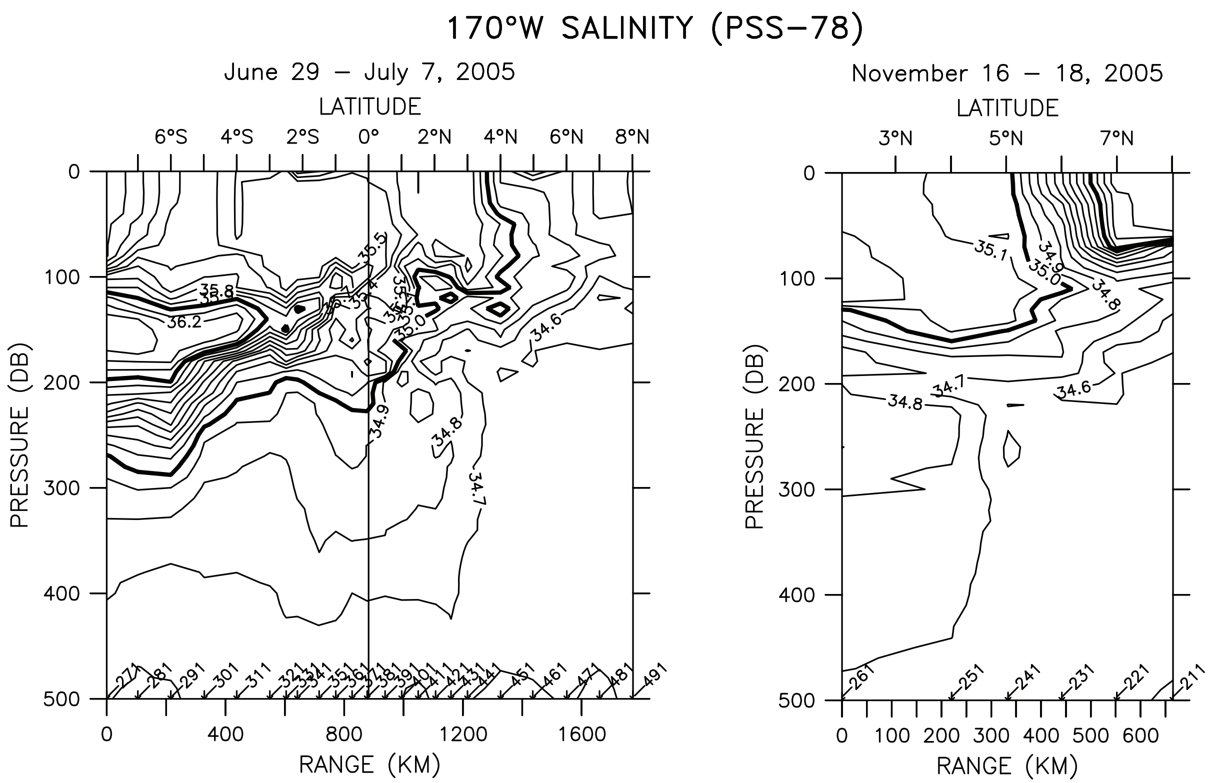

Figure 42: GP3-05-KA summer and GP7-05-KA fall salinity (PSS-78) sections along 170°W. Contour intervals are 0.1.

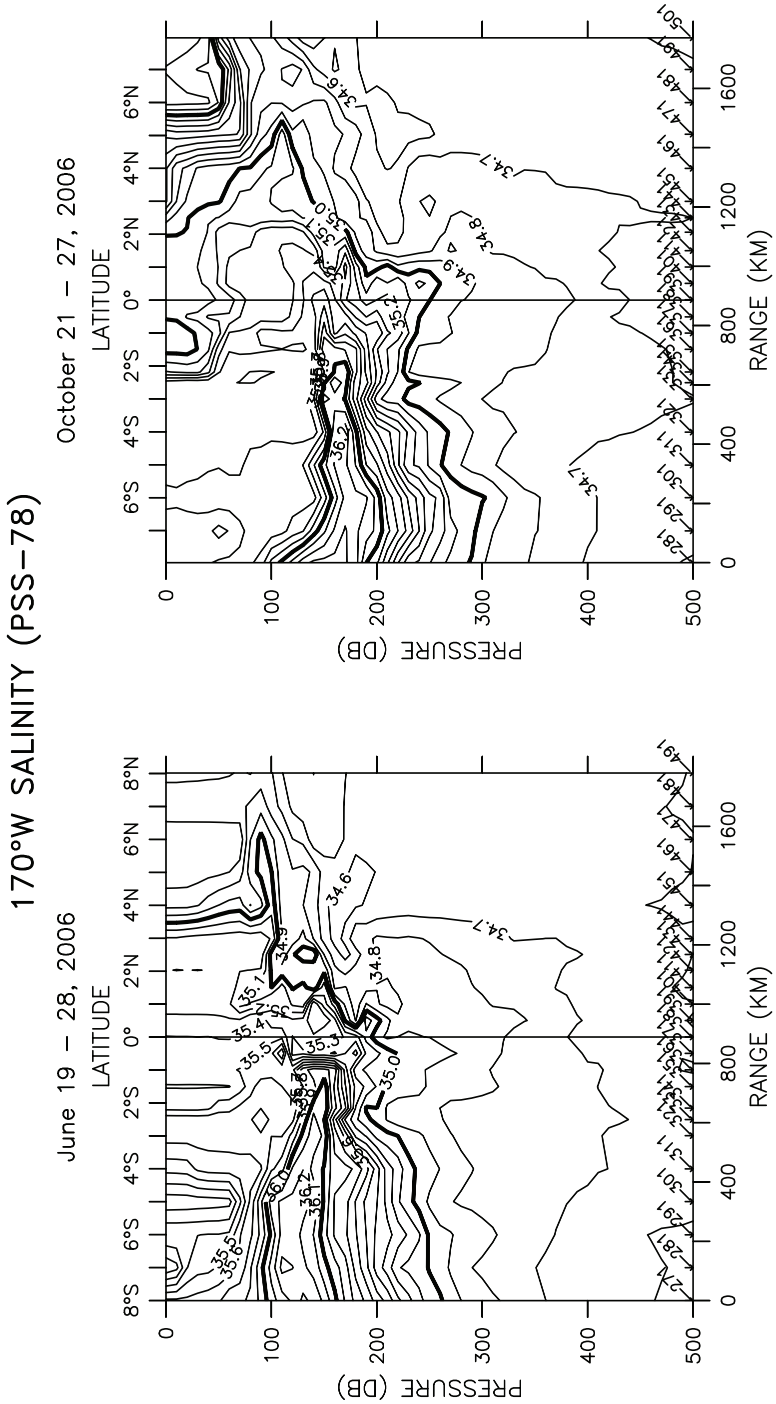

Figure 43: GP3-06-KA summer and GP7-06-KA fall salinity (PSS-78) sections along 170°W. Contour intervals are 0.1.

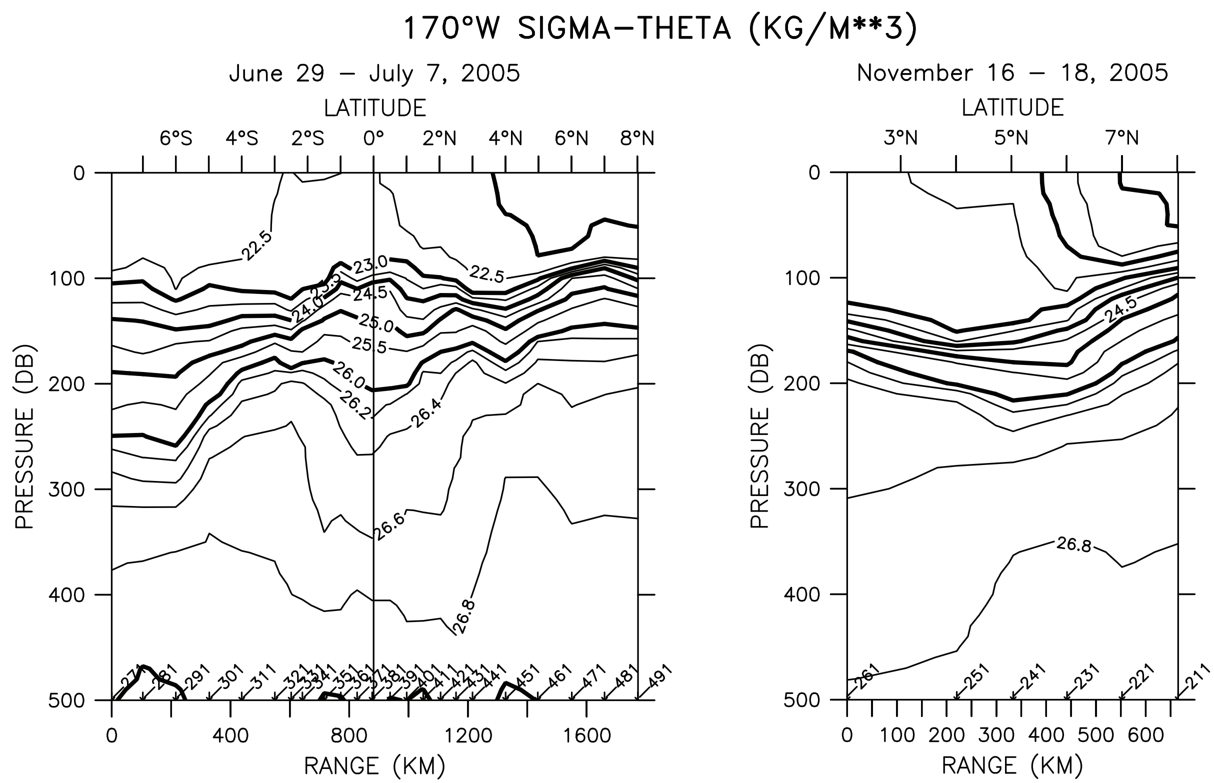

Figure 44: GP3-05-KA summer and GP7-05-KA fall potential density (kg/m^3) sections along 170°W. Contour intervals are 0.5 less than 26.0 and 0.2 greater than 26.0.

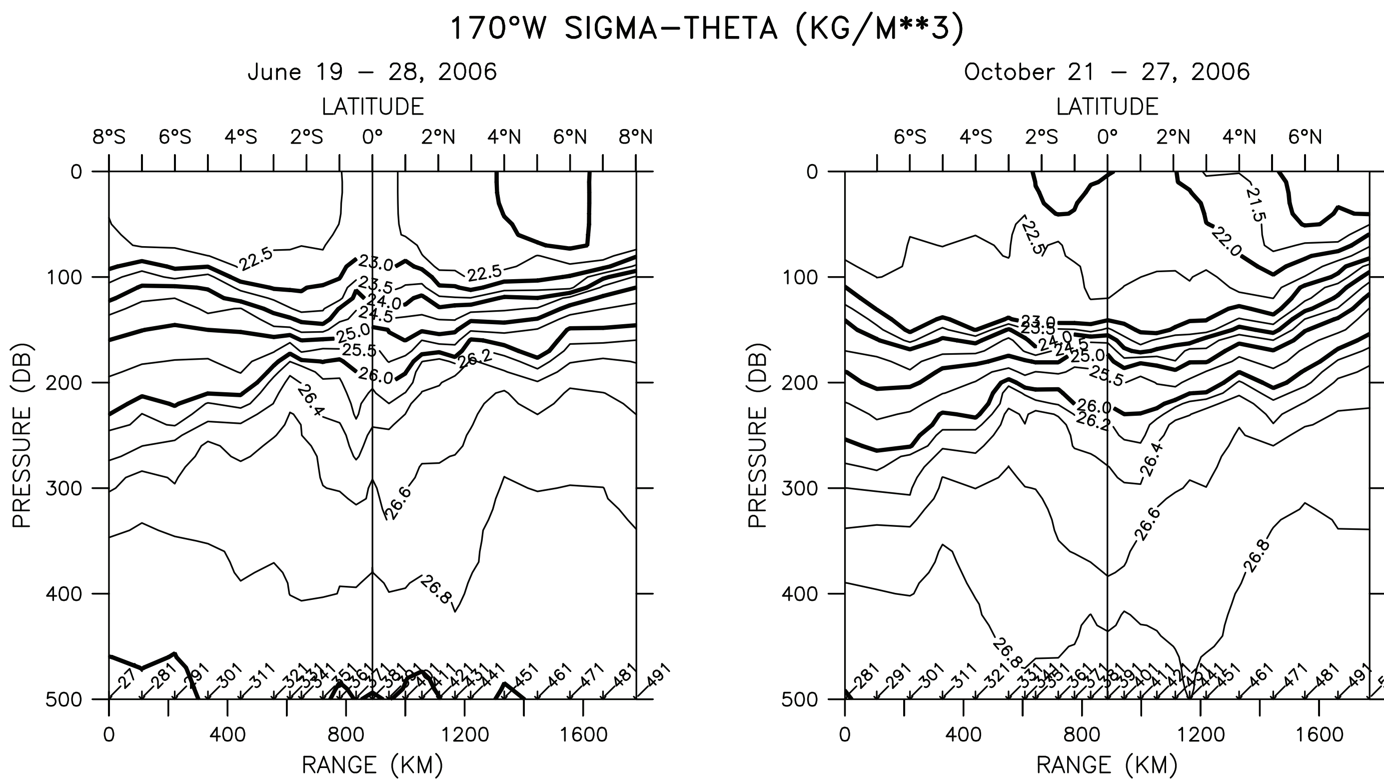

Figure 45: GP3-06-KA summer and GP7-06-KA fall potential density (kg/m^3) sections along 170°W. Contour intervals are 0.5 less than 26.0 and 0.2 greater than 26.0.

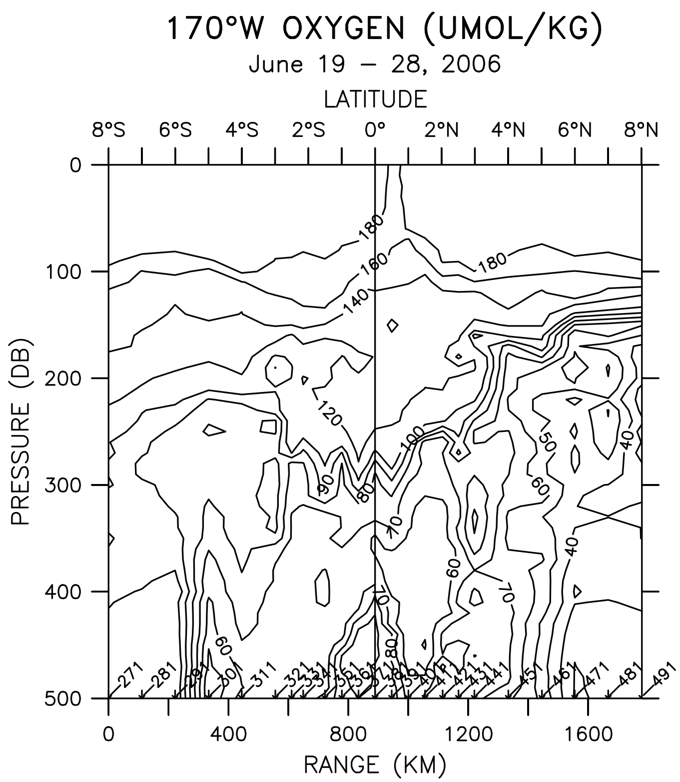

Figure 46: GP3-06-KA summer oxygen (μmol/kg) section along 170°W. Contour intervals are 5 less than 10, 10 between 10 and 100, and 20 greater than 100.

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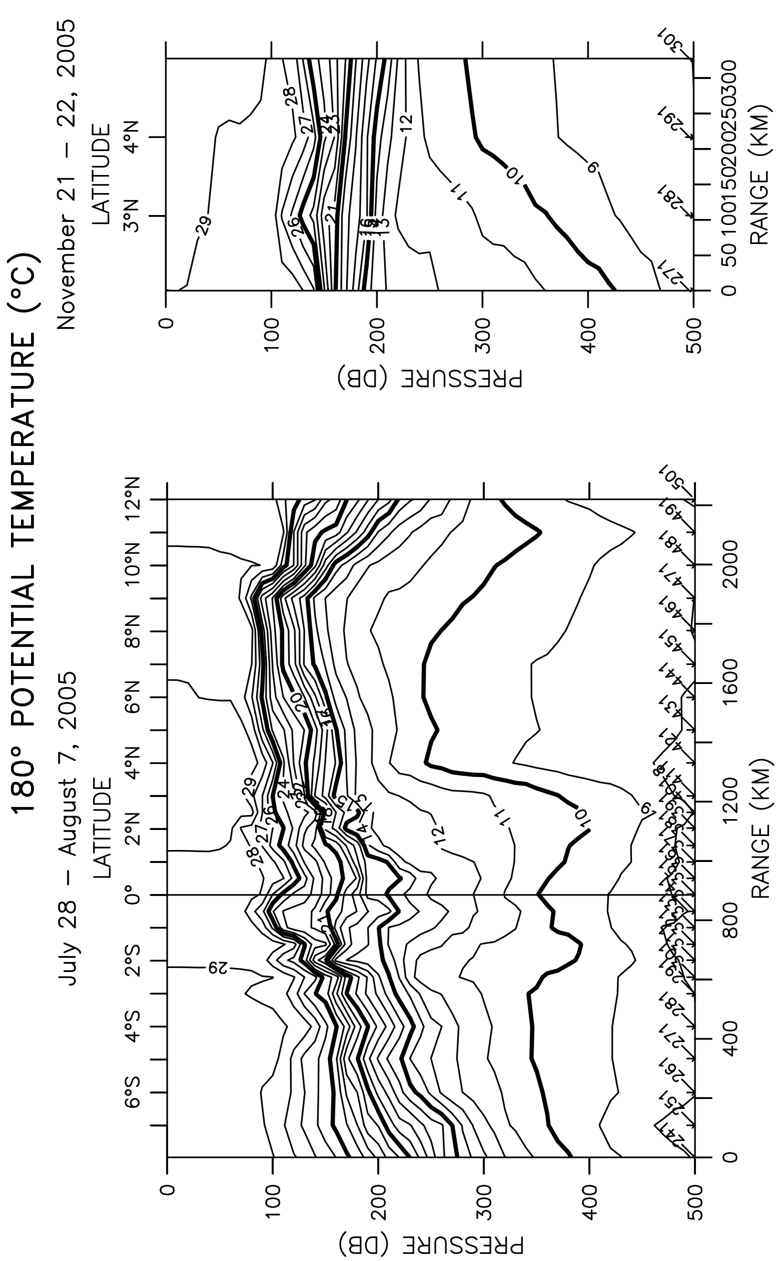

Figure 47: GP4-05-KA summer and GP7-05-KA fall potential temperature (°C) sections along 180°. Contour intervals are 1°C.

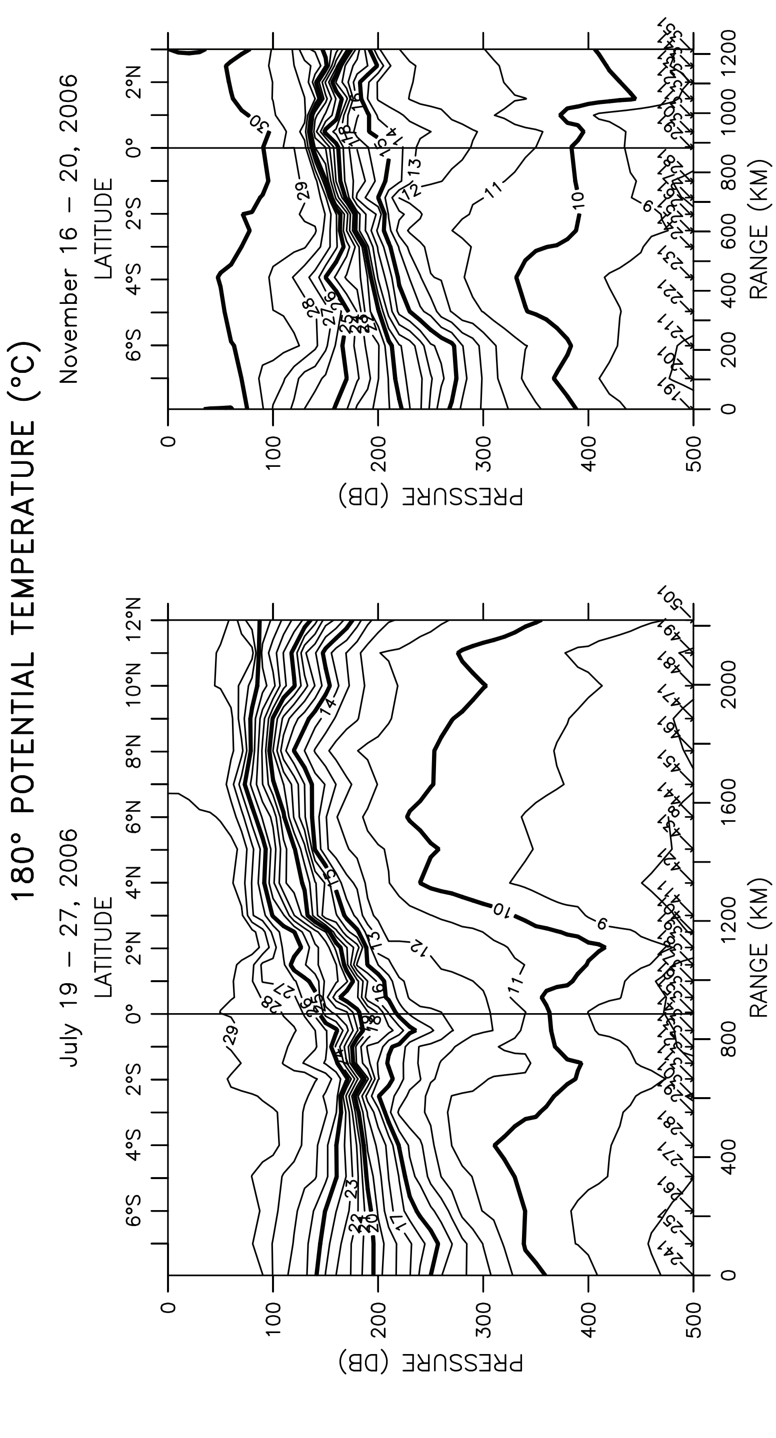

Figure 48: GP4-06-KA summer and GP7-06-KA fall potential temperature (°C) sections along 180°. Contour intervals are 1°C.

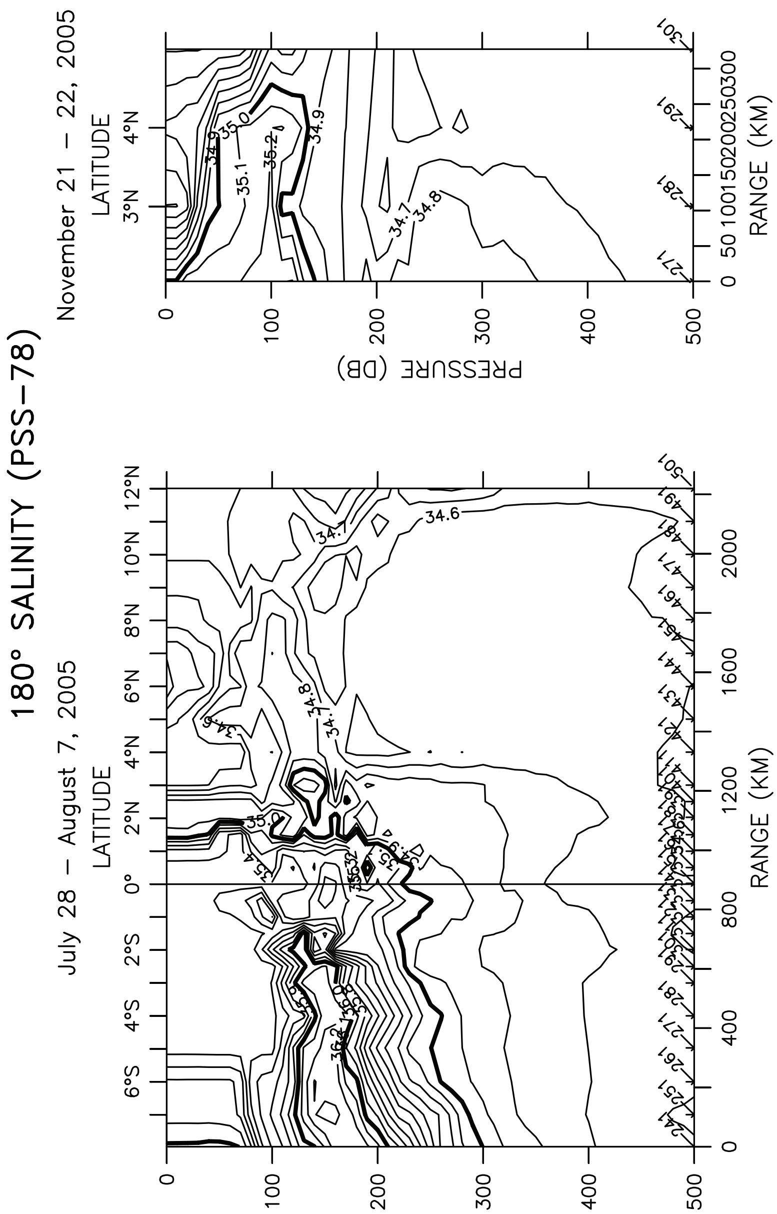

Figure 49: GP4-05-KA summer and GP7-05-KA fall salinity (PSS-78) sections along 180°. Contour intervals are 0.1.

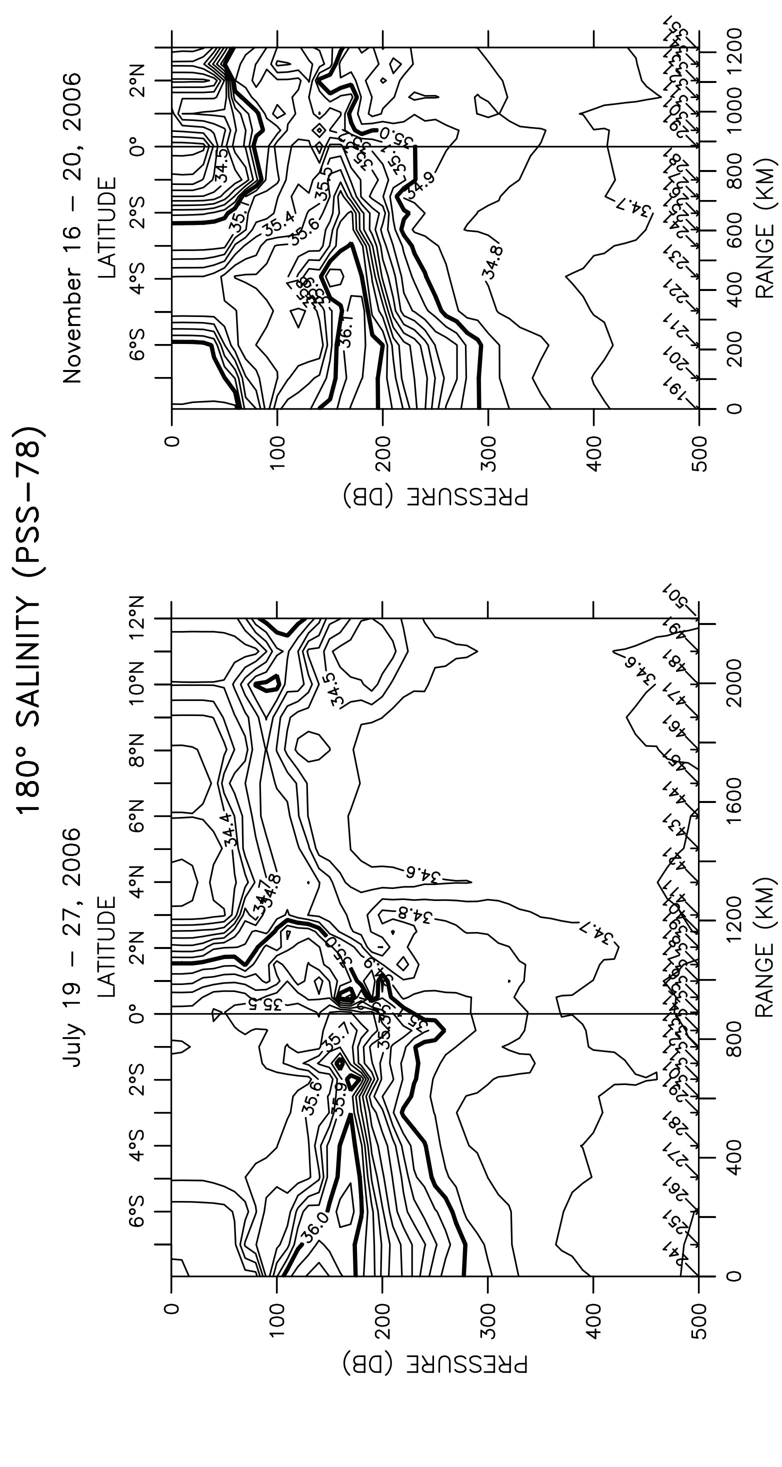

Figure 50: GP4-06-KA summer and GP7-06-KA fall salinity (PSS-78) sections along 180°. Contour intervals are 0.1.

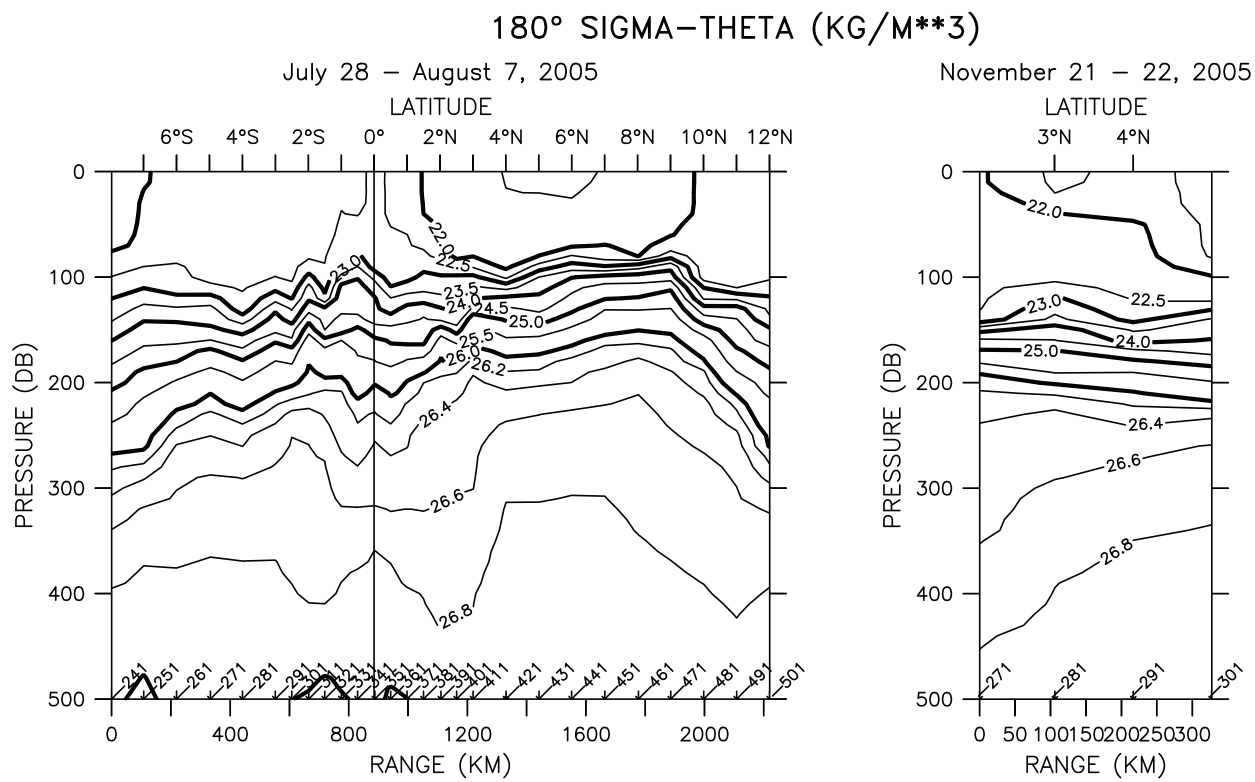

Figure 51: GP4-05-KA summer and GP7-05-KA fall potential density (kg/m^3) sections along 180°. Contour intervals are 0.5 less than 26.0 and 0.2 greater than 26.0.

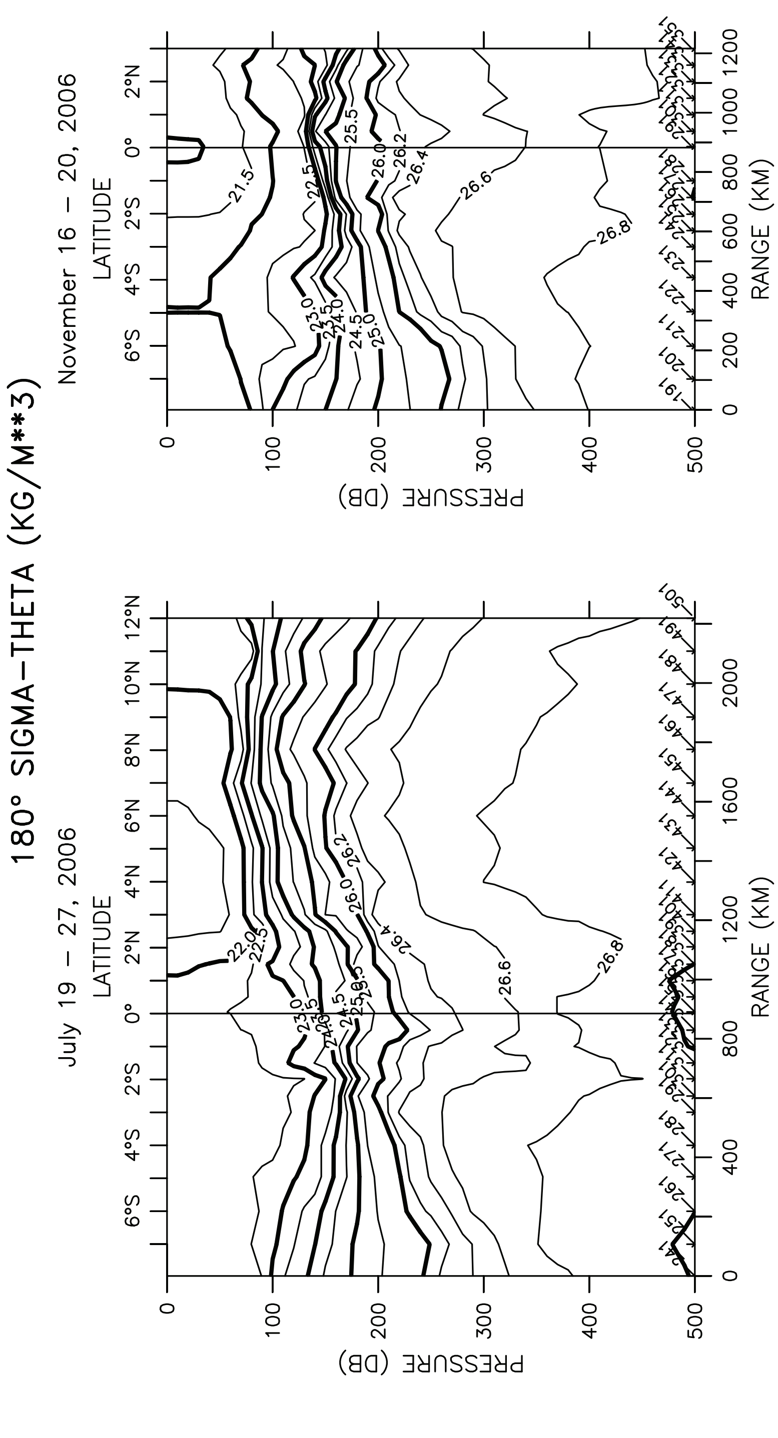

Figure 52: GP4-06-KA summer and GP7-06-KA fall potential density (kg/m^3) sections along 180°. Contour intervals are 0.5 less than 26.0 and 0.2 greater than 26.0.

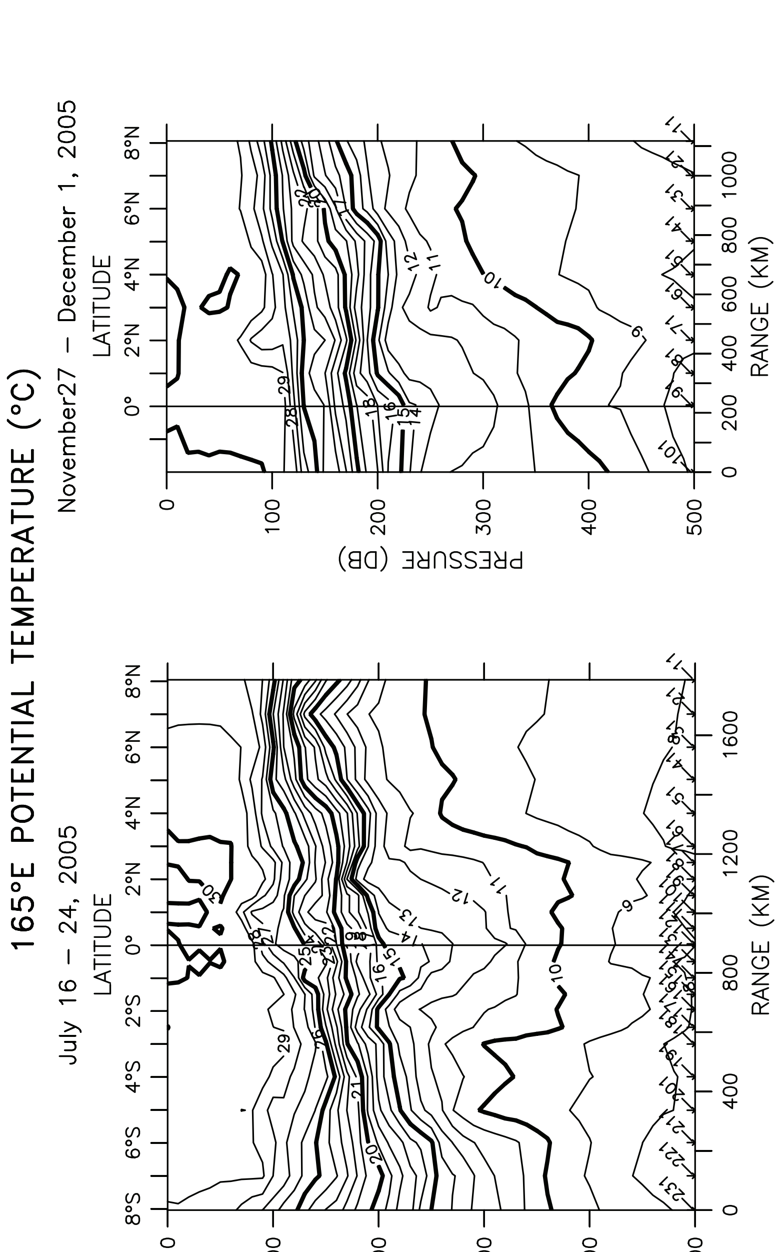

Figure 53: GP4-05-KA summer and GP8-05-KA fall potential temperature (°C) sections along 165°E. Contour intervals are 1°C.

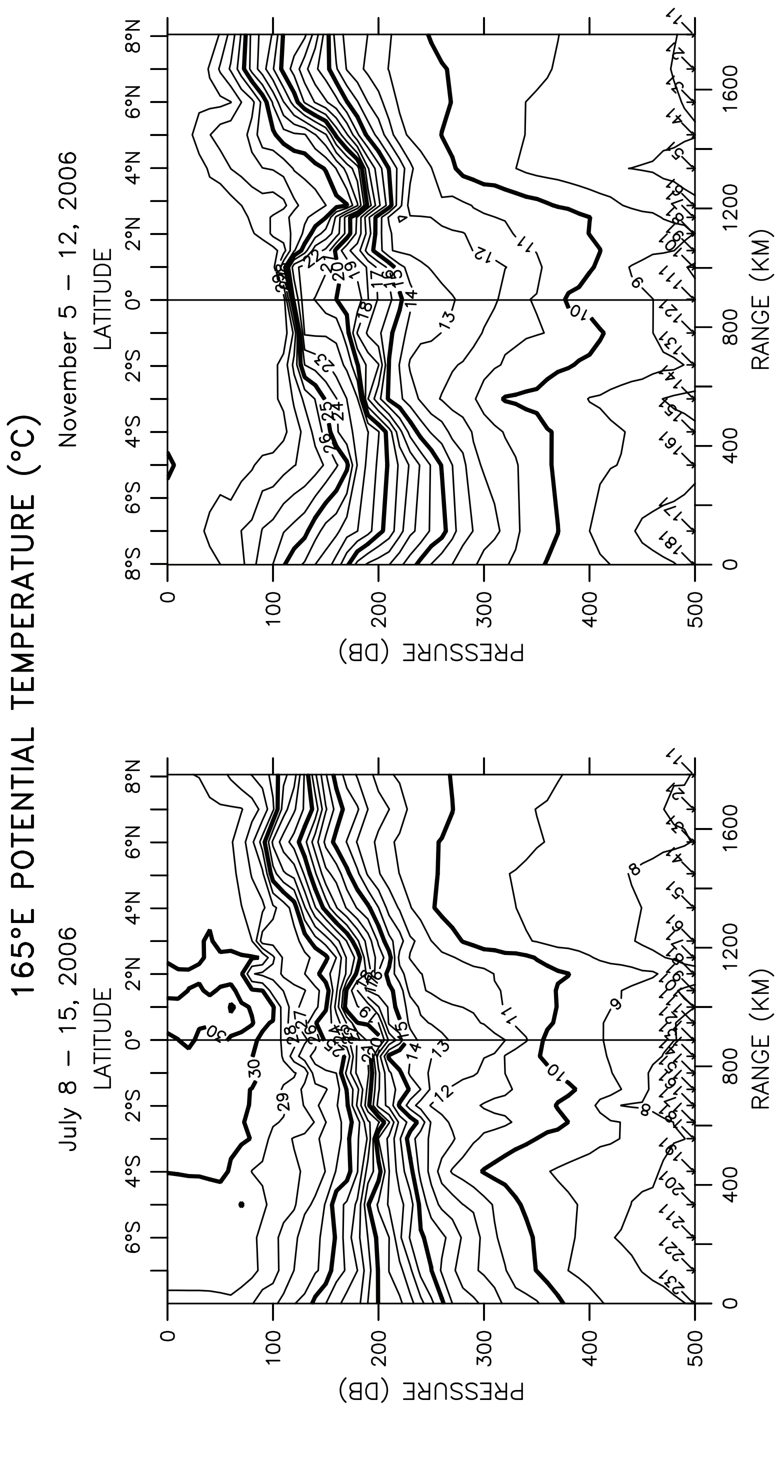

Figure 54: GP4-06-KA summer and GP8-06-KA fall potential temperature (°C) sections along 165°E. Contour intervals are 1°C.

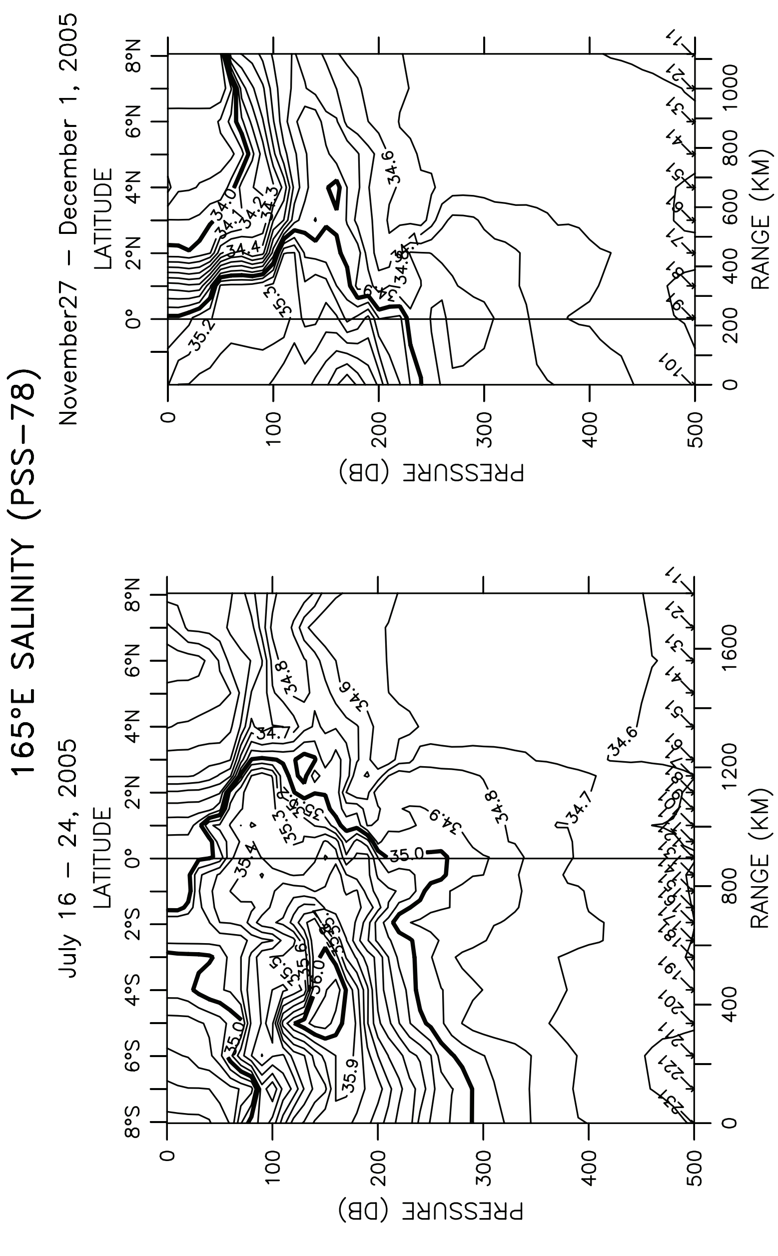

Figure 55: GP4-05-KA summer and GP8-05-KA fall salinity (PSS-78) sections along 165°E. Contour intervals are 0.1.

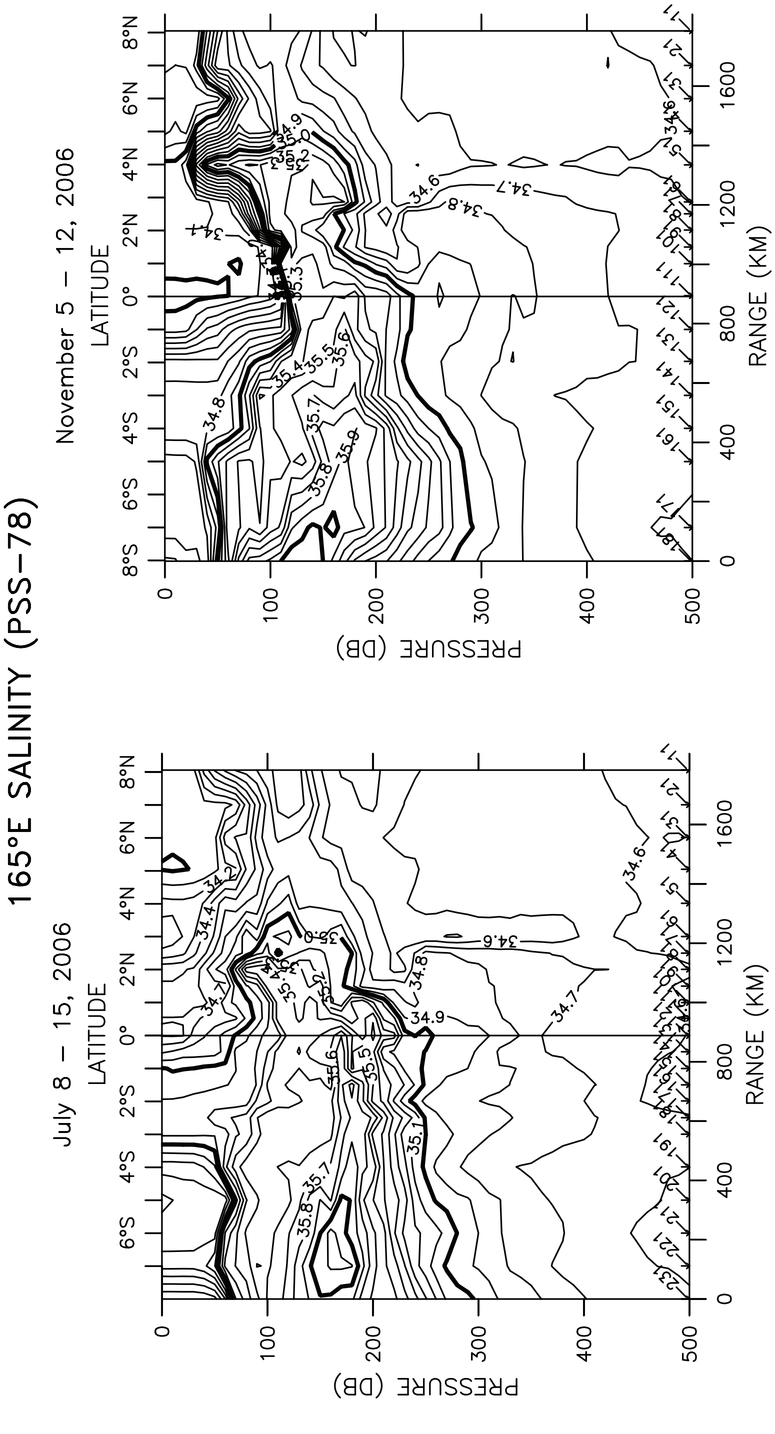

Figure 56: GP4-06-KA summer and GP8-06-KA fall salinity (PSS-78) sections along 165°E. Contour intervals are 0.1.

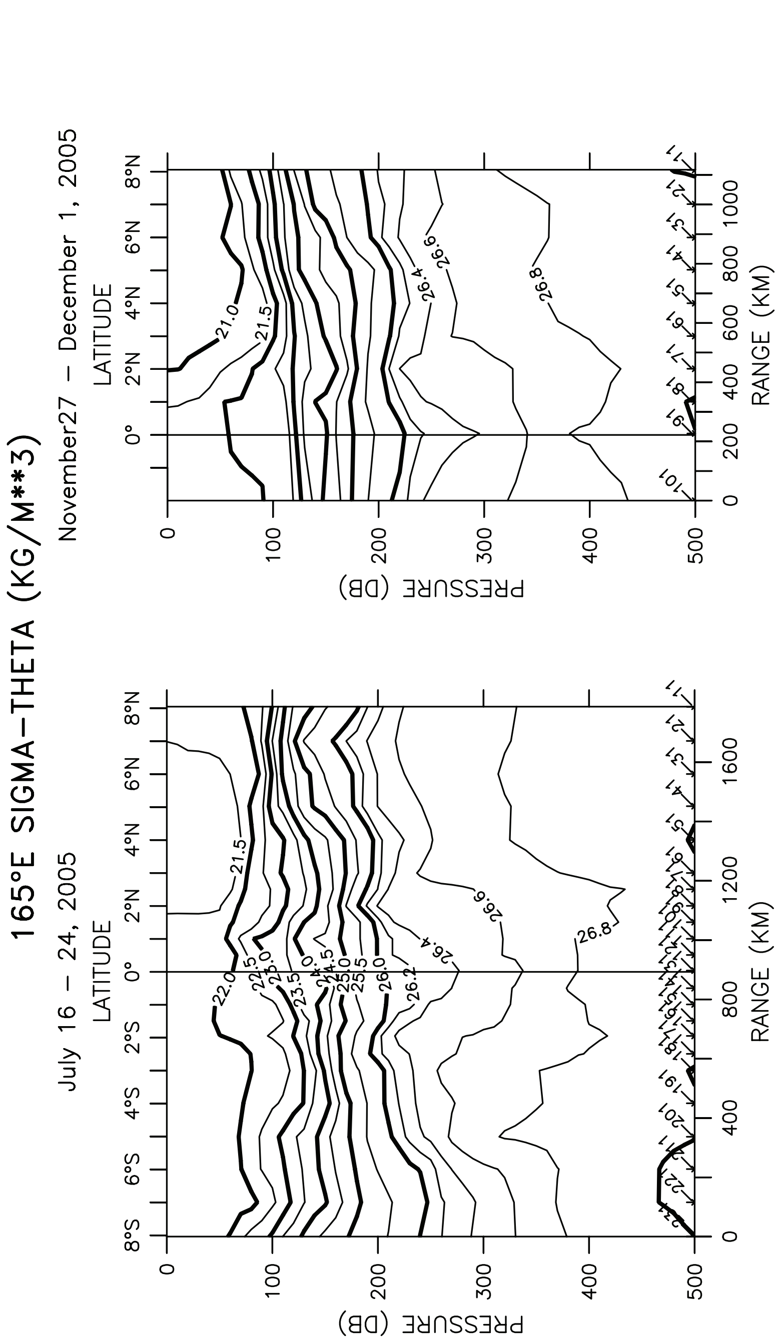

Figure 57: GP4-05-KA summer and GP8-05-KA fall potential density (kg/m^3) sections along 165°E. Contour intervals are 0.5 less than 26.0 and 0.2 greater than 26.0.

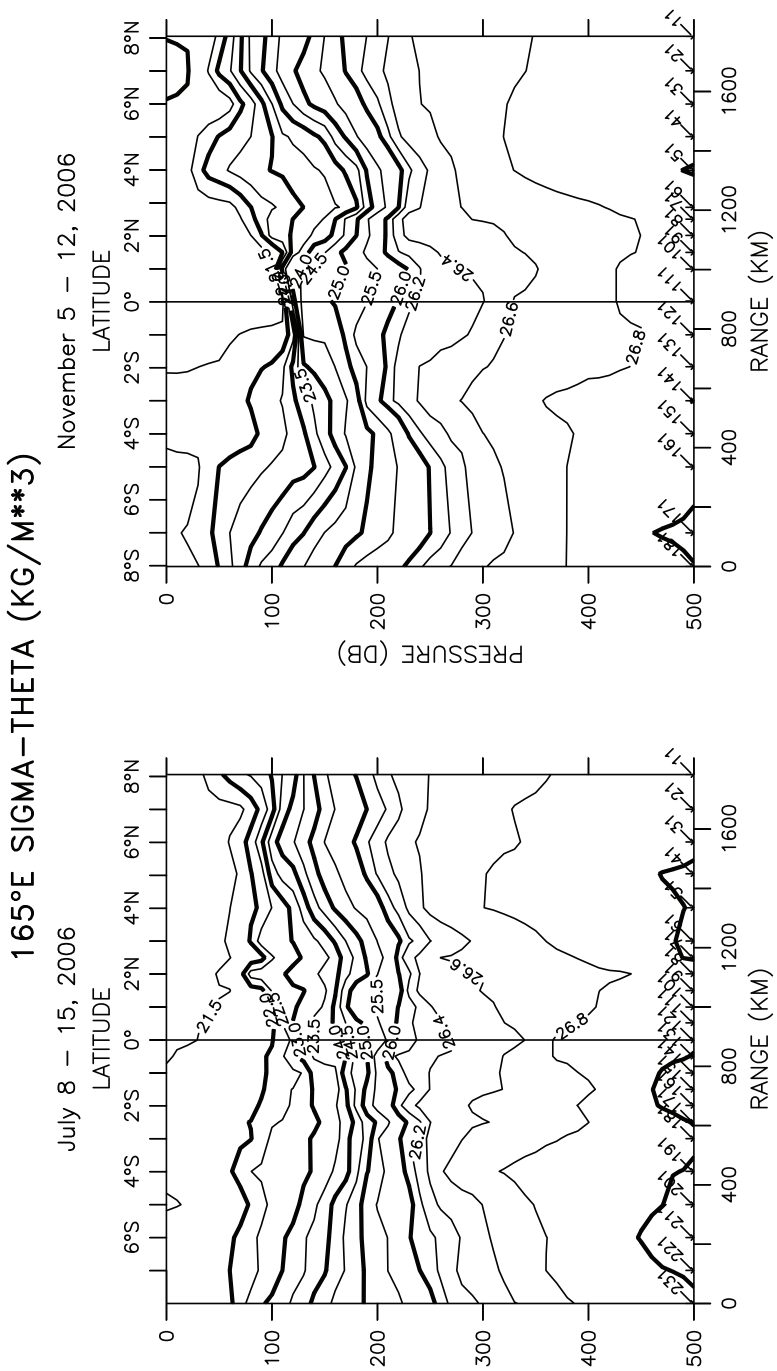

Figure 58: GP4-06-KA summer and GP8-06-KA fall potential density (kg/m^3) sections along 165°E. Contour intervals are 0.5 less than 26.0 and 0.2 greater than 26.0.

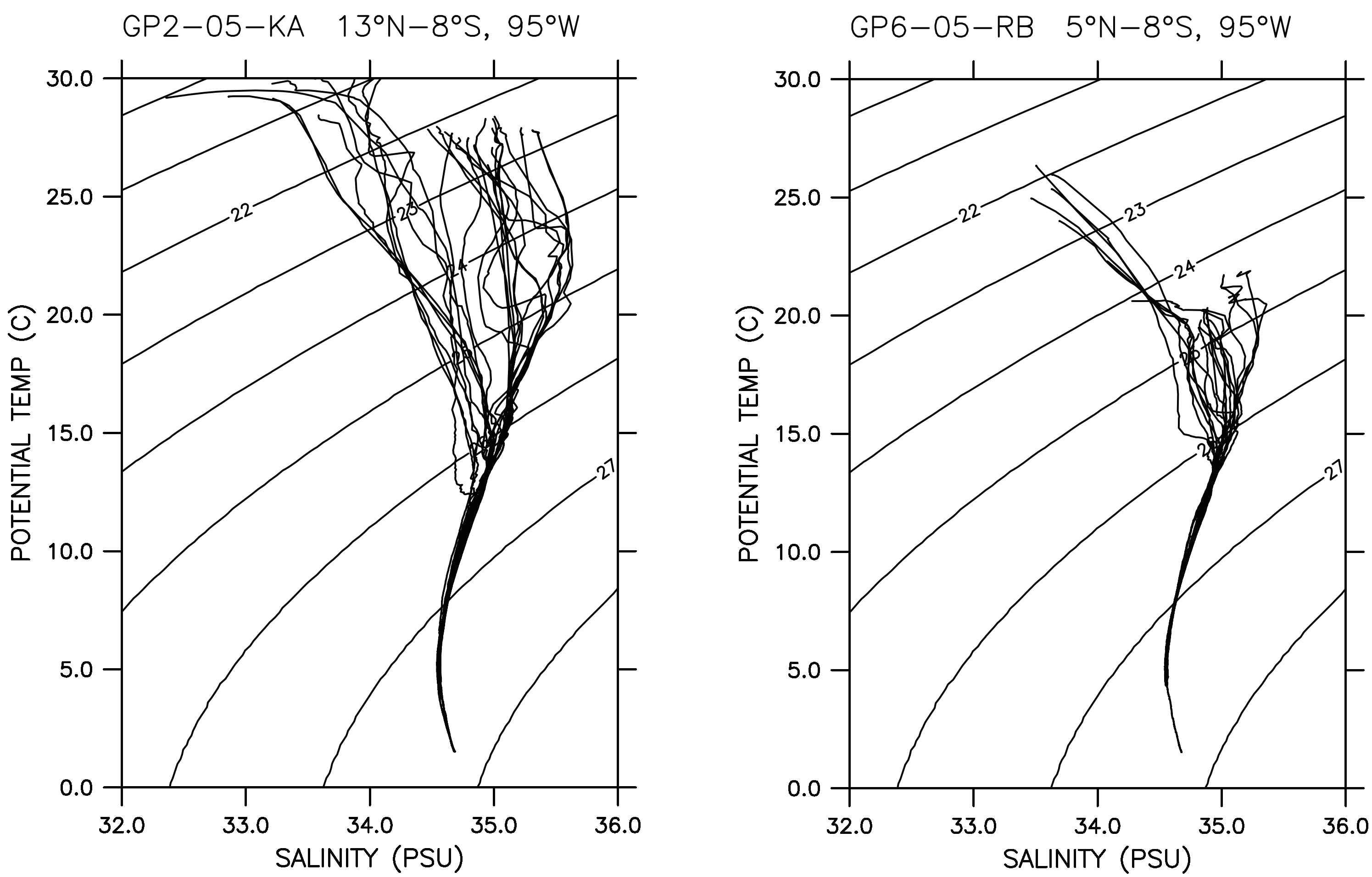

Figure 59: GP2-05-KA spring (April 23−May 9, 2005) and GP6-05-RB fall (October 31−November 6, 2005) composite θ-S diagrams along 95°W.

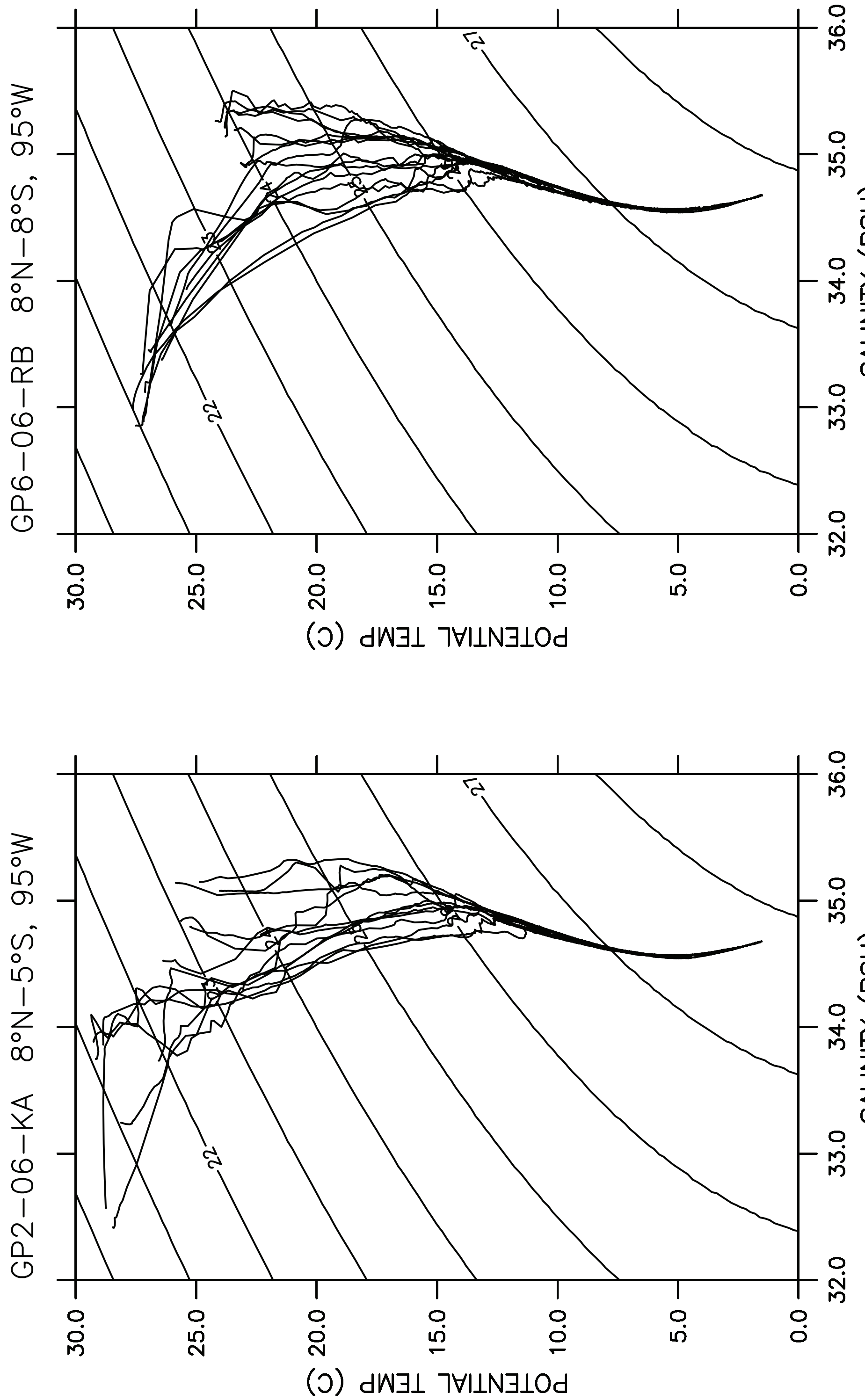

Figure 60: GP2-06-KA spring (April 18−25, 2006) and GP6-06-RB fall (November 7−14, 2006) composite θ-S diagrams along 95°W.

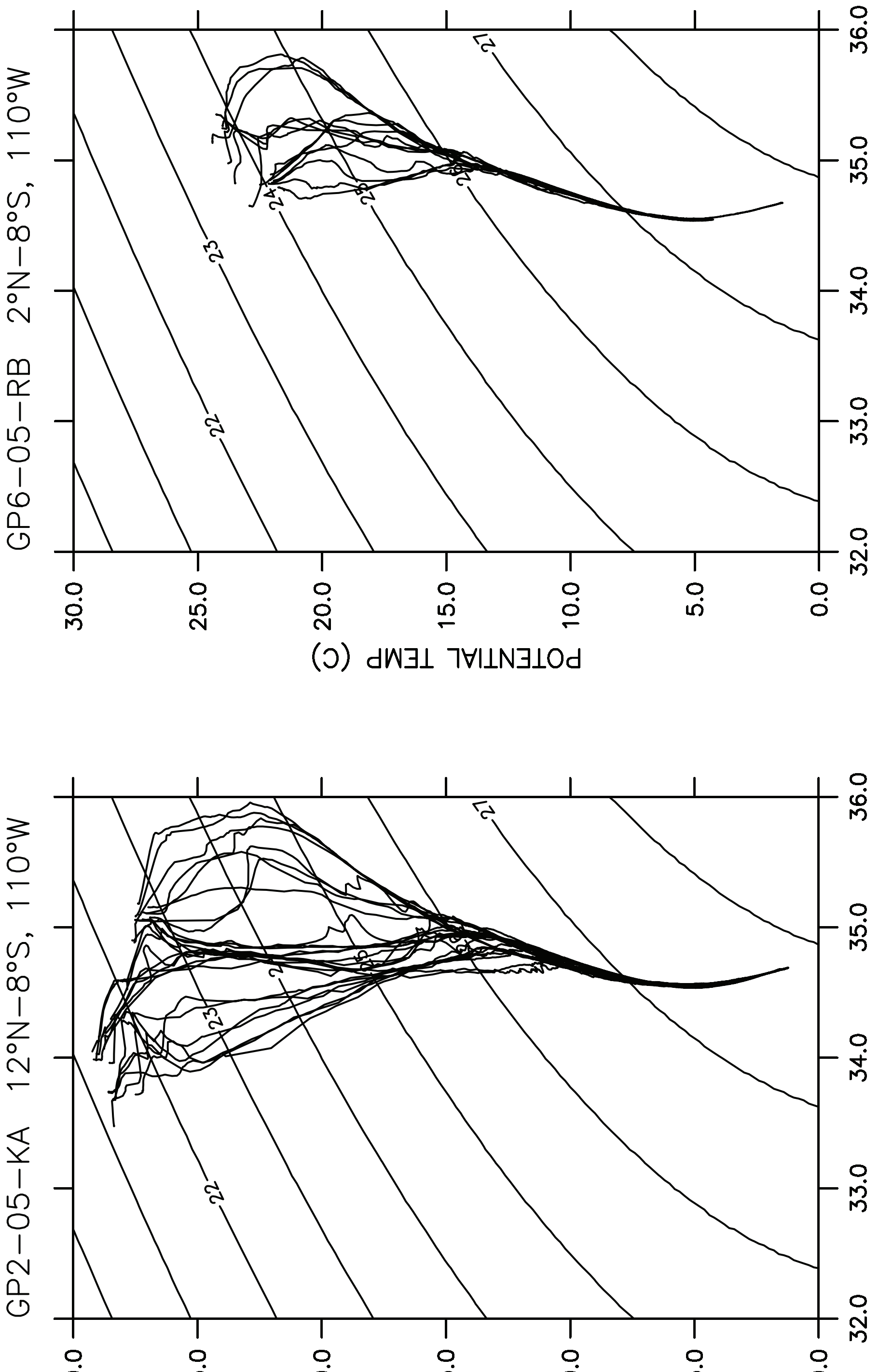

Figure 61: GP2-05-KA spring (April 10−19, 2005) and GP6-05-RB fall (November 14−20, 2005) composite θ-S diagrams along 110°W.

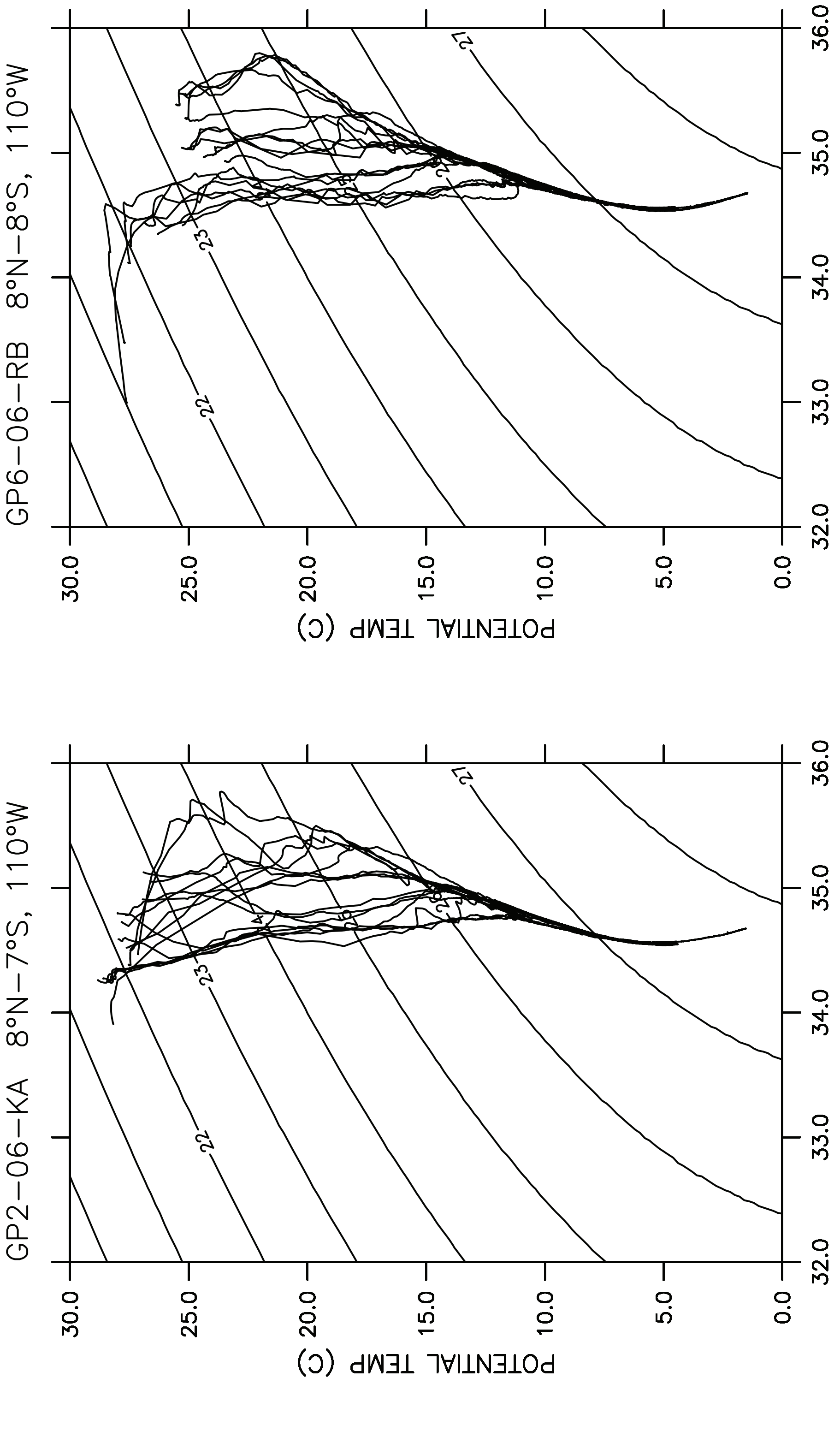

Figure 62: GP2-06-KA spring (April 8−14, 2006) and GP6-06-RB fall (November 18−25, 2006) composite θ-S diagrams along 110°W.

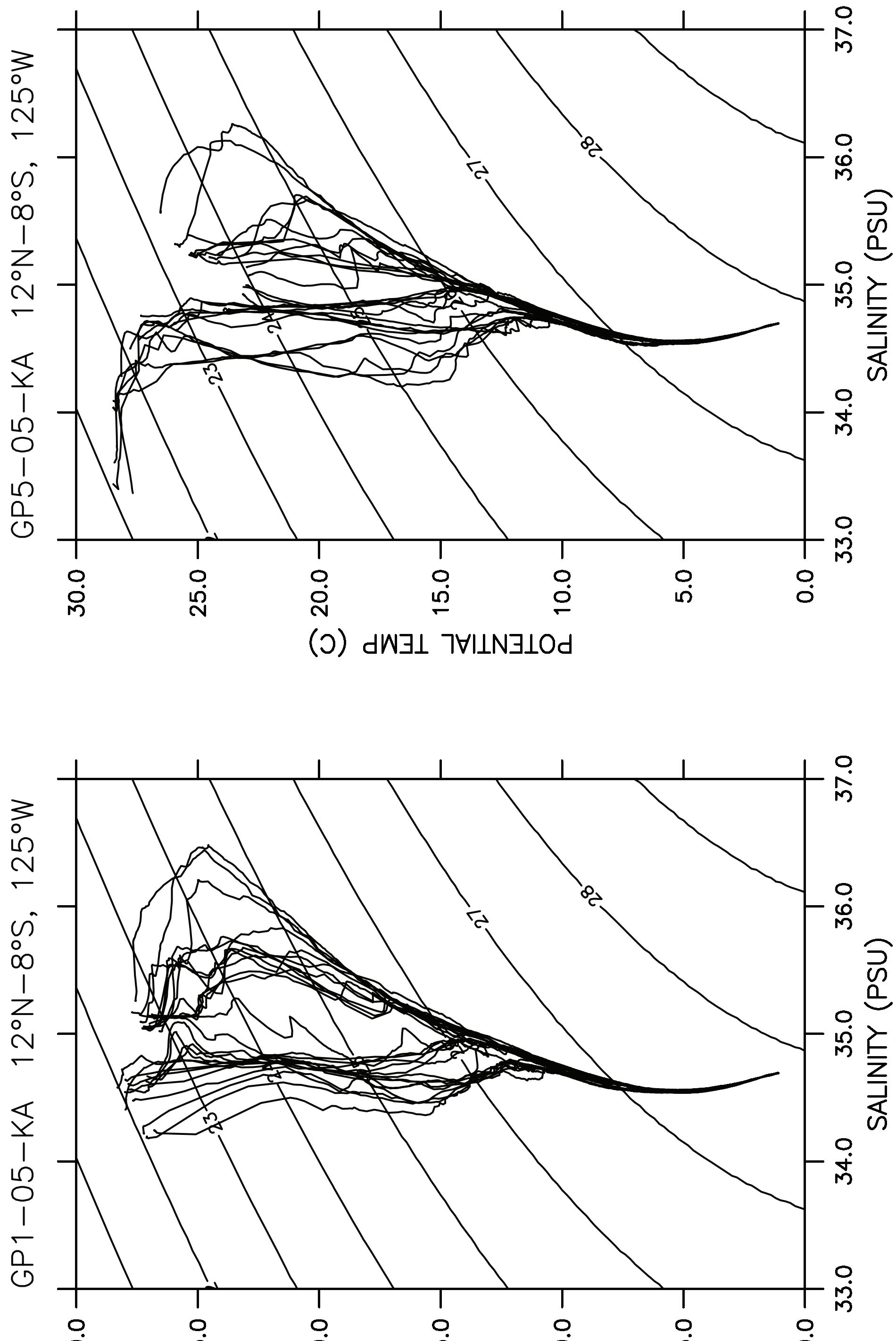

Figure 63: GP1-05-KA spring (March 12−20, 2005) and GP5-05-KA summer (August 31−September 10, 2005) composite θ-S diagrams along 125°W.

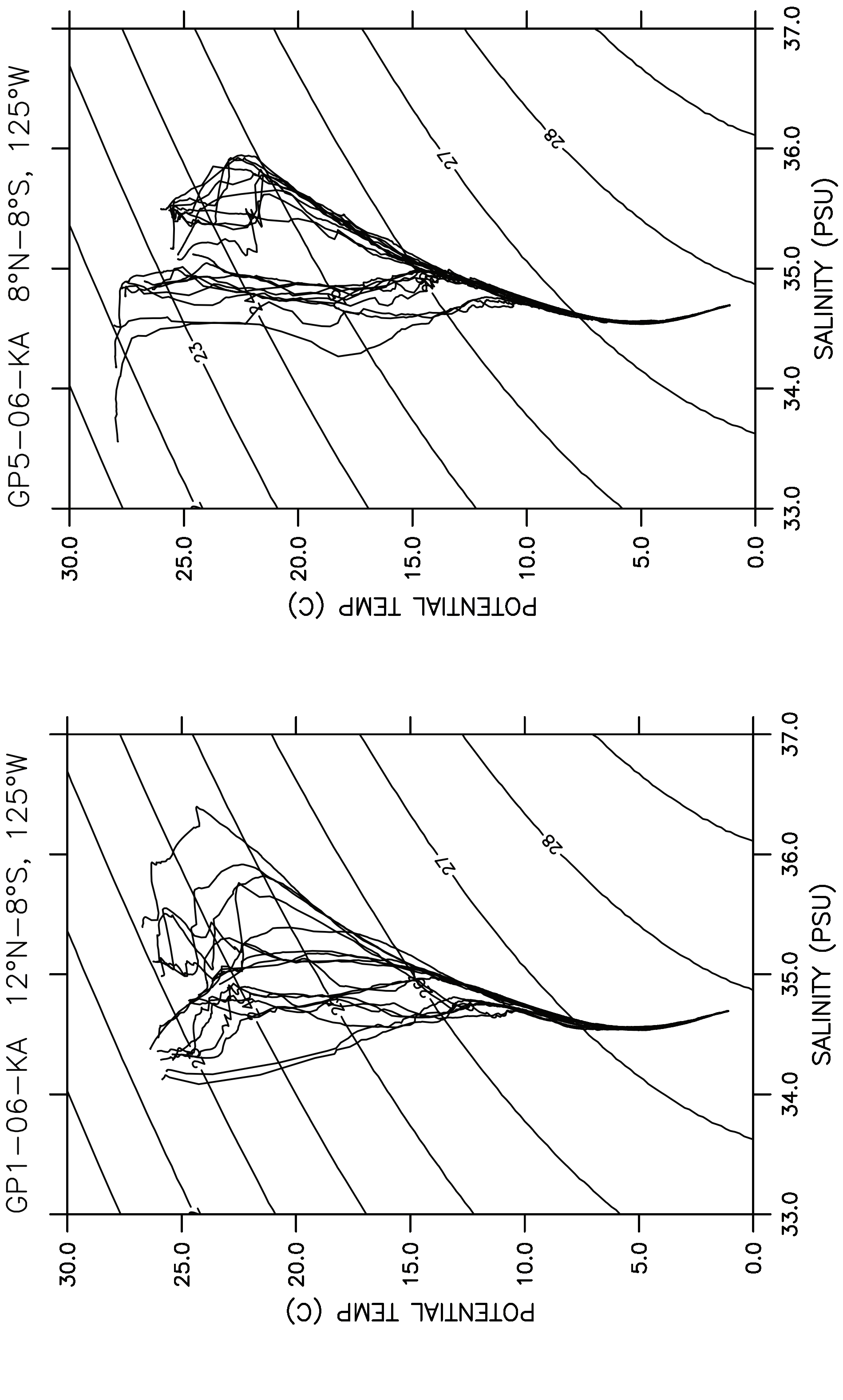

Figure 64: GP1-06-KA winter (January 26−February 4, 2006) and GP5-06-KA summer (August 26−September 3, 2006) composite θ-S diagram along 125°W.

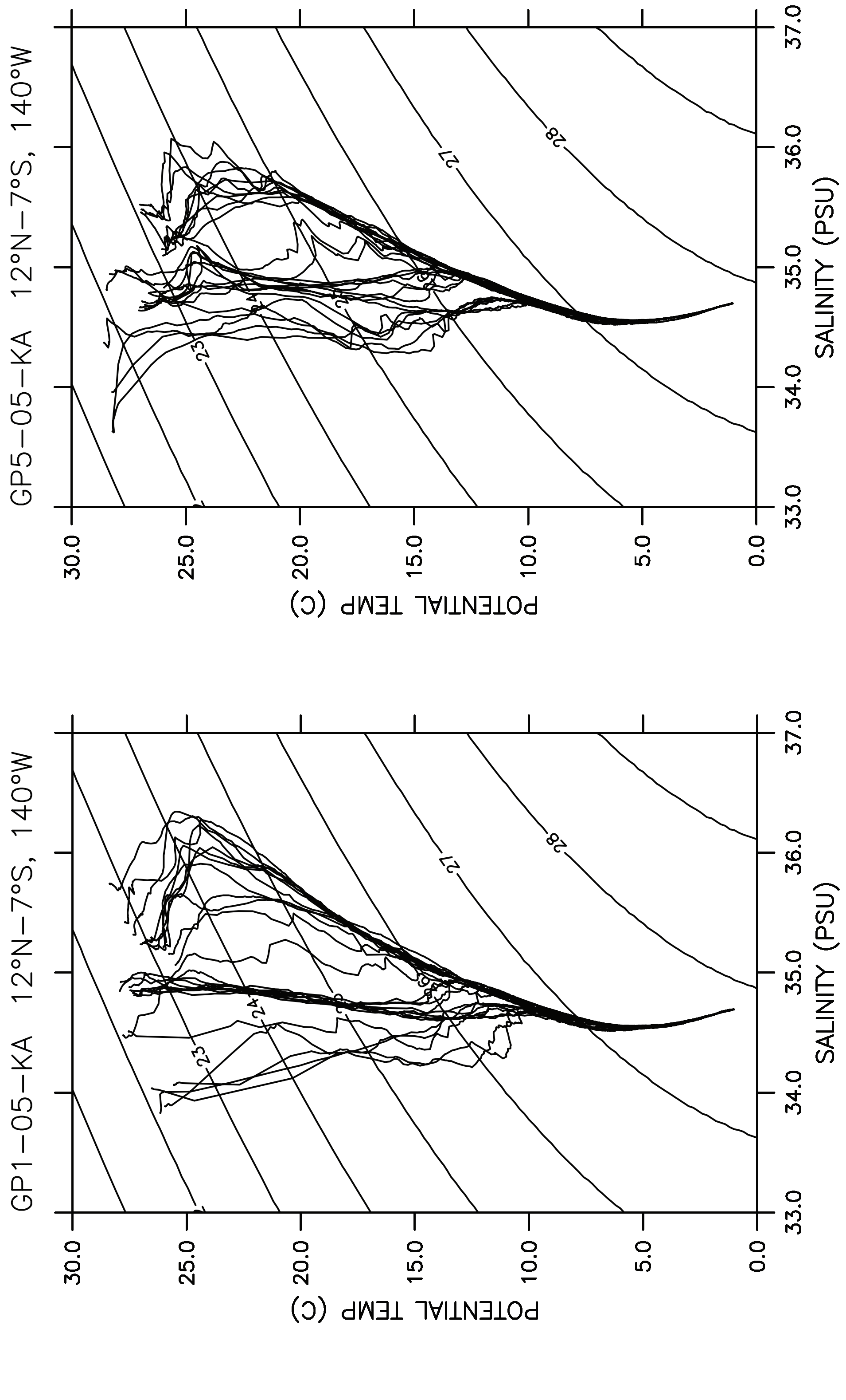

Figure 65: GP1-05-KA winter (February 23−March 5, 2005) and GP5-05-KA fall (September 19−28, 2005) composite θ-S diagrams along 140°W.

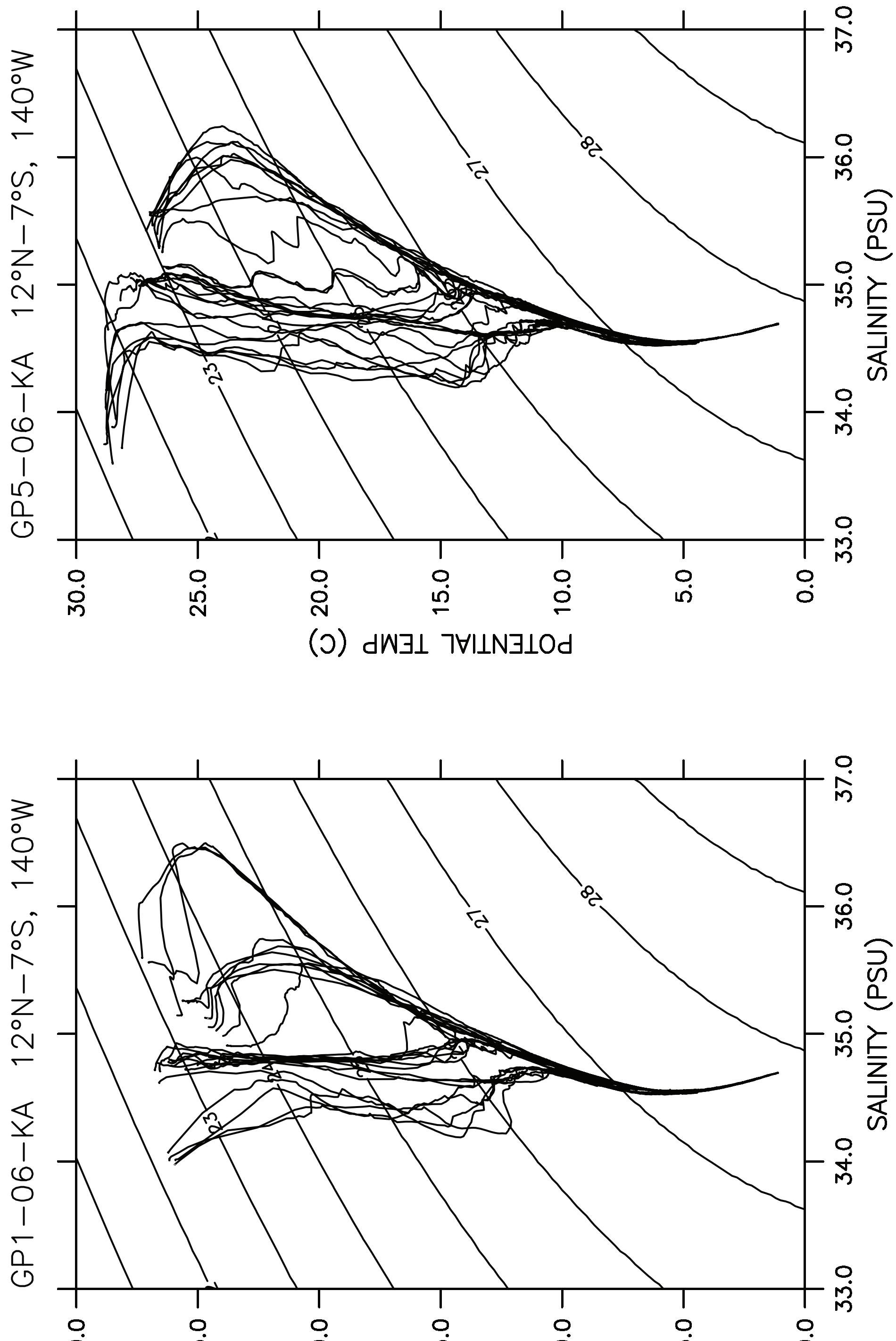

Figure 66: GP1-06-KA winter (January 11−19, 2006) and GP5-06-KA fall (September 11−20, 2006) composite θ-S diagrams along 140°W.

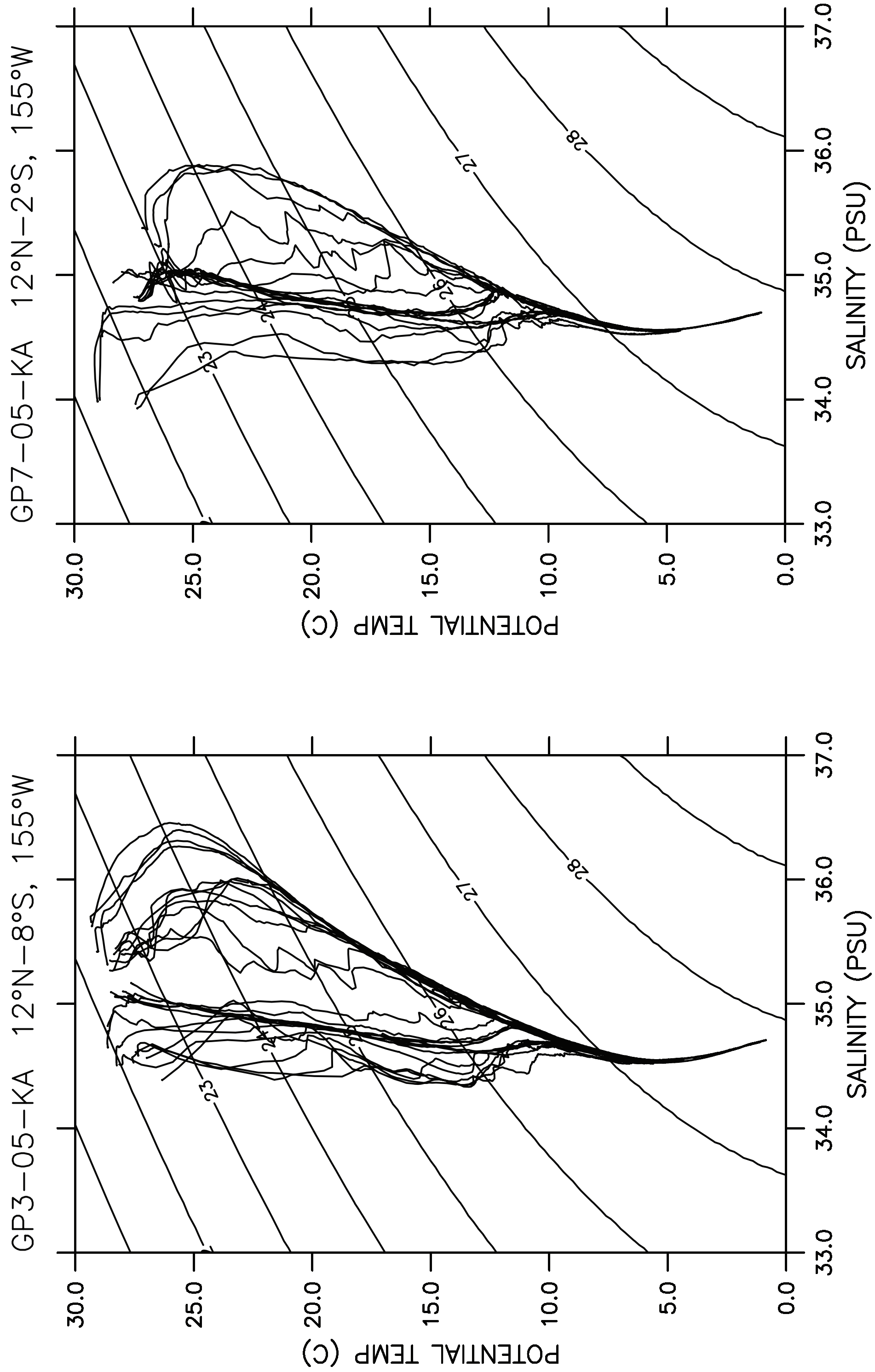

Figure 67: GP3-05-KA summer (June 12−20, 2005) and GP7-05-KA fall (October 21−27, 2005) composite θ-S diagrams along 155°W.

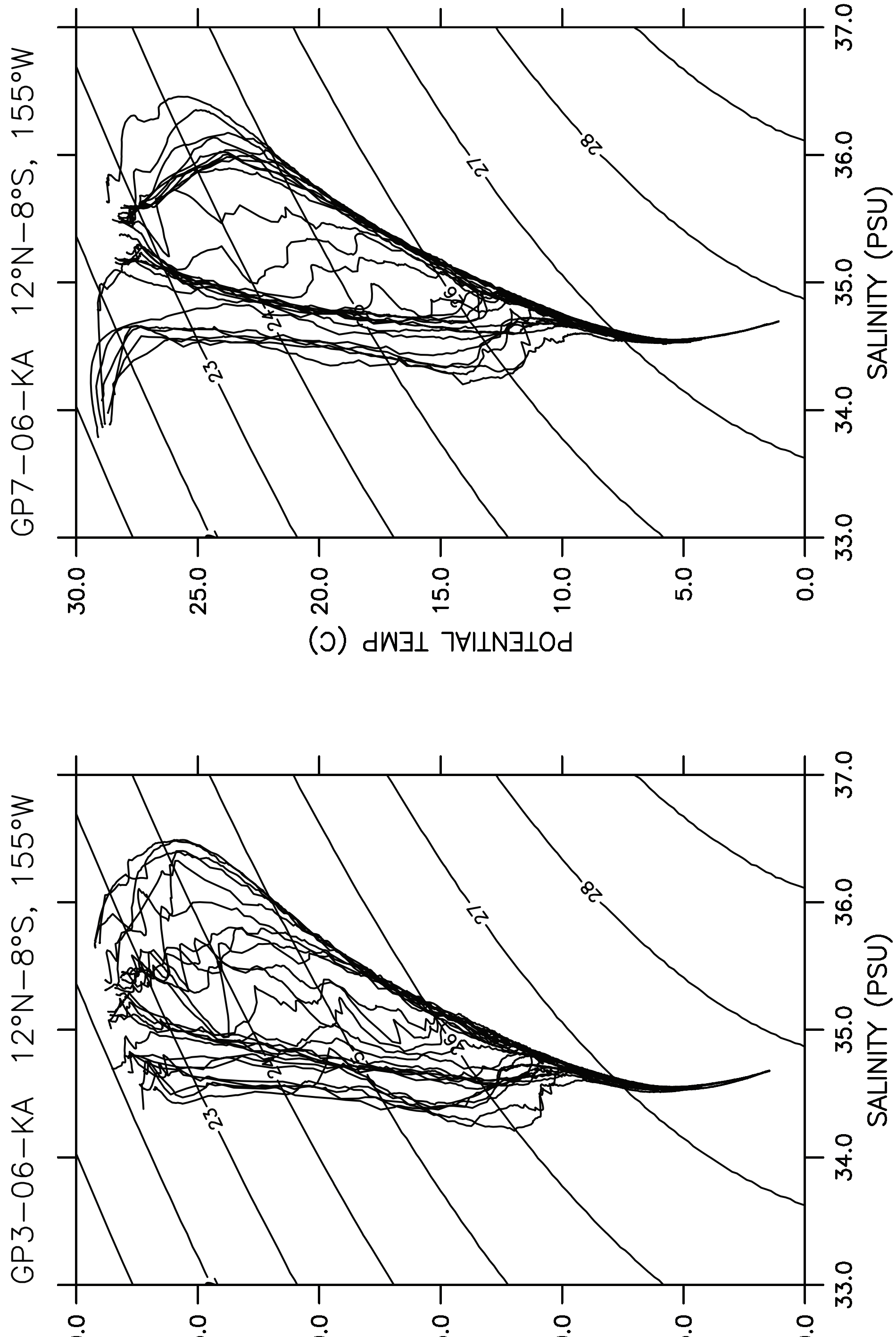

Figure 68: GP3-06-KA summer (June 2−10, 2006) and GP7-06-KA fall (October 9−17, 2006) composite θ-S diagrams along 155°W.

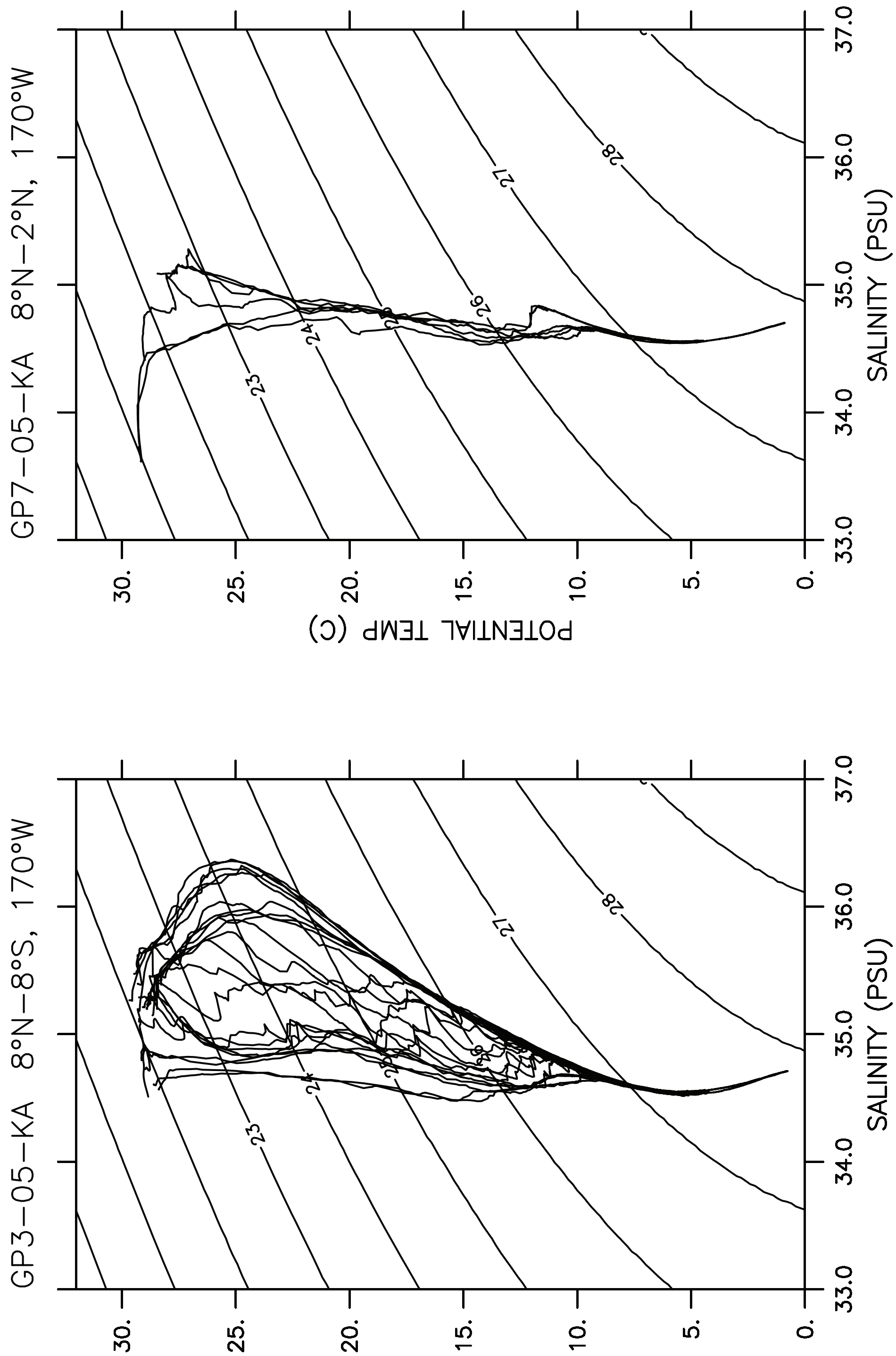

Figure 69: GP3-05-KA summer (June 29−July 7, 2005) and GP7-05-KA fall (November 16−18, 2005) composite θ-S diagrams along 170°W.

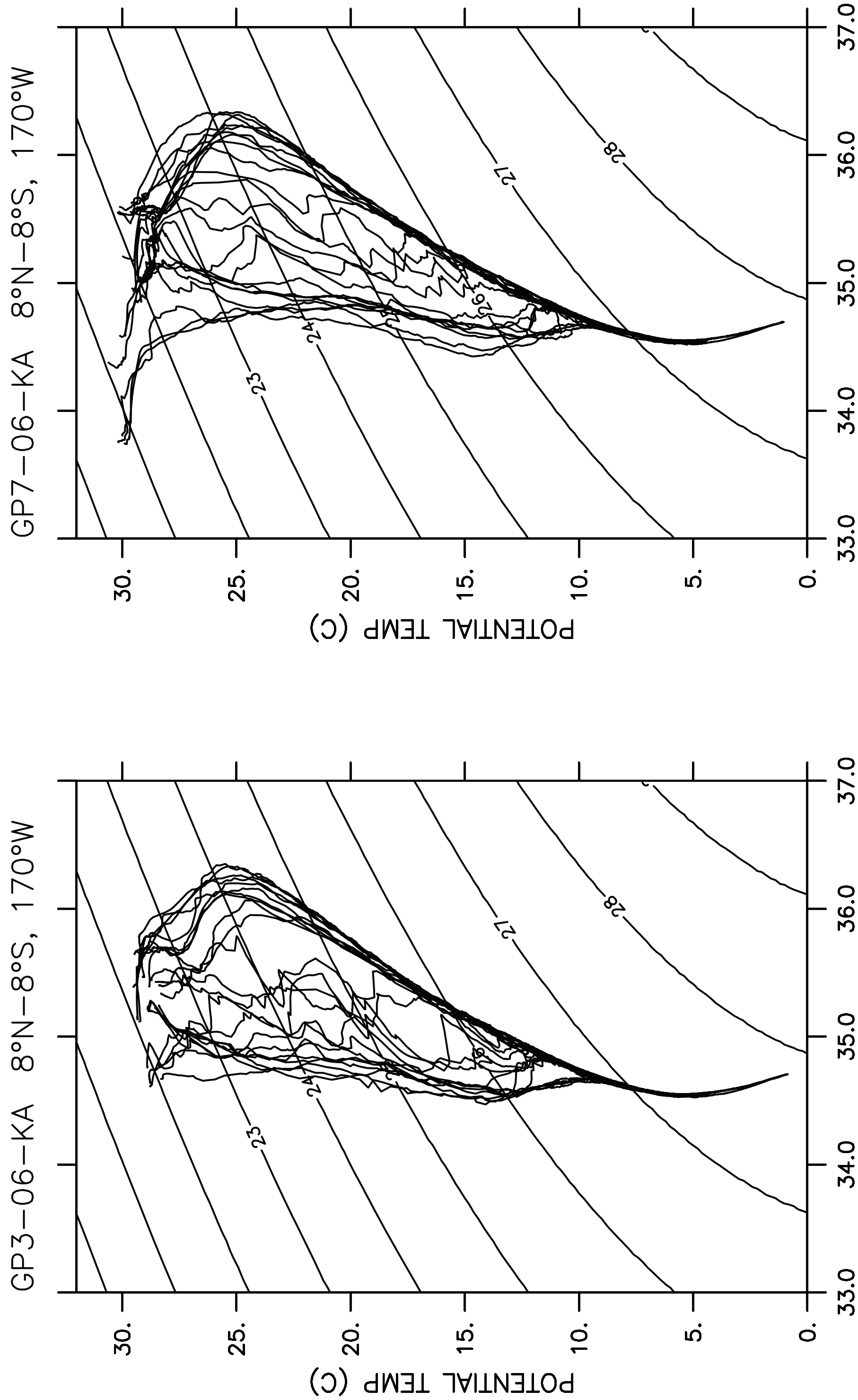

Figure 70: GP3-06-KA summer (June 19−28, 2006) and GP7-06-KA fall (October 21−27, 2006) composite θ-S diagrams along 170°W.

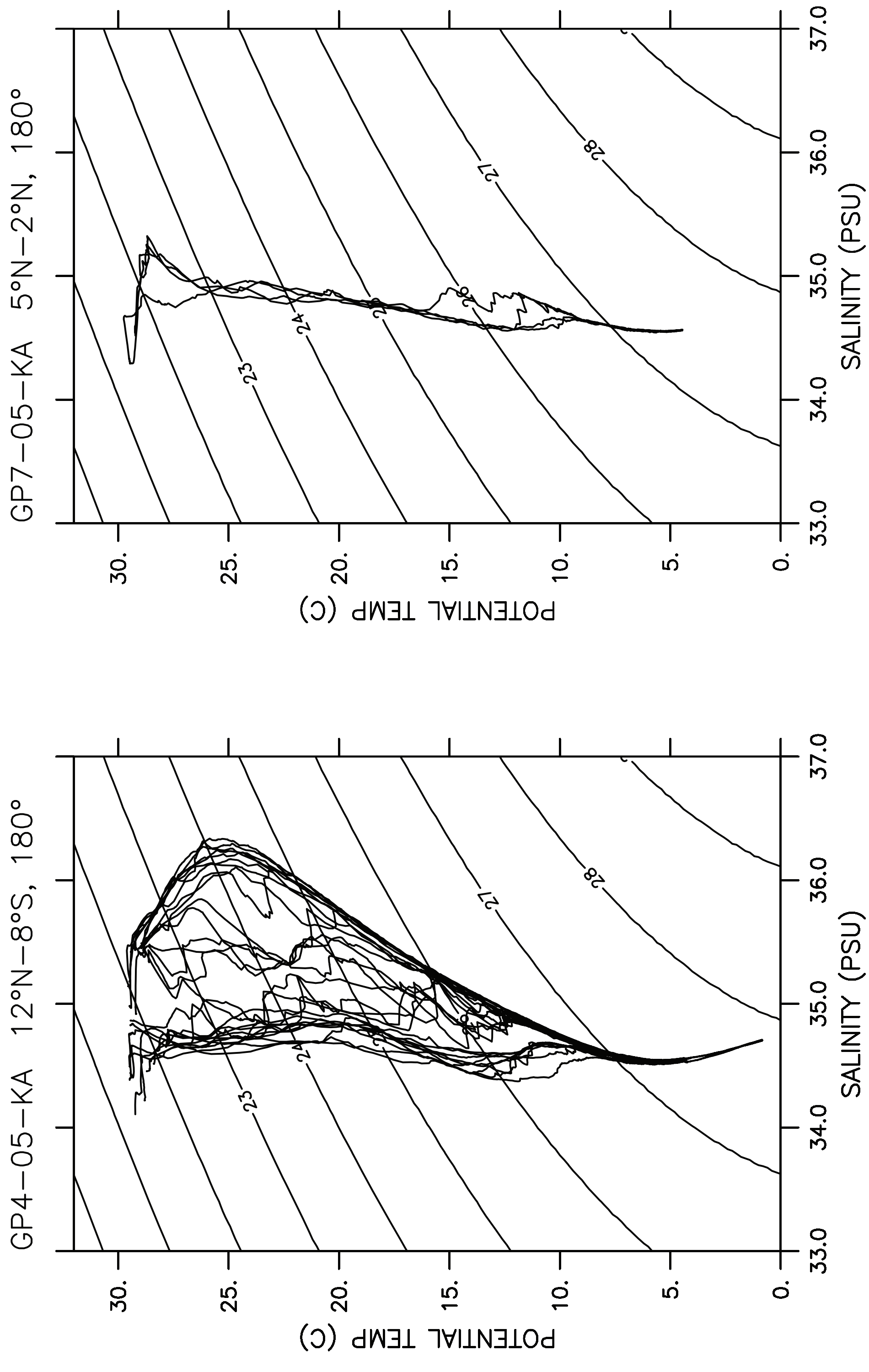

Figure 71: GP4-05-KA summer (July 28−August 7, 2005) and GP7-05-KA fall (November 21−22, 2005) composite θ-S diagrams along 180°.

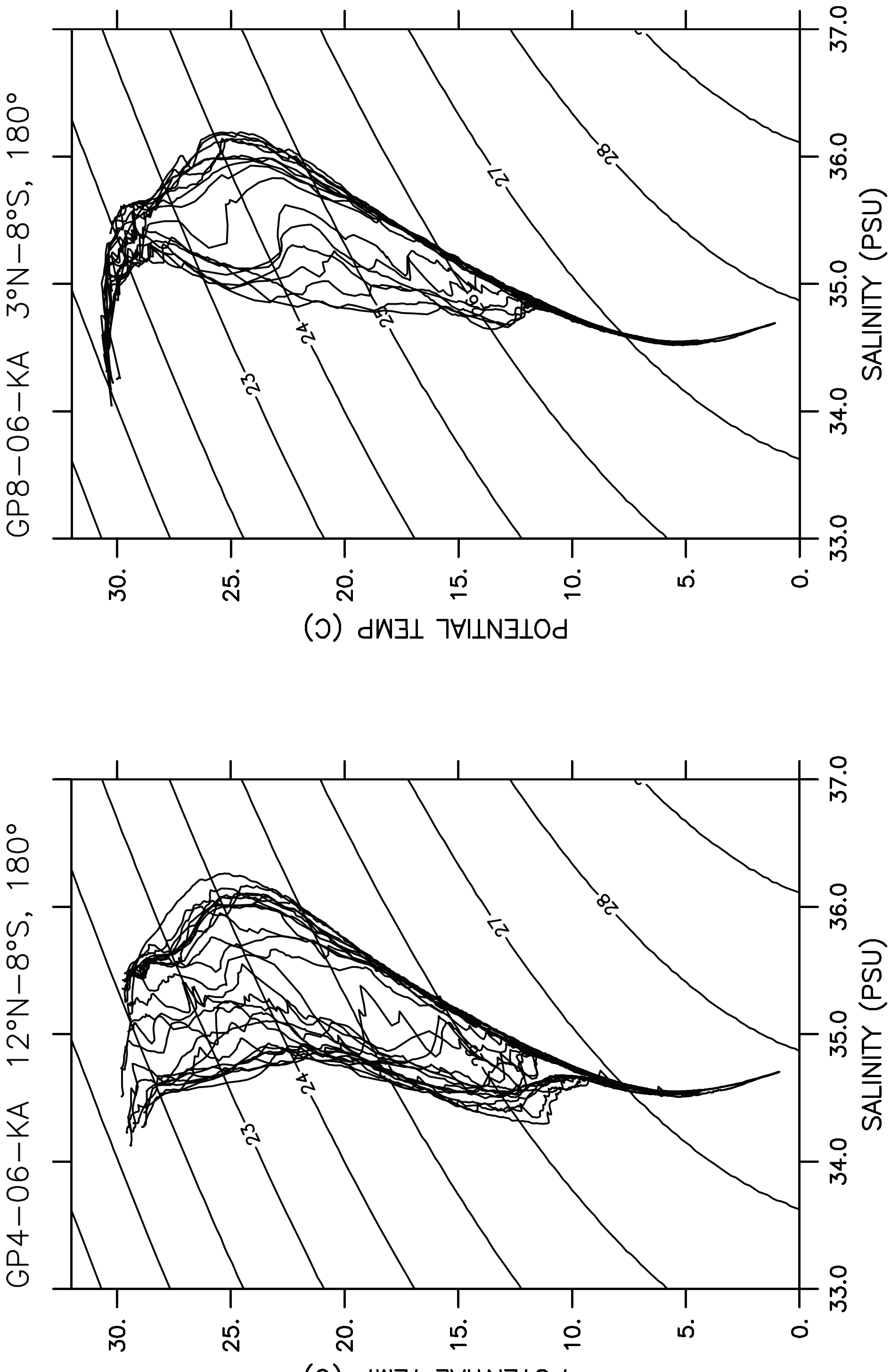

Figure 72: GP4-06-KA summer (July 19−27, 2006) and GP8-06-KA fall (November 16−20, 2006) composite θ-S diagrams along 180°.

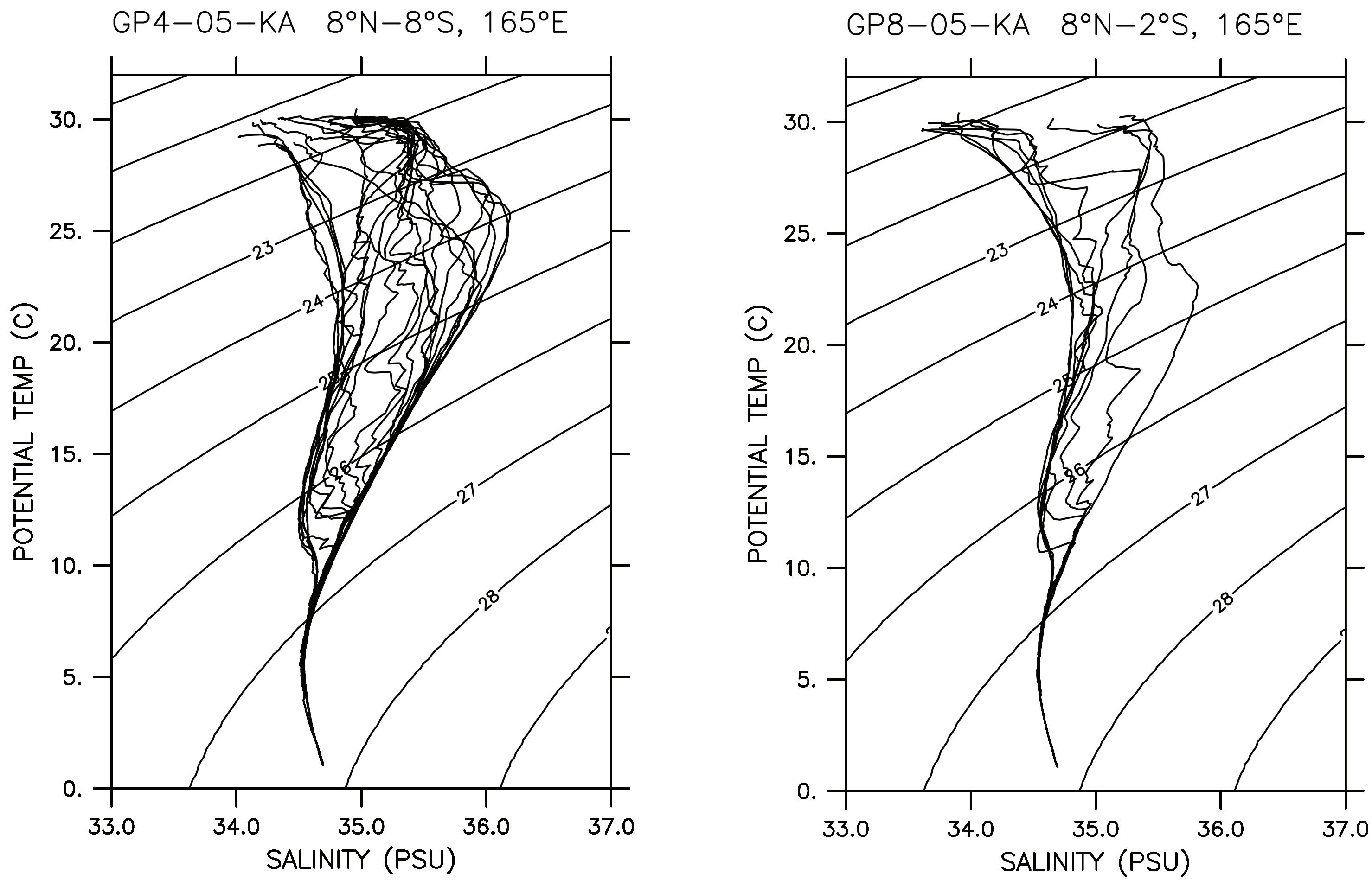

Figure 73: GP4-05-KA summer (July 16–24, 2005) and GP8-05-KA fall (November 27–December 1, 2006) composite θ-S diagrams along 165°E.

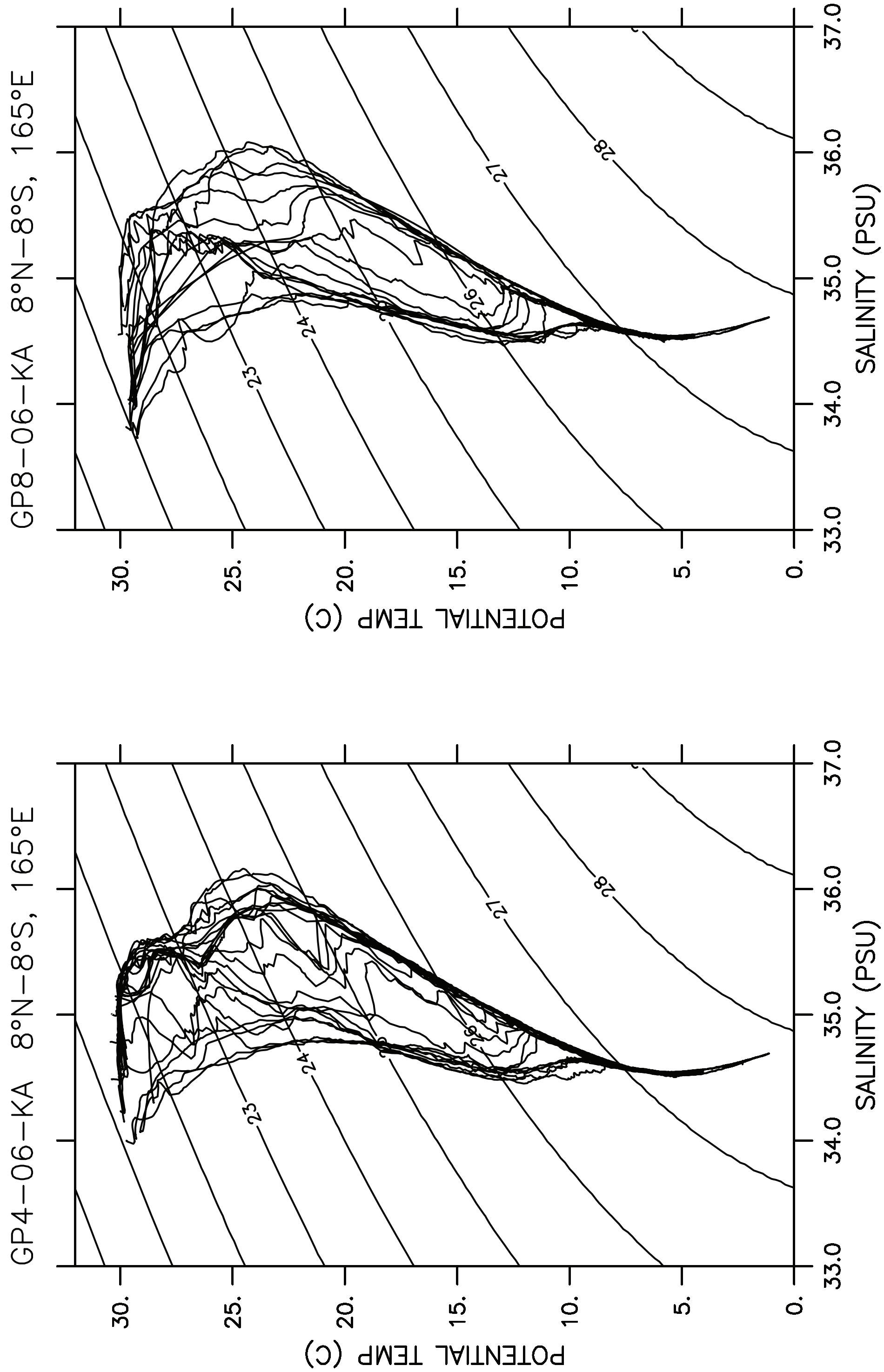

Figure 74: GP4-06-KA summer (July 8−15, 2006) and GP8-06-KA fall (November 5−12, 2006) composite θ-S diagrams along 165°E.

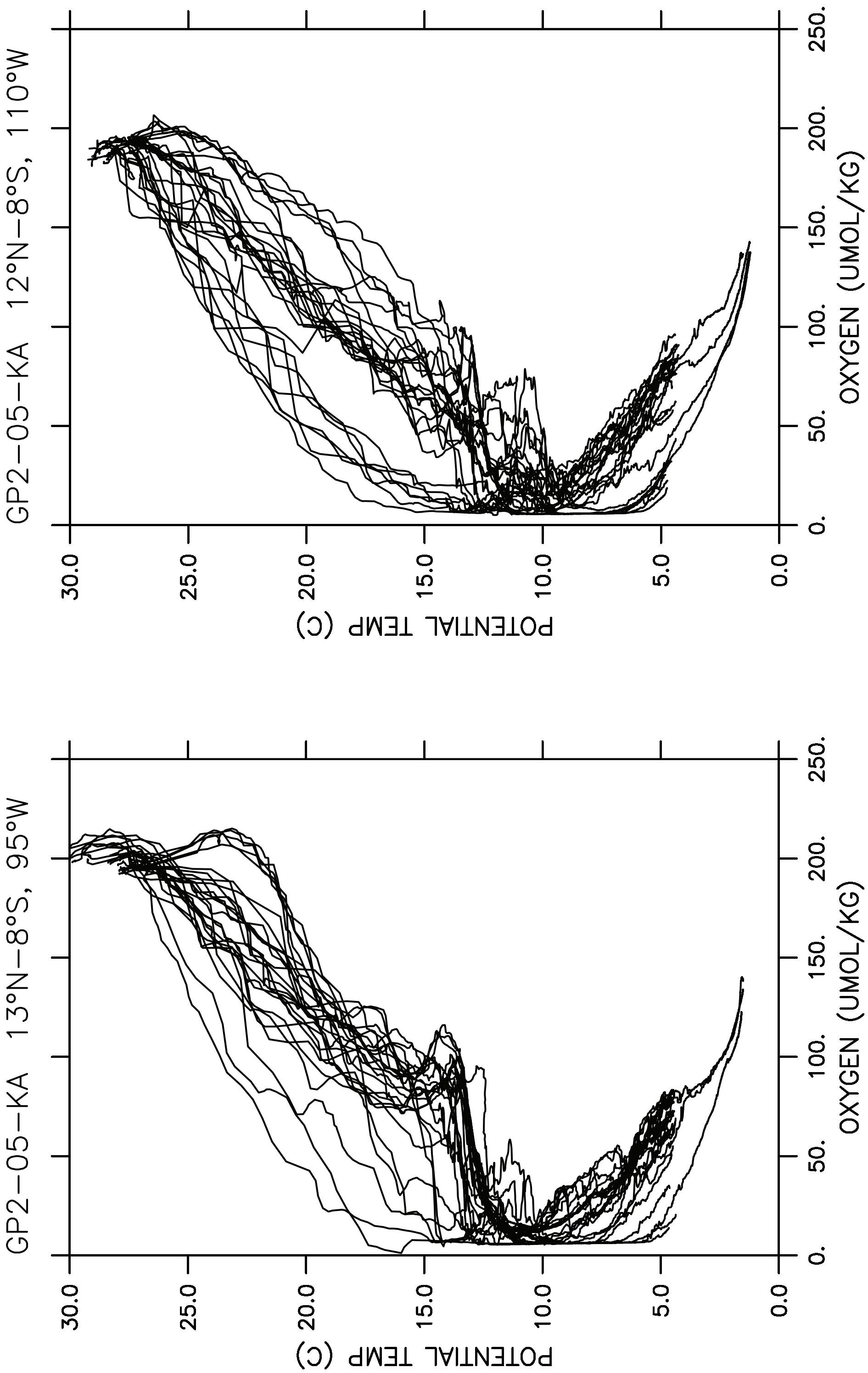

Figure 75: GP2-05-KA spring composite θ-O_2 diagrams along 95°W (April 23–May 9, 2005) and 110°W (April 10–19, 2005).

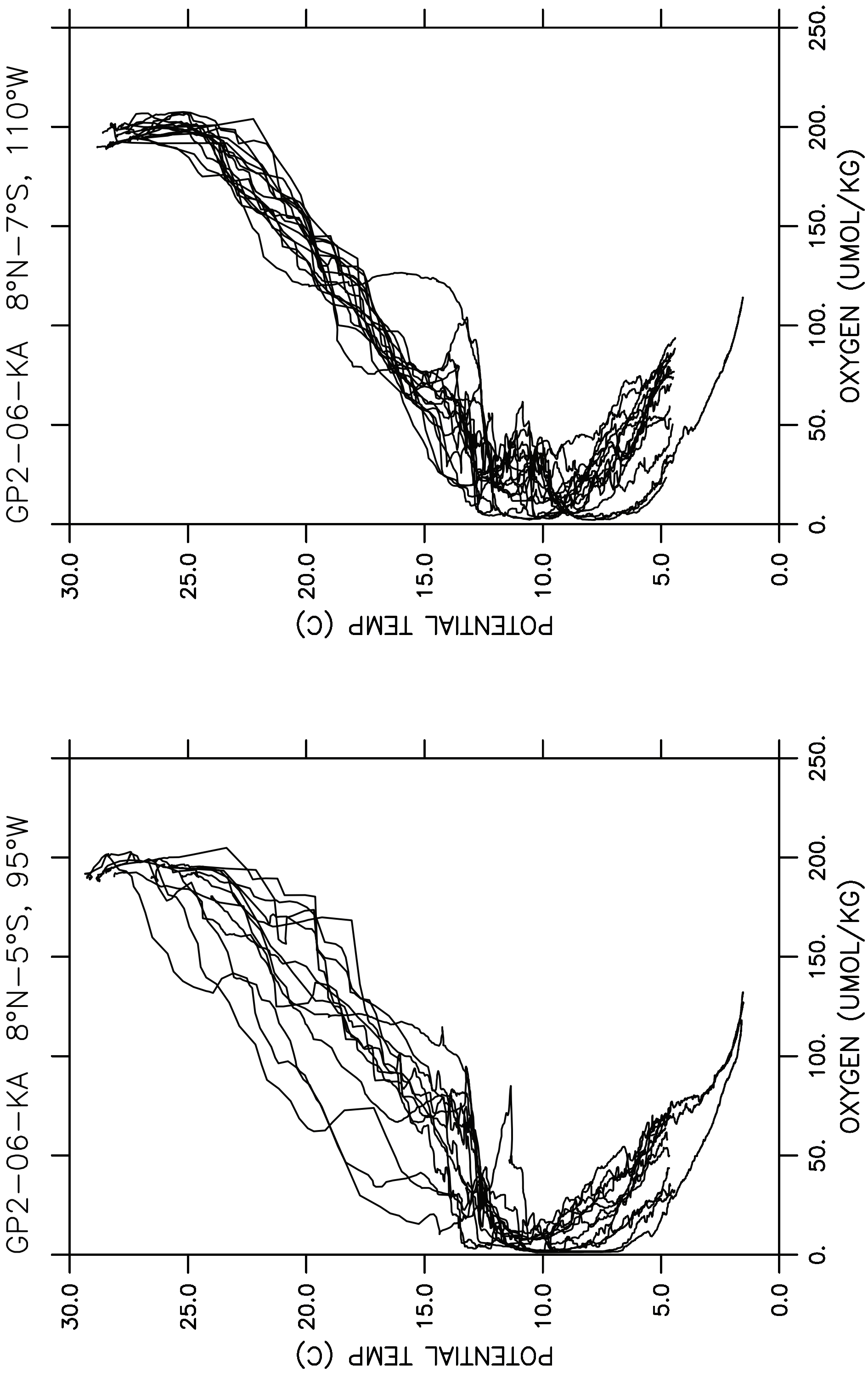

Figure 76: GP2-06-KA spring composite θ-O_2 diagrams along 95°W (April 18−25, 2006) and 110°W (April 8−14, 2006).

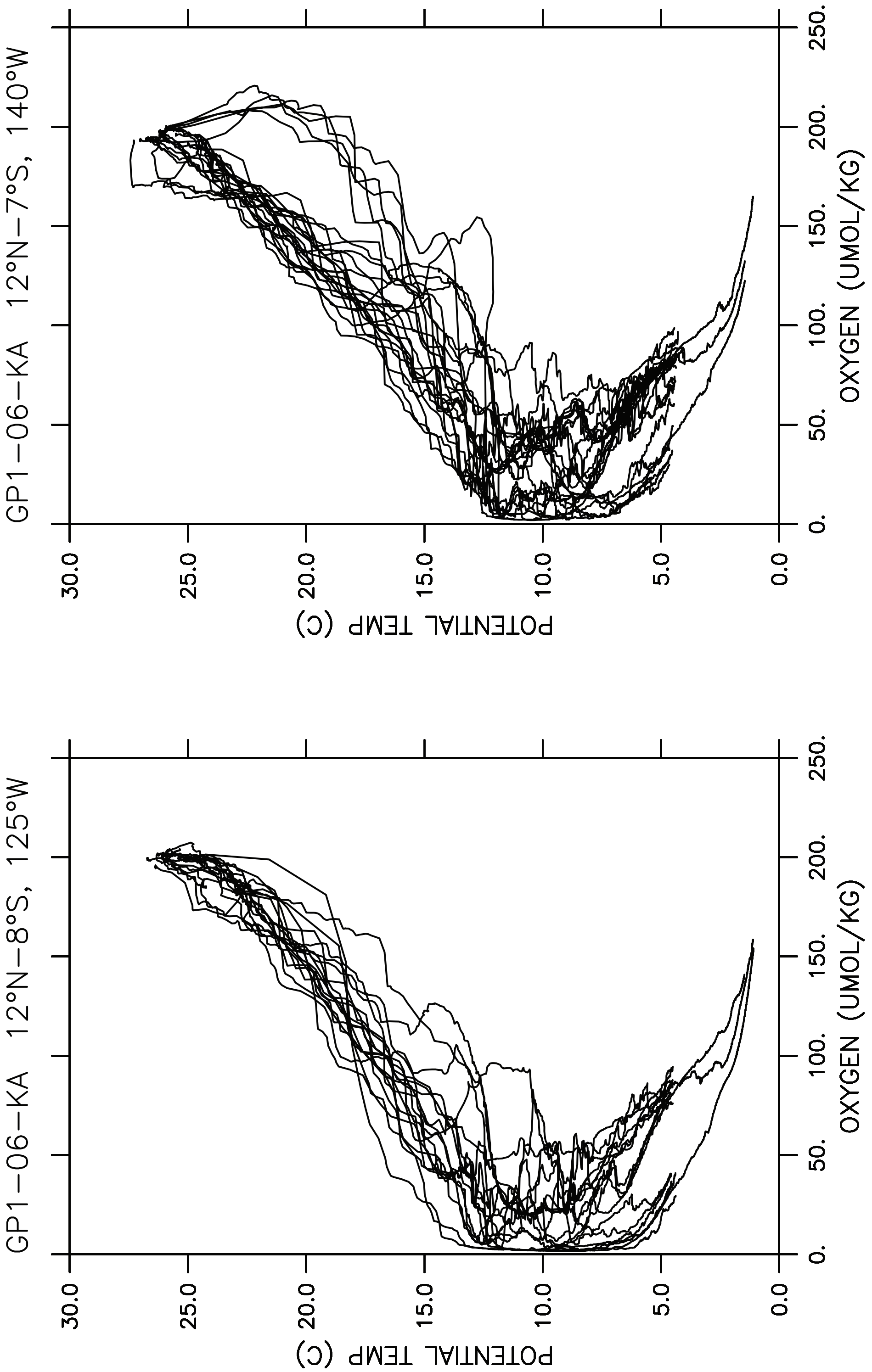

Figure 77: GP1-06-KA winter composite θ-O_2 diagrams along 125°W (January 26−February 4, 2006) and 140°W (January 11−19, 2006).

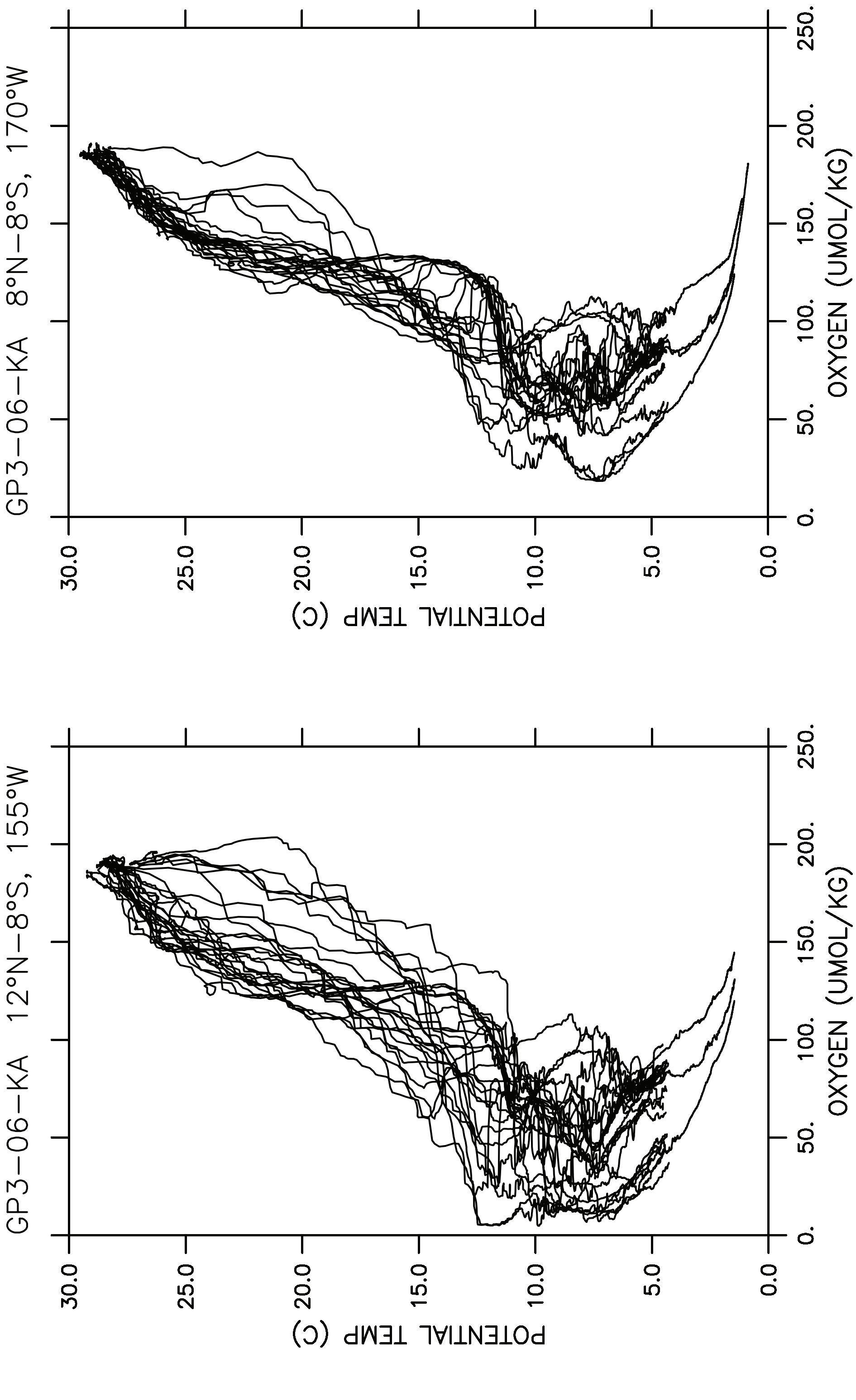

Figure 78: GP3-06-KA summer composite θ-O_2 diagrams along 155°W (June 2−10, 2006) and 170°W (June 19−28, 2006).

Table 3: Drift and viscous heating corrections for CTD temperature calibration.

Cruise	Temp Sensor S/N	Drift Correction (°C)	Viscous Heat Correction (°C)
GP105	4211	0.0000	−0.0006
GP205	4211	0.0000	−0.0006
	1710	0.0000	−0.0006
GP305	1710	0.0000	−0.0006
GP405	1710	0.0000	−0.0006
GP505	1710	0.0001	−0.0006
GP605	1370	0.0016	−0.0006
GP705	4211	0.0002	−0.0006
GP805	1710	0.0002	−0.0006
GP106	1710	0.0002	−0.0006
GP206	4211	0.0003	−0.0006
GP306	4211	0.0004	−0.0006
GP406	4211	0.0004	−0.0006
GP506	4211	0.0007	−0.0006
GP606	4193	0.0000	−0.0006
GP706	4211	0.0008	−0.0006
GP806	4211	0.0008	−0.0006

Table 4: Weather condition code used to describe each set of CTD measurements.

Code	Weather Condition
0	Clear (no cloud)
1	Partly cloudy
2	Continuous layer(s) of cloud(s)
3	Sandstorm, dust storm, or blowing snow
4	Fog, thick dust or haze
5	Drizzle
6	Rain
7	Snow, or rain and snow mixed
8	Shower(s)
9	Thunderstorms

Table 5: Sea state code used to describe each set of CTD measurements.

Code	Height (meters)	Description
0	0	Calm-glassy
1	0–0.1	Calm-rippled
2	0.1–0.5	Smooth-wavelet
3	0.5–1.25	Slight
4	1.25–2.5	Moderate
5	2.5–4	Rough
6	4–6	Very rough
7	6–9	High
8	9–14	Very high
9	>14	Phenomenal

Table 6: Visibility code used to describe each set of CTD measurements.

Code	Visibility
0	<50 meters
1	50–200 meters
2	200–500 meters
3	500–1,000 meters
4	1–2 km
5	2–4 km
6	4–10 km
7	10–20 km
8	20–50 km
9	50 km or more

Table 7: Cloud type.

Code	Cloud Types
0	Cirrus
1	Cirrocumulus
2	Cirrostratus
3	Altocumulus
4	Altostratus
5	Nimbostratus
6	Stratocumulus
7	Stratus
8	Cumulus
9	Cumulonimbus
X	Clouds not visible

Table 8: Cloud amount.

Code	Cloud Amount
0	0
1	1/10 or less but not zero
2	2/10–3/10
3	4/10
4	5/10
5	6/10
6	7/10–8/10
7	9/10
8	10/10
9	Sky obscured or not determined