

MICROCOPY RESOLUTION TEST CHART
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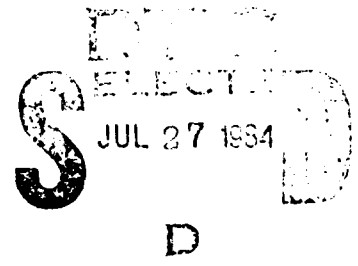
Hydrographic Measurements in the Western Alboran Sea, October 1982

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Oceanography Division

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HYDROGRAPHIC MEASUREMENTS IN THE WESTERN ALBORAN SEA, OCTOBER 1982

1. INTRODUCTION

The Naval Ocean Research and Development Activity (NORDA) is studying the inflow of the Atlantic Water into the Mediterranean Sea in an Office of Naval Research funded project entitled "Mesoscale Flow Dynamics in the Strait of Gibraltar and Alboran Sea." This project has become part of an international study of the Alboran Sea/Strait of Gibraltar/Gulf of Cadiz region. This broader study has taken the name ¿Donde Va?.

The second of two ¿Donde Va? field periods occurred during October 1982 (Donde Va Group, 1984). We did 78 CTD (conductivity temperature depth profiler) stations and 152 XBT (expendable bathythermography) drops (Bergin and Kinder, 1983) during USNS BARTLETT cruise 1311-82. This note discusses the CTD data.

2. CRUISE PLAN

The plan of the cruise was to accomplish seven objectives (listed in decreasing priority):

- Recover five subsurface current meter moorings that had been deployed in June;
- Do CTD/XBT sections across the Atlantic inflow and Alboran Gyre in coordination with the Spanish ship CORNIDE DE SAAVEDRAA;
- Obtain velocity profiles across the Atlantic inflow with a tethered velocity profiler;
- Do CTD or velocity profiler time series stations;
- Obtain airsonde and other meteorological data;
- Obtain aerosol data;
- Take Secchi disc readings.

The CTD/XBT sections (Fig. 1, Tables 1-2) were designed to cross the historical position of the Atlantic inflow and the anticyclonic gyre (Cano and de Castillejo, 1972; Lanoix, 1974; Cheney and Doblár, 1982; Parrilla and Kinder, 1984). We also received infrared satellite images during October from M. Phillipe (Centre de Meteorologie Spatiale, Lannion, France) and P. E. La Violette (NORDA).

3. DATA COLLECTION AND PROCESSING

Data were acquired from a Neil Brown MK III CTD that was lowered at 60 m/min. The onboard digital recording system malfunctioned, so that data had to be recorded in analog form on the backup tape deck. This tape deck had intermittent failures in one channel that resulted in large data losses at some stations. For those stations marked "not on tape" in Table 1, we have only the shipboard printouts that were intended for preliminary data analysis only. The data for these stations were limited to about one sample every 5 m compared to one sample every few centimeters for other stations. In this report the data from the stations without a tape record are not plotted.

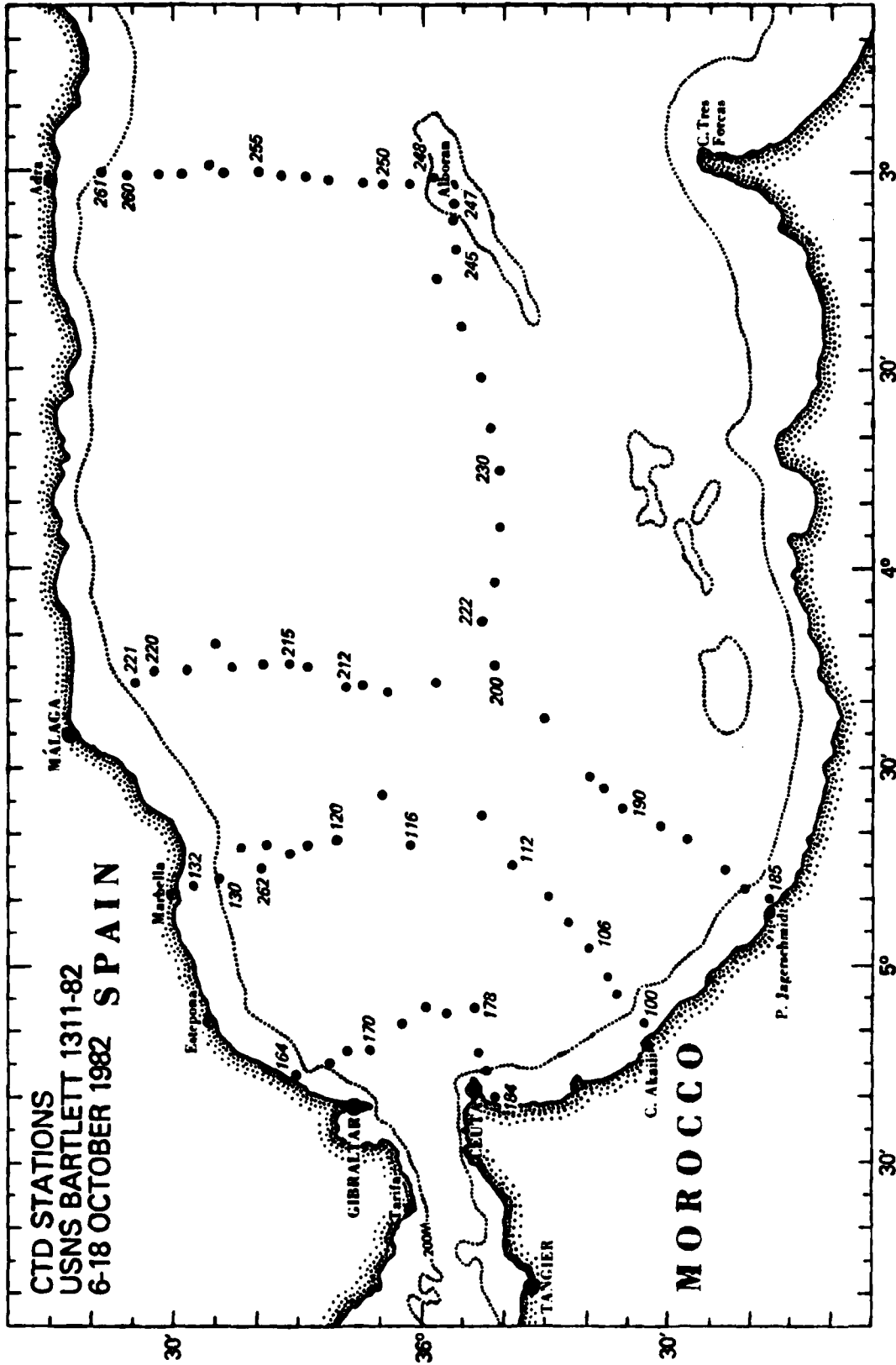


Figure 1. Cruise Track of USNS BARTLETT

TABLE 1. LIST OF STATIONS

Cast numbers appear in the form SSSCCC where SSS is a three digit number that corresponds to a geographic location (station number) and CCC is intended to be a three digit number that is consecutive throughout the cruise ("cast number"). At a time series station, only one number is assigned to the entire suite of data which may consist of many profiles (yo-yos). Anomalies:

010010 refers to both a velocity profile and XBT

SSS227 - SSS266 were skipped by mistake

DR - dead reckoning (no fix within 15 minutes)

S - satellite fix

O - Omega fix

R - radar fix

V - visual fix

CAST	TIME	JULIAN DAY	LATITUDE (N)	LONGITUDE (W)	SOURCE	DEPTH (m)	COMMENTS
100026	1513	6 OCT 279	35 32.5	5 08.3	0	80	
102028	1644	6 OCT 279	35 36.0	5 04.0	0	190	
104030	2041	6 OCT 279	35 36.9	5 02.4	0	377	
106032	2201	6 OCT 279	35 39.7	4 57.4	S	432	

108034	2359	6 OCT 279	35 42.0	4 53.7	0	506
110036	0118	7 OCT 280	35 44.5	4 50.2	S	592
112039	0333	7 OCT 280	35 48.1	4 45.0	0	1140
114041	0609	7 OCT 280	35 52.4	4 36.2	S	1207
116043	0900	7 OCT 280	36 00.8	4 41.4	0	1155
118045	1001	7 OCT 280	36 04.5	4 34.2	S	1142
120047	1232	7 OCT 280	36 10.2	4 41.4	0	996
122050	1328	7 OCT 280	36 12.7	4 41.2	0	952
124052	1430	7 OCT 280	36 15.8	4 42.5	S	885
126054	1557	7 OCT 280	36 18.5	4 41.2	0	763
128056	1713	7 OCT 280	36 21.7	4 43.4	0	476
130058	1819	7 OCT 280	36 24.4	4 46.6	0	230
132060	1918	7 OCT 280	36 27.2	4 47.3	0	75
164092	0911	10 OCT 283	36 15.1	5 15.8	0	92
166098	1024	10 OCT 283	36 11.3	5 14.9	0	302
168100	1123	10 OCT 283	36 08.9	5 12.4	0	639
170102	1252	10 OCT 283	36 05.7	5 12.4	0	783
172104	1402	10 OCT 283	36 02.8	5 09.5	0	680
174106	1523	10 OCT 283	35 59.4	5 08.8	0	541
174107	1603	10 OCT 283	35 59.3	5 05.8	0	526
176109	1727	10 OCT 283	35 57.2	5 07.1	S	506
178111	1846	10 OCT 283	35 53.8	5 0.06	S	459

To 500 m only

Not on tape

Not on tape

Not on tape

Not on tape

Not on tape

180113	2016	10 OCT 283	35 53.4	5 12.6	0	585
182115	2111	10 OCT 283	35 52.8	5 15.6	0	441
184117	2217	10 OCT 283	35 52.0	5 20.1	0	190
185118	0300	11 OCT 284	35 17.0	4 50.2	0	85
186119	0358	11 OCT 284	35 20.4	4 49.3	0	325
187120	0459	11 OCT 284	35 23.4	4 46.2	0	375
188121	0602	11 OCT 284	35 27.5	4 40.3	0	423
189122	0729	11 OCT 284	35 30.4	4 39.7	0	480
190123	0922	11 OCT 284	35 36.2	4 37.7	0	980
191124	1133	11 OCT 284	35 37.4	4 33.8	0	1004
192125	1244	11 OCT 284	35 39.3	4 31.7	0	1360
192126	1339	11 OCT 284	35 39.8	4 30.2	0	1360
196130	1503	11 OCT 284	35 45.0	4 21.7	0	1480
200134	1637	11 OCT 284	35 50.7	4 14.9	0	1382
204138	1930	11 OCT 284	35 58.3	4 17.8	0	1197
208142	2100	11 OCT 284	36 04.0	4 18.8	0	1308
210144	2227	11 OCT 284	36 07.6	4 17.7	0	1272
212146	2333	11 OCT 284	36 10.5	4 17.6	0	1171
214148	0035	12 OCT 285	36 13.5	4 15.0	0	1055
215149	0216	12 OCT 285	36 16.2	4 14.8	0	502
216150	0335	12 OCT 285	36 19.8	4 14.8	0	739

Not on tape

Record to 20 m on
upcast for remote
sensing
To 500 m only

To 500 m only

To 500 m only

To 500 m only

To 500 m only

To 500 m only

217151	0523	12 OCT 285	36 22.9	4 15.5	0	657
218152	0631	12 OCT 285	36 24.7	4 11.5	0	567
219153	0738	12 OCT 285	36 28.1	4 16.2	0	434
220154	0857	12 OCT 285	36 32.2	4 16.0	0	360
221155	0952	12 OCT 385	36 35.6	4 17.0	S	265
222156	1525	12 OCT 285	34 52.7	4 08.0	0	1348
224158	1633	12 OCT 285	35 51.1	4 02.0	0	1074
226160	1746	12 OCT 285	35 50.6	3 54.6	DR	1120
230164	1950	12 OCT 285	35 51.2	3 45.1	0	1415
234168	2135	12 OCT 285	35 51.6	3 39.6	0	1422
238172	2251	12 OCT 285	35 53.4	3 31.5	0	1515
238173	2333	12 OCT 285	35 53.0	3 31.3	0	1515
242177	0105	13 OCT 286	35 56.2	3 24.2	0	1468
244179	0236	13 OCT 286	35 57.9	3 16.4	S	1334
245180	0443	13 OCT 286	35 55.3	3 11.8	0	659
246181	0602	13 OCT 286	35 56.5	3 05.3	0	263
247182	0652	13 OCT 286	35 56.5	3 04.7	0	112
248183	0745	13 OCT 286	35 58.2	3 01.6	0	84
249184	0835	13 OCT 286	36 01.1	3 02.8	0	980
250185	0944	13 OCT 286	36 04.5	3 02.8	0	1621
250186	1005	13 OCT 286	36 04.2	3 02.7	S	1680

To 500 m only

To 500 m only

To 500 m only

To 500 m only

Upcast of 238172

To 500 m only

Not on tape

Repeat 250185

251187	1148	13 OCT 286	36 06.5	3 01.7	0	1603	To 500 m only
							Not on tape
252188	1250	13 OCT 286	36 10.5	3 01.8	0	772	Not on tape
253189	1400	13 OCT 286	36 12.9	3 02.0	S	760	To 500 m only
							Not on tape
254190	1507	13 OCT 286	36 16.8	3 01.7	0	857	To 500 m only
							Not on tape
255191	1611	13 OCT 286	36 19.8	3 00.6	0	935	To 500 m only
256192	1725	13 OCT 286	36 23.0	3 00.6	0	854	To 500 m only
257193	1833	13 OCT 286	36 25.4	2 59.6	S	805	
258194	2011	13 OCT 186	36 29.3	3 02.1	0	706	
259195	2116	13 OCT 286	36 31.5	3 01.9	0	556	
260196	2218	13 OCT 286	36 35.3	3 01.9	0	467	
261197	2302	13 OCT 286	36 37.9	3 01.3	0	232	
262501	1334	14 OCT 287	36 16.8	4 46.1	0	798	Time series. 42
262542	0340	15 OCT 288	36 18.9	4 45.8	0	700	yo-yo's. 262506
							not on tape.

Table 2. Positions for Time-Series Station

<u>Yo-Yo #</u>	<u>Time</u>	<u>Day</u>	<u>Latitude (N)</u>	<u>Longitude (W)</u>	<u>Depth (m)</u>	<u>Comments</u>
501	1334	14 OCT 287	36-16.8	4-46.1	798	To 785 m
502	1420		36-16.9	4-45.0		
503	1440		36-17.2	4-45.2		
504	1500		36-17.5	4-45.3		
505	1520		36-17.7	4-45.3		
506	1540		36-18.2	4-45.0		Not on tape
507	1600		36-18.5	4-44.7	732	
508	1620		36-18.8	4-44.7	723	
509	1640		36-19.0	4-43.7	710	
510	1700		36-19.4	4-44.2	694	
511	1720		36-19.6	4-43.9	698	
512	1740		36-19.5	4-44.4		
513	1800		36-19.6	4-43.8		
514	1820		36-19.5	4-43.5	658	
515	1840		36-19.4	4-43.6	679	
516	1900		36-19.5	4-43.8	695	
517	1920		36-19.4	4-44.1	692	
518	1940		36-19.3	4-44.0	694	
519	2000		36-19.3	4-44.3	692	
520	2020		36-19.1	4-44.2	703	
521	2040		36-18.8	4-44.3	714	
522	2100		36-18.6	4-44.1	728	
523	2120		36-18.1	4-44.3	743	
524	2140		36-17.9	4-44.1	763	
525	2200		36-17.5	4-44.5	776	
526	2220		36-17.2	4-44.2	792	
527	2240		36-16.7	4-44.2	803	
528	2300		36-16.8	4-44.3	815	
529	2320		36-16.9	4-44.1	823	
530	2340		36-17.0	4-43.9	820	
531	0000	15 OCT 288	36-16.7	4-44.4	818	
532	0020		36-16.7	4-44.3	814	
533	0040		36-16.7	4-44.4	812	
534	0100		36-16.6	4-44.6	808	
535	0120		36-16.8	4-45.6	804	
536	0140		36-17.0	4-46.0	794	
537	0200		36-17.1	4-45.8	783	
538	0220		36-17.5	4-45.4	782	
539	0240		36-17.7	4-45.4	759	
540	0300		36-18.2	4-45.6	714	
541	0320		36-18.6	4-45.8	710	
542	0340	15 OCT 288	36-18.9	4-45.8	700	To 685 m

The analog tape data were transcribed to digital form and then edited to remove spikes. The sensor responses were matched, and then the data were pressure-sorted and filtered to produce 1-dbar averages (Hallock, 1982). Salinities were calculated using the 1978 practical salinity scale (Lewis and Perkin, 1981), potential temperature using Fofonoff (1962), and density (as sigma-theta) using UNESCO (1980) and Millero and Poisson (1981). The new salinity and density algorithms will differ from the older algorithms in the range of Mediterranean Water. The Deep Water salinities are about 0.006 lower (Lewis and Perkin, 1981), and the densities about 0.02 kg/m^3 lower (Parrilla, 1984).

Water samples obtained with a rosette sampler were used to monitor CTD performance. Two water samples were collected at the same depth at each of 10 stations (frequent rosette malfunctions reduced the number of samples collected). Water sample salinities were determined using a Guildline Salinometer, and compared to the CTD values (Table 3). The CTD was 0.008 lower than the water samples. Using the same CTD and salinometer in June (Kinder et al., 1983), we estimated that the CTD was 0.003 too low. The same salinometer and the same operator were used to check the Neil Brown CTD on the CORNIDE DE SAAVEDRAA during October, and the agreement was within 0.003. We also compared salinity cross sections from the Mediterranean Water below 500 dbar for June and October BARTLETT data and for October CORNIDE DE SAAVEDRAA data. Because of the small salinity gradients, a difference of 0.005 at 1000 dbar displaces the isohaline about 100 dbar. The intercomparison of the three data sets showed that the October Bartlett deep salinities were 0.003 to 0.008 too low. We, therefore, added a correction of 0.005 to all the BARTLETT October CTD salinities. This correction makes the three data sets more compatible below 500 dbar, and has no consequences at shallow depths because of the large salinity gradients there. Accuracies for this data are: 0.005°C , 0.005 salinity, and 5 dbar.

Because new algorithms were being implemented while these data were being processed, there are several anomalies in the plotted data:

- Potential temperature is used throughout, although sometimes labeled as "t" (e.g., sigma-t);
- Salinity was always calculated using practical salinity units, although it is labeled "ppt." Practical salinity has no units;
- Density is always represented as sigma-theta, although it is labeled as "sigma-t";
- Density in the plots was calculated using the older algorithms (Fofonoff, 1962). This is significant for the Mediterranean Water theta-S diagrams where the plotted isopycnals are about 0.02 kg/m^3 too high. Data files for this data and for the June data (Kinder et al., 1983) have been updated with the new algorithm.

Navigation was by radar and visual fixes near land, and by satellite and omega elsewhere. Station positions near land were accurate to about 0.5 km. Away from land, the combination of accurate but intermittent satellite fixes and continuous but inaccurate omega gave an estimated accuracy of about 1 km. Individual fixes based on the satellite system were accurate to about 0.5 km and on omega to about 2.0 km.

Table 3. Salinity Calibration

Station	Water Sample T(°C)	Sample	P(dbar)	CTD T(°C)		Sample - CTD
106	12.88	38.435	410	12.86	38.422	+0.013
112	13.00	38.424	1067	12.93	38.419	+0.005
114	13.03	38.442	1178	12.98	38.426	+0.016
118	13.00	38.427	1128	12.95	38.420	+0.007
124	12.96	38.400	840	12.94	38.427	-0.027*
196	13.11	38.467	500	13.12	38.465	+0.002
200	12.98	38.426	1340	12.96	38.419	+0.007
200	12.96	38.437	1196	12.96	38.422	+0.015
200	13.22	38.492	422	13.20	38.482	+0.010
200	13.23	38.429	340	13.23	38.469	-0.040*
208	13.00	38.420	1300	12.97	38.420	0
214	12.85	38.438	1000	12.96	38.428	+0.010
226	12.98	38.433	1013	12.97	38.427	+0.006

*Outliers

For all samples (n = 13): mean difference = +0.0018
standard deviation = 0.0166

For all samples less outliers (n = 11): mean difference = +0.0083
standard deviation = 0.0051

4. DISCUSSION

In addition to composite theta-S plots (Fig. 2), we have also provided four plots for each station (Figs. 3-69). Plot A is the density as sigma-theta (labeled as sigma-t), salinity, and potential temperature (theta) versus pressure for the entire cast. Plot B is the theta-salinity correlation diagram for the entire cast. Plot C is the same as plot A, but it is limited to the upper 70 dbar to illustrate details of interest to ¿Donde Va? optical and biological investigators. Plot D is the same as B, but limited to potential temperatures below 13.4°C to illustrate the properties of Mediterranean Water.

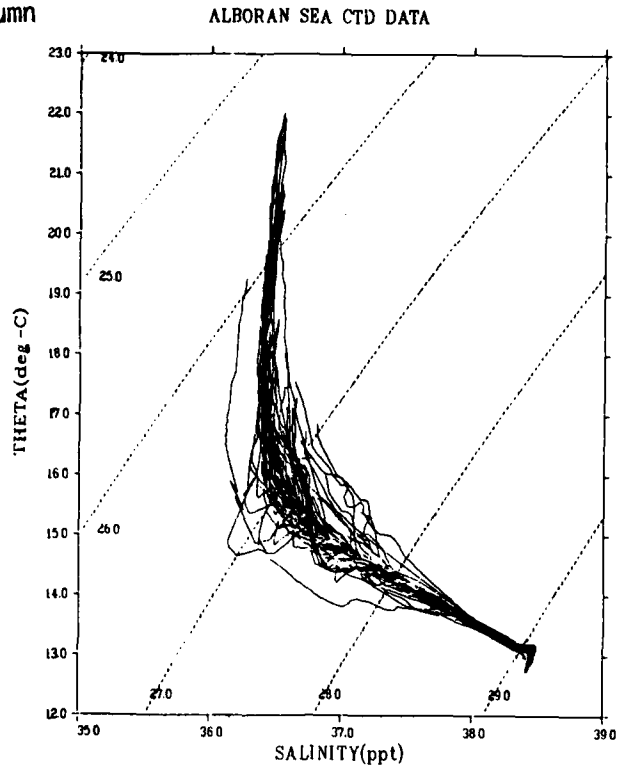
Station 200 (Fig. 36) was designated an intercalibration station with the CORNIDE DE SAAVEDRAA, and it shows the water masses normally present in the western Alboran Sea (Fig. 2). Low salinity Atlantic Water occupied the upper 100 dbar as a nearly isohaline but thermally-stratified layer (20.5°C, 36.46, 3 dbar; 15.5°C, 36.47, 103 dbar). At 72 dbar, there was a small salinity minimum (36.41) within this layer relict from the North Atlantic Central Water (Lanoix, 1974). Salinities then decreased while temperature decreased until a slight temperature minimum (about 0.015°C cooler) at 270 dbar (13.16°C, 38.41, 29.00 kg/m³) that delineates Mediterranean Winter Water (Lanoix, 1974; Parrilla and Kinder, 1984). Below this was the Intermediate Water salinity maximum (400 dbar, 13.15°C, 38.49, 29.07 kg/m³) that is relict of Levantine Intermediate Water (Katz, 1972; Parrilla and Kinder, 1984). Both potential temperature and salinity then decrease to the bottom where Western Mediterranean Deep Water resides (Lacombe et al., 1981; Parrilla and Kinder, 1984) (1400 dbar, 12.75°C, 38.42, 29.10 kg/m³).

Time-series station 262 consisted of 42 casts made near the same point (Table 2 has positions) over 14 hours. The first and last cast were made close to the bottom, and the other casts were between 5 and 350 dbar. Figure 70 has five parts. Parts A, B, and C are successive vertical profiles of temperature, salinity, and density. Part D is the successive theta-salinity diagrams, and Part E is the composite theta-S diagram. The figure shows changes in both the T-S correlations and a large downward displacement of the isopycnals when a 25 m amplitude internal wave passed the station during casts 536-538.

5. REFERENCES

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A. Entire water column



B. Mediterranean water only

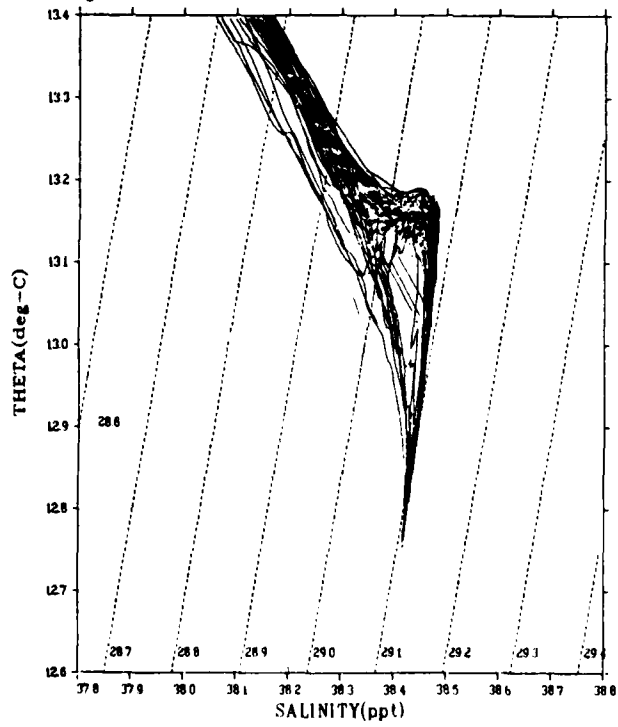
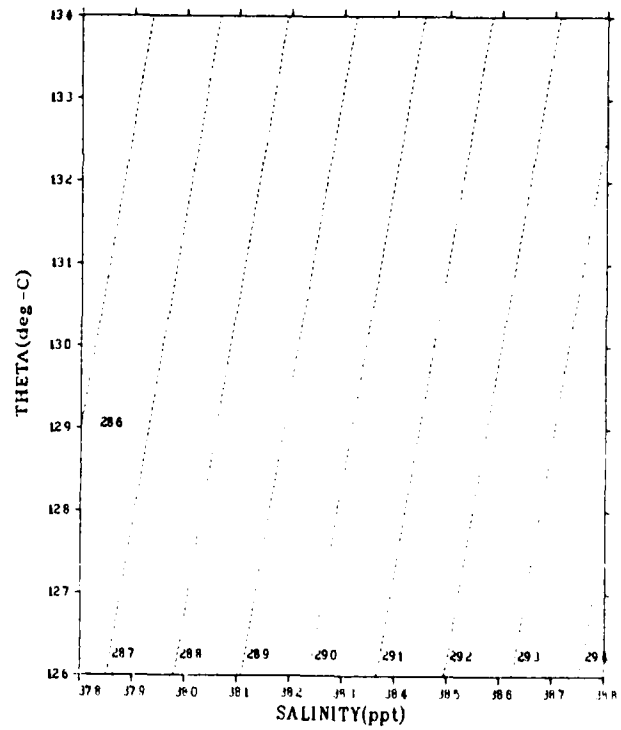
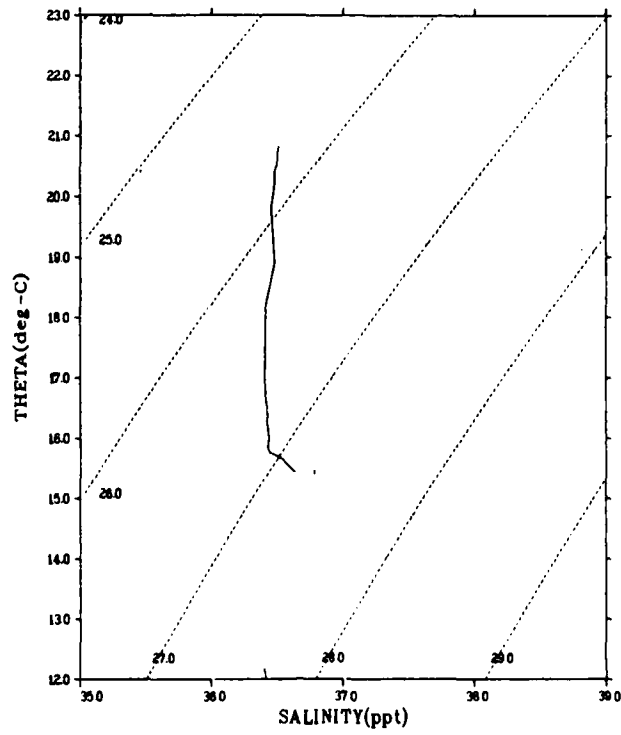


Figure 2. Composite potential temperature-salinity

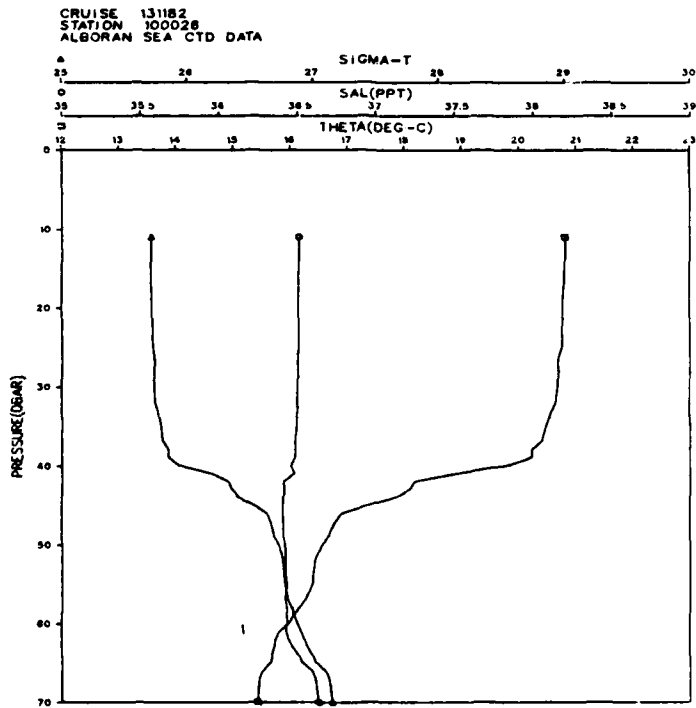
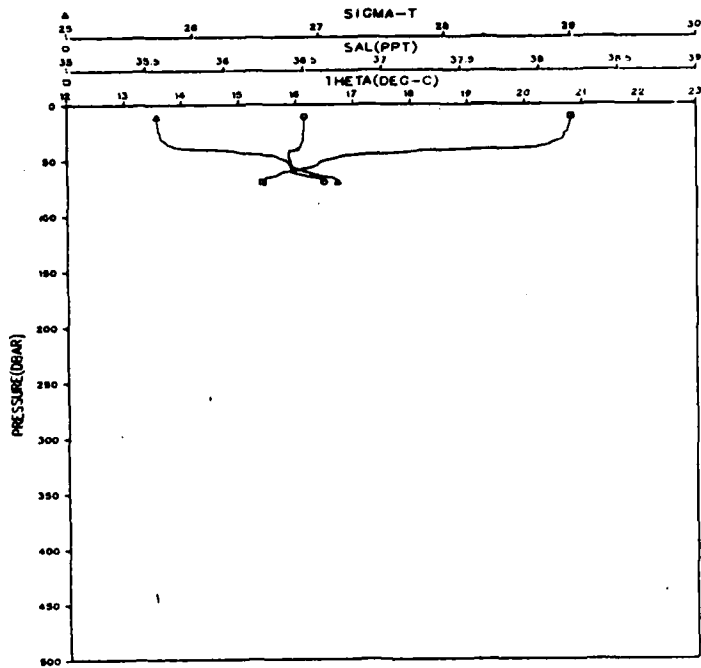
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ALBORAN SEA CTD DATA
CRUISE 131182 STATION 100026



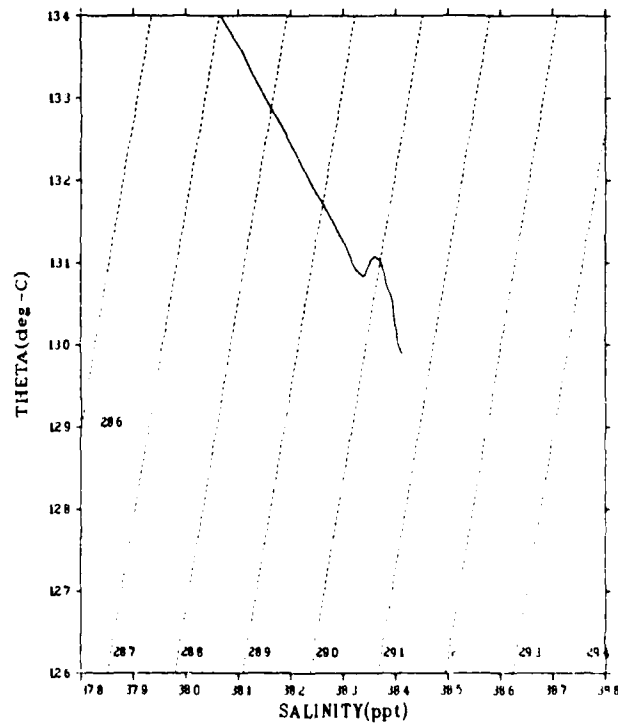
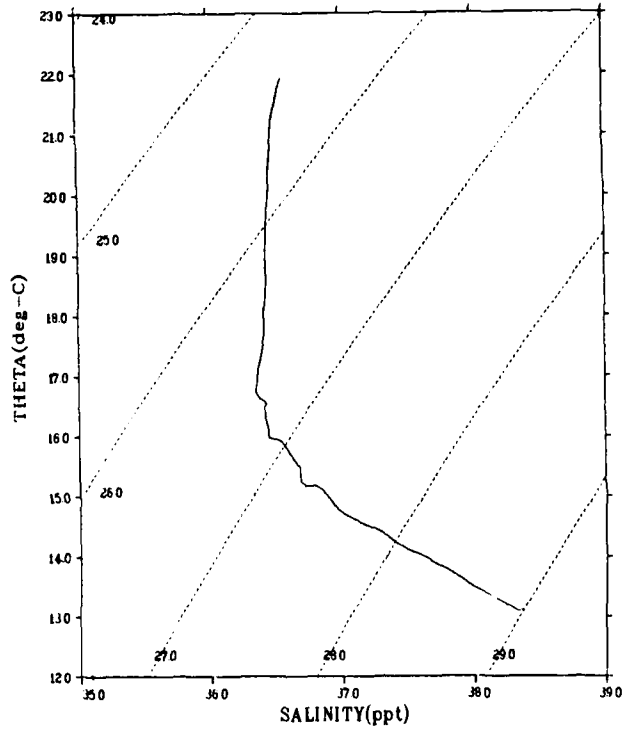
Figures 3a and 3b

CRUISE 131182
 STATION 100026
 ALBORAN SEA CTD DATA

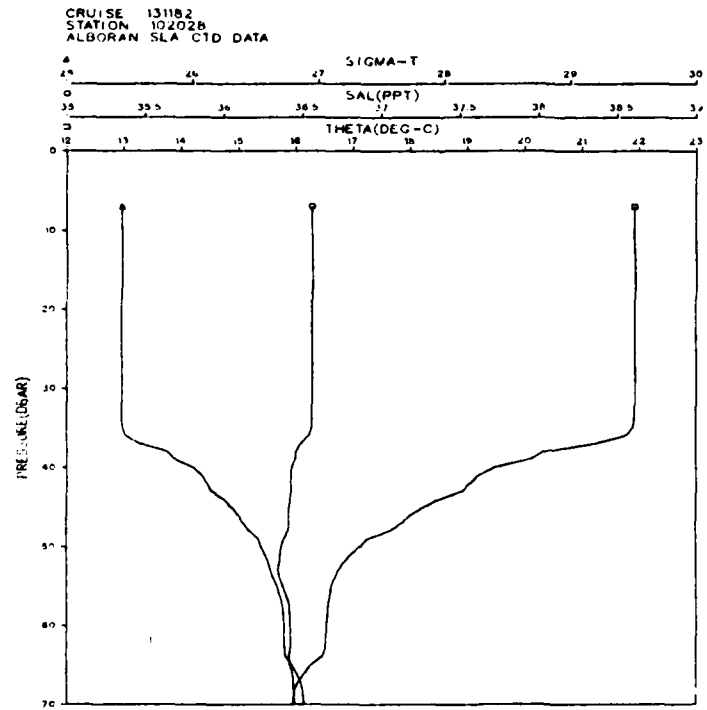
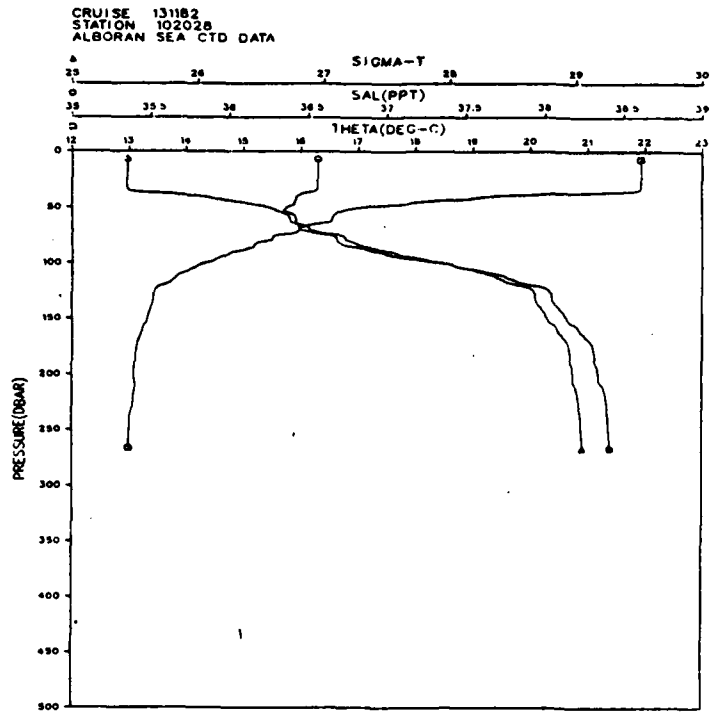


Figures 3c and 3d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 102028

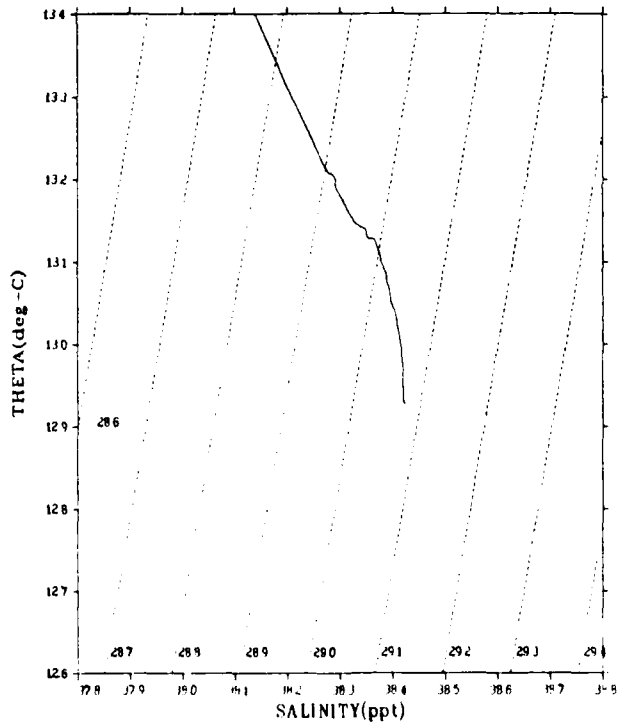
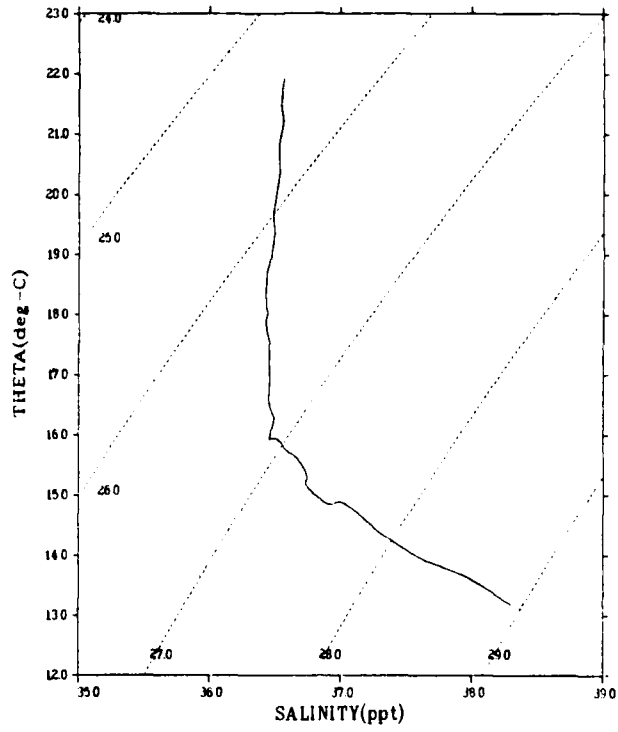


Figures 4a and 4b



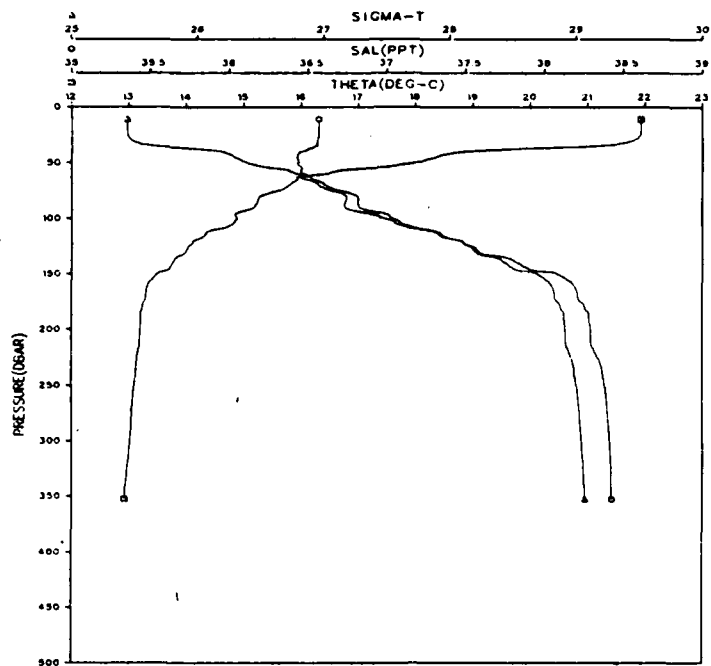
Figures 4c and 4d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 104030

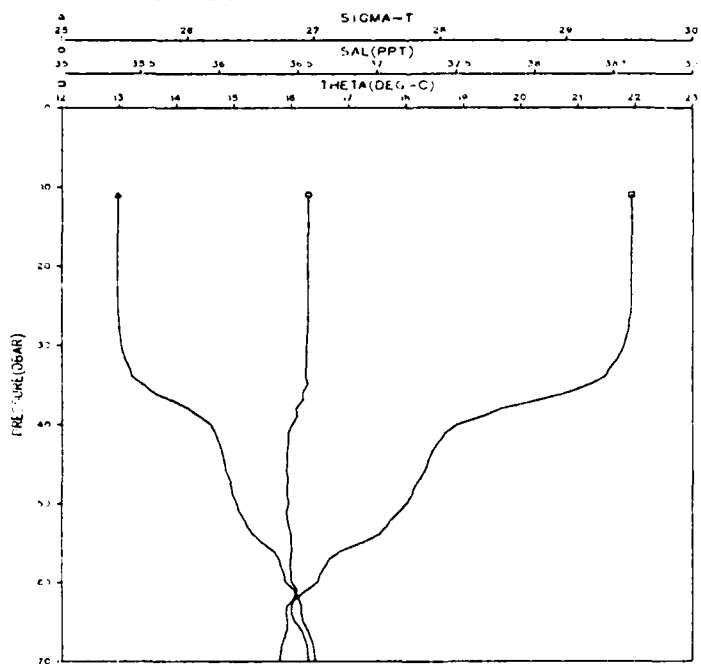


Figures 5a and 5b

CRUISE 131182
STATION 104030
ALBORAN SEA CTD DATA

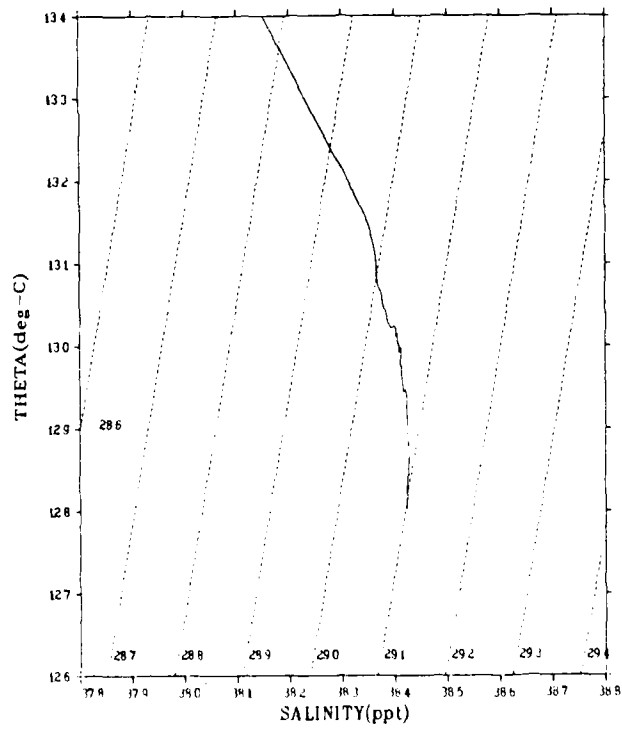
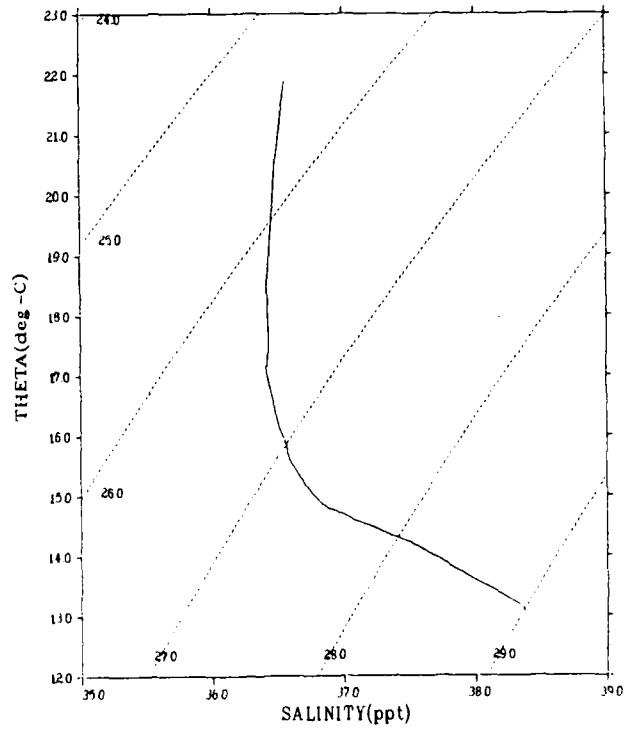


CRUISE 131182
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ALBORAN SEA CTD DATA



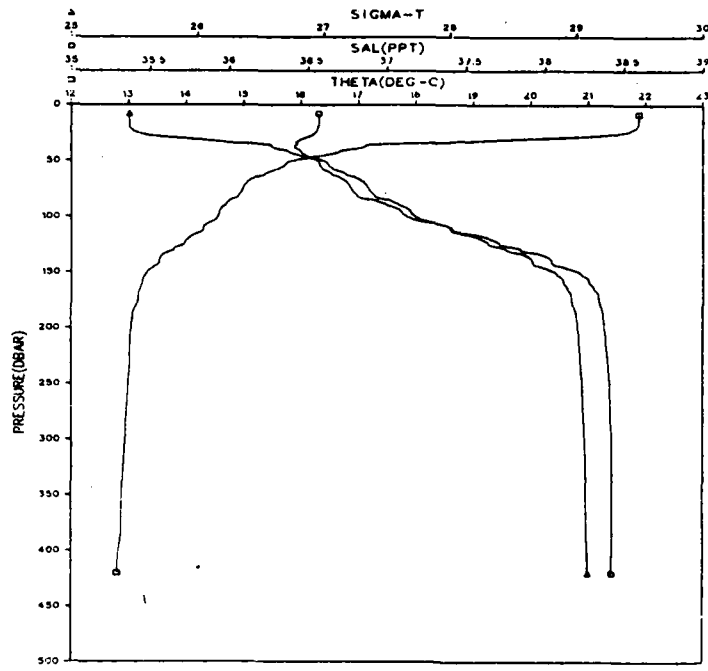
Figures 5c and 5d

ALBORAN SEA CTD DATA
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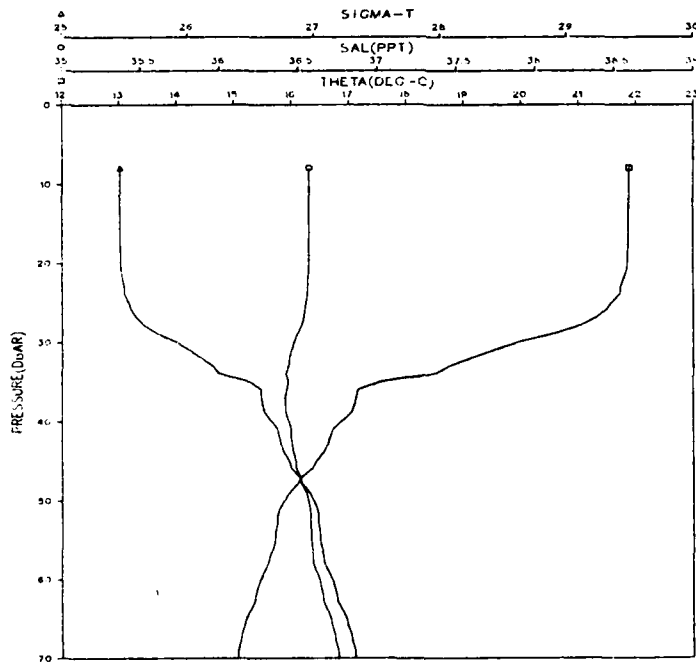


Figures 6a and 6b

CRUISE 131182
STATION 106032
ALBORAN SEA CTD DATA

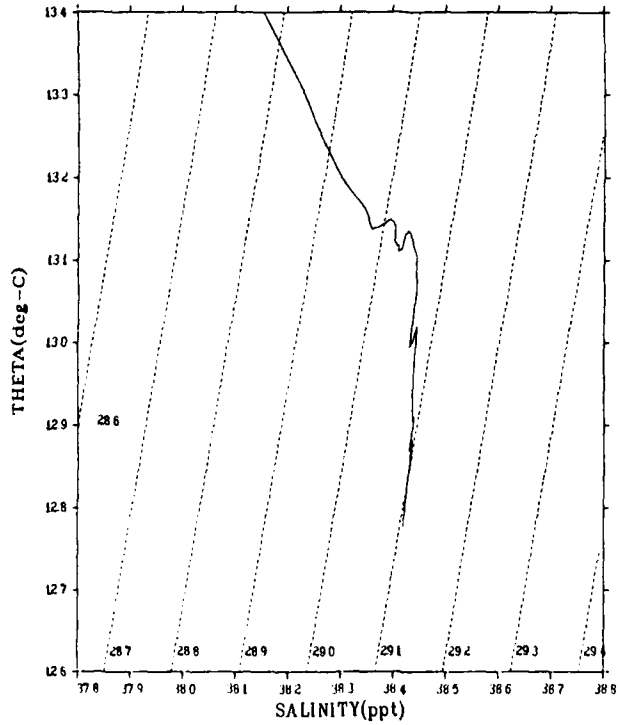
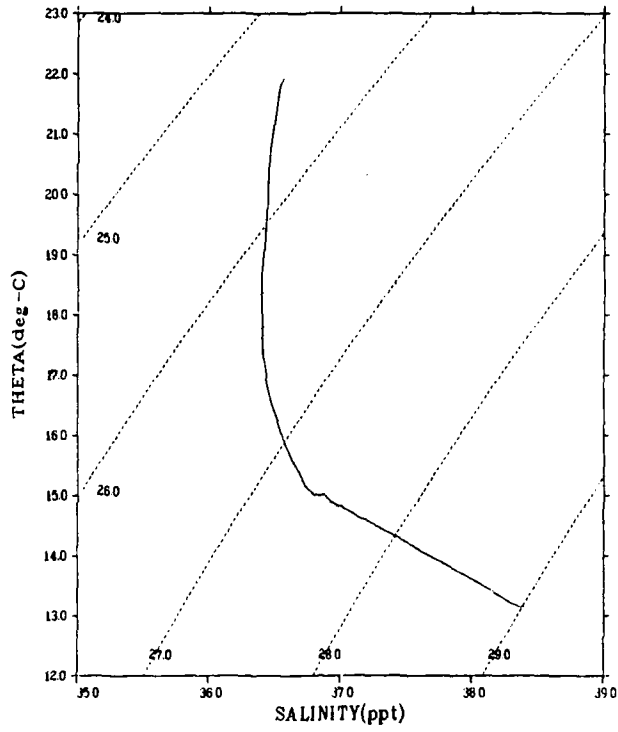


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ALBORAN SEA CTD DATA



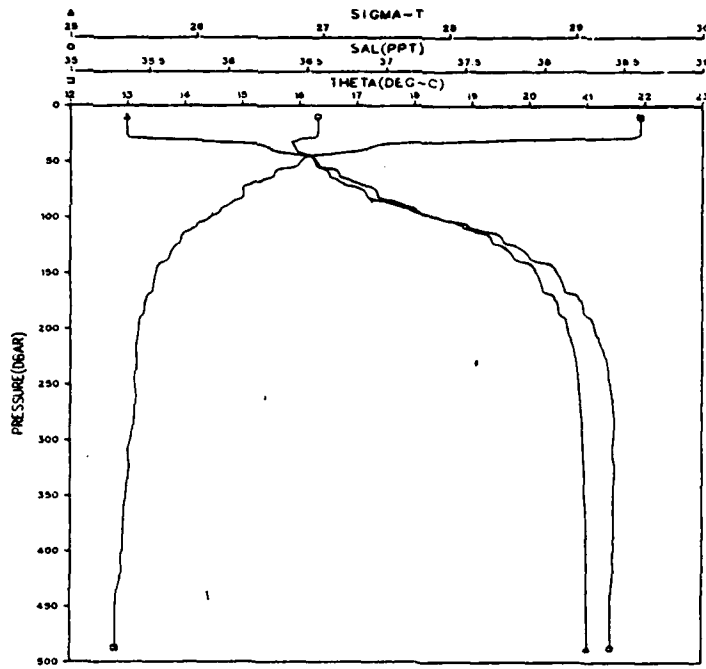
Figures 6c and 6d

ALBORAN SEA CTD DATA
 CRUISE 131182 STATION 108034

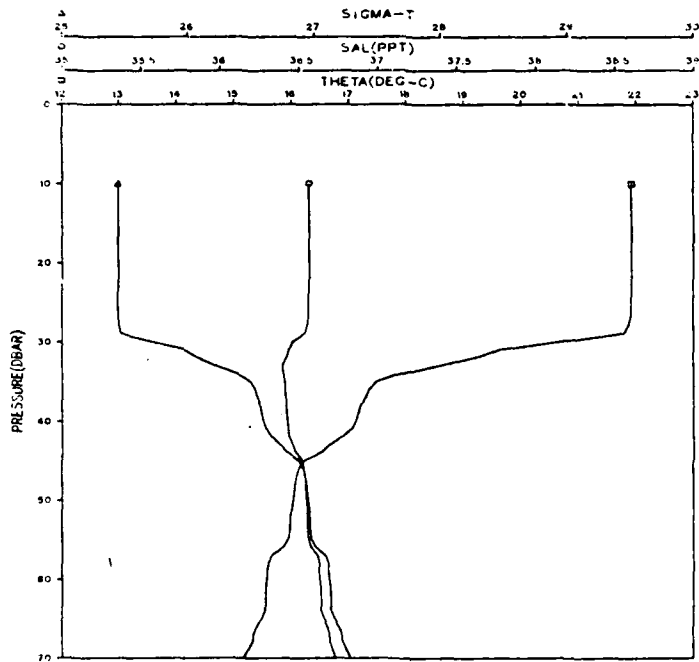


Figures 7a and 7b

CRUISE 131182
STATION 108034
ALBORAN SEA CTD DATA

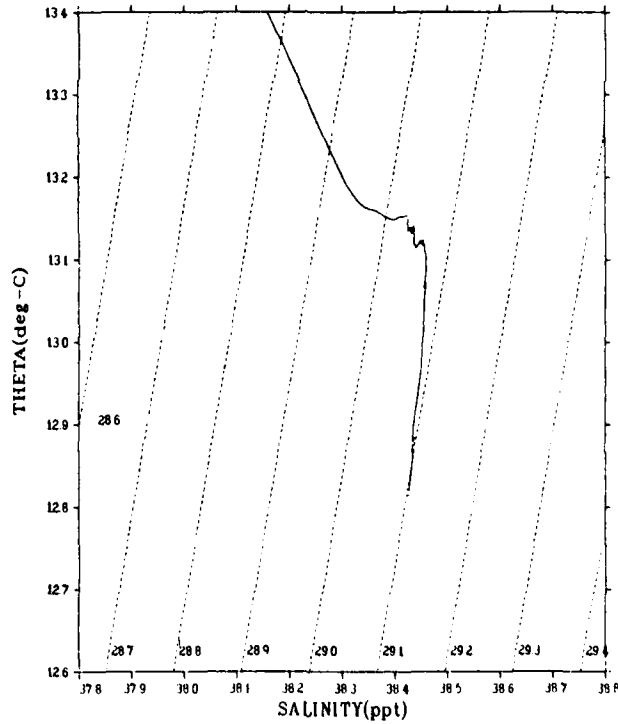
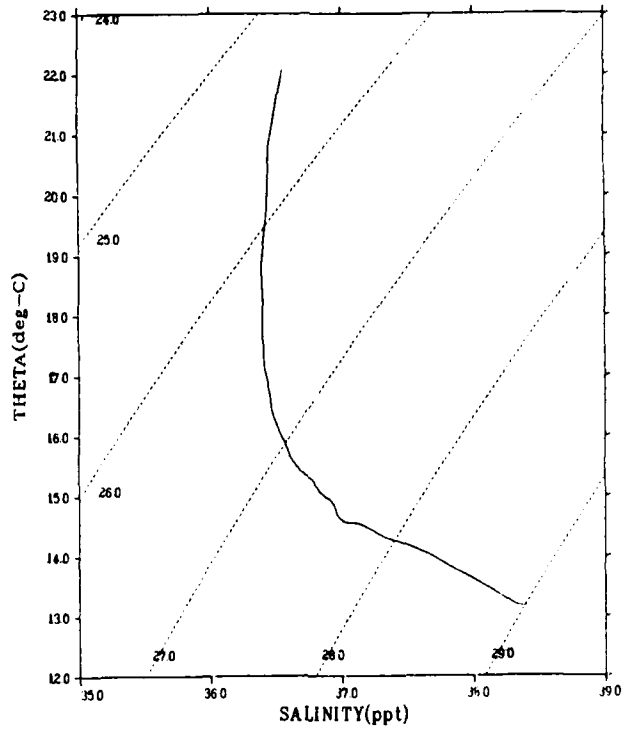


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ALBORAN SEA CTD DATA



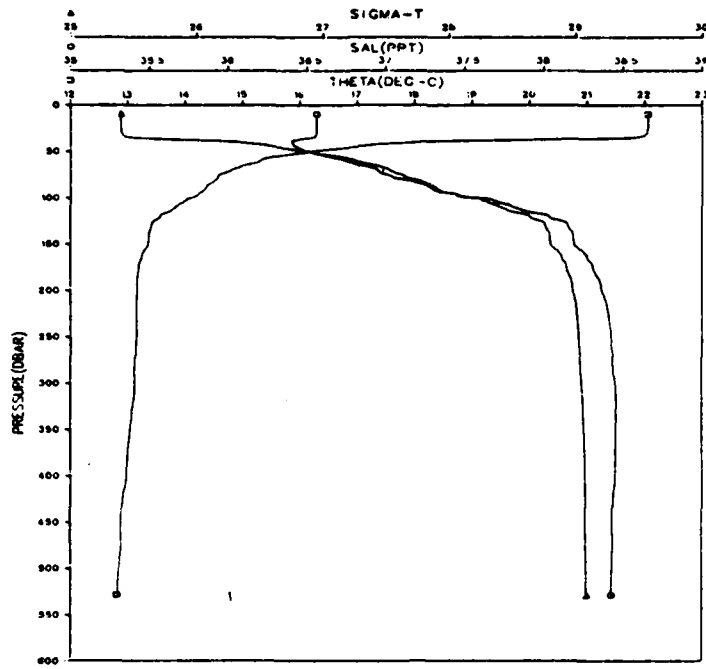
Figures 7c and 7d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 110036

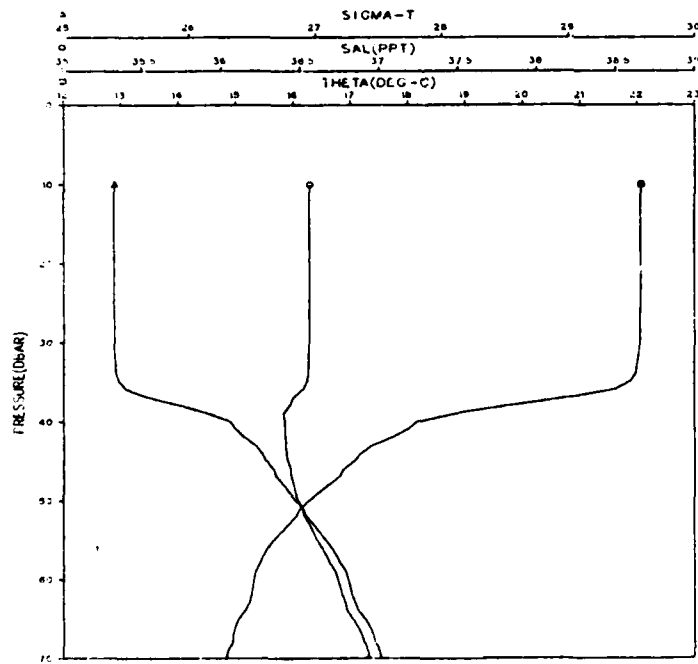


Figures 8a and 8b

CRUISE 131182
 STATION 110038
 ALBORAN SEA CTD DATA

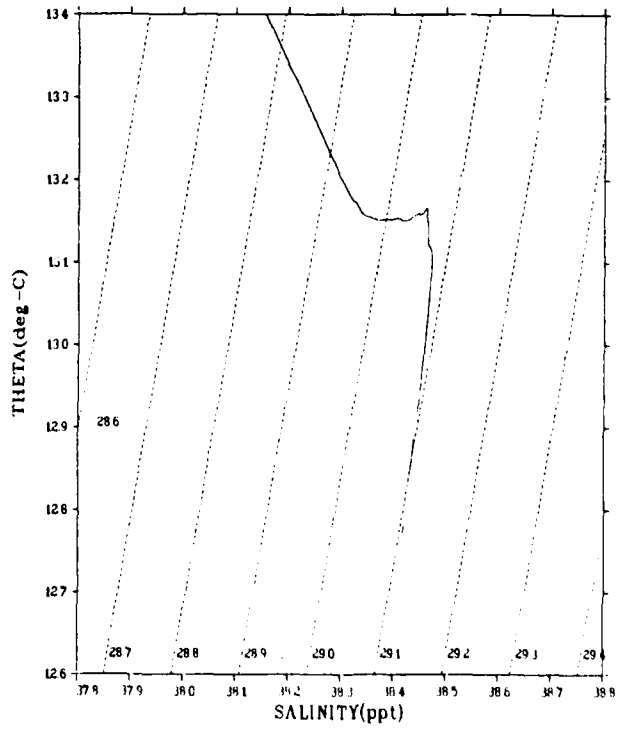
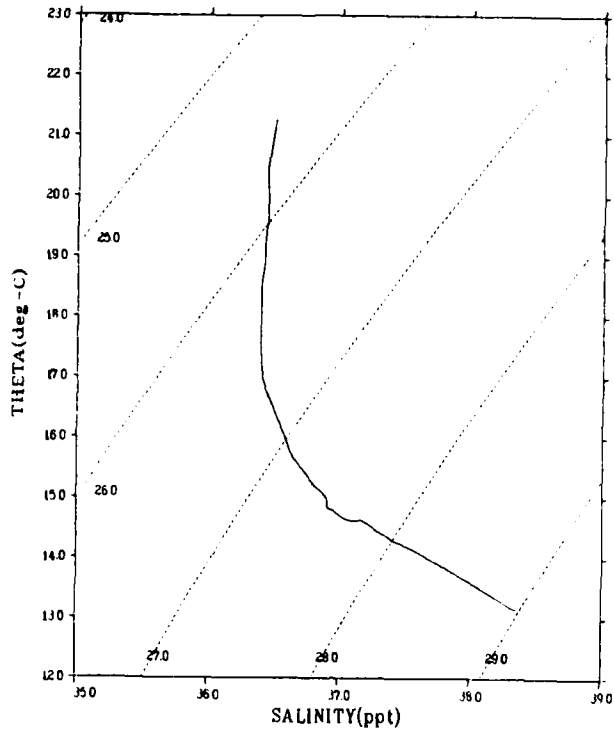


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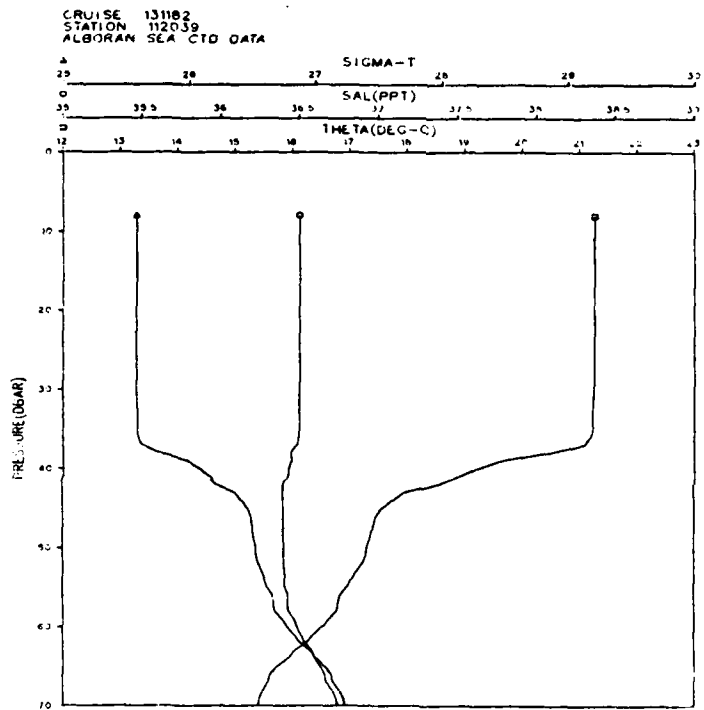
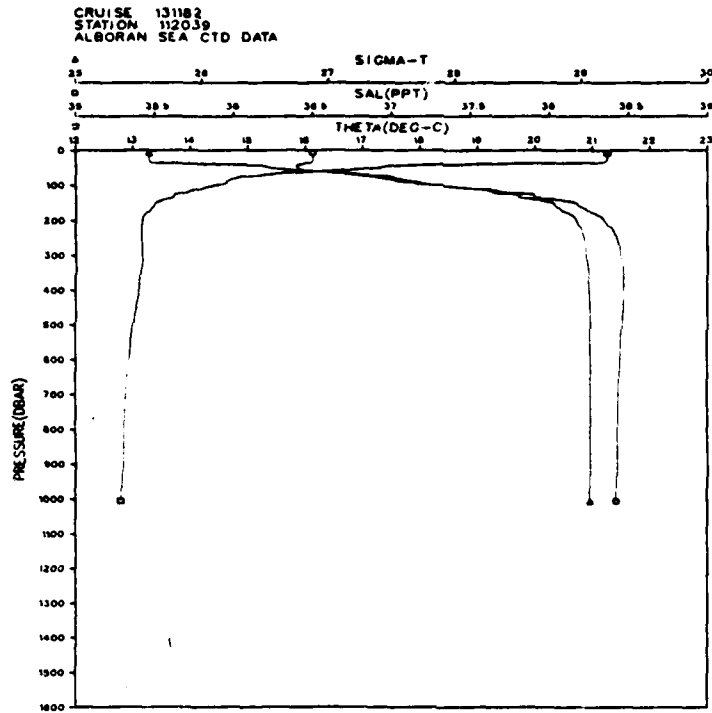


Figures 8c and 8d

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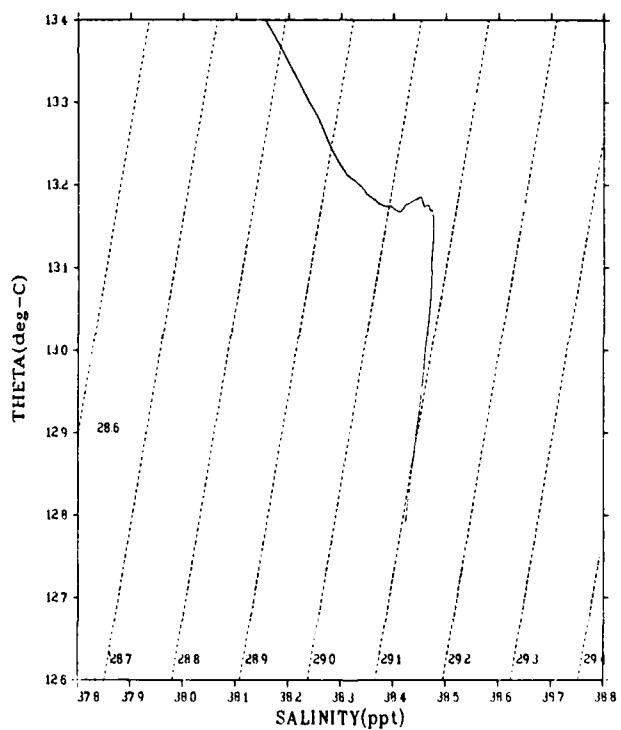
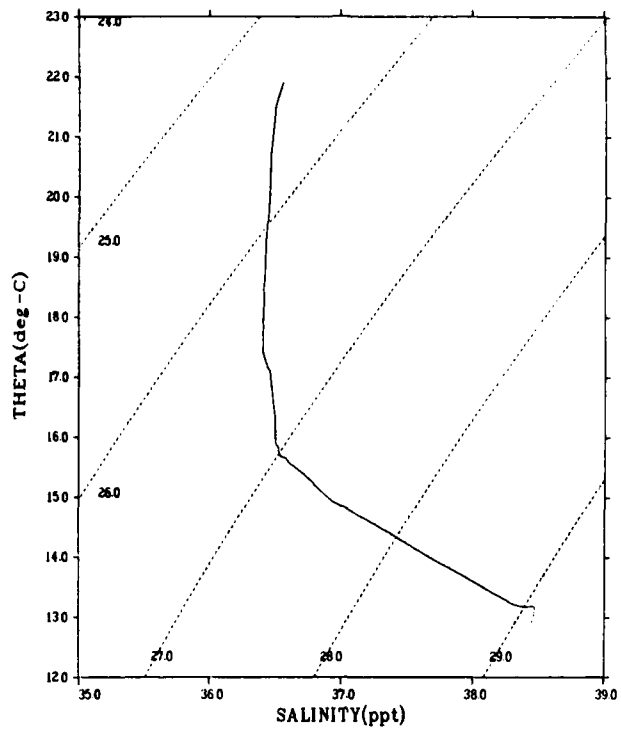


Figures 9a and 9b



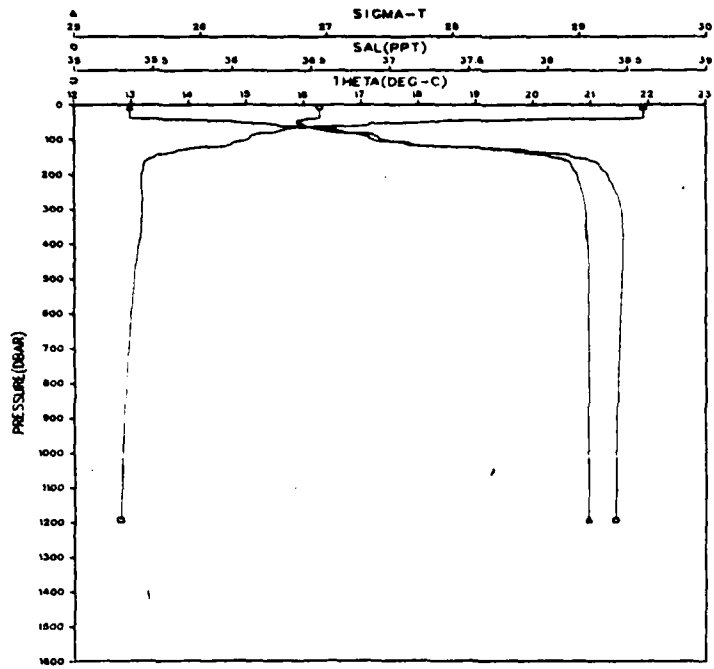
Figures 9c and 9d

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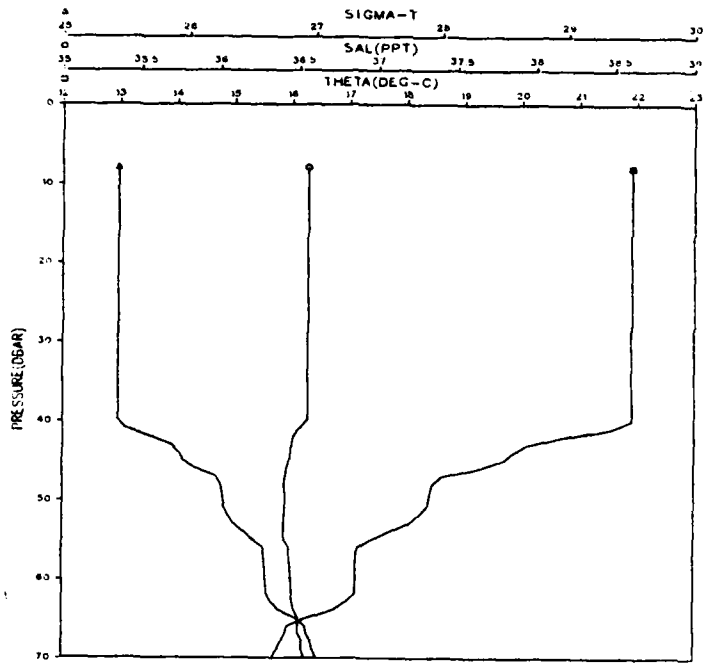


Figures 10a and 10b

CRUISE 131182
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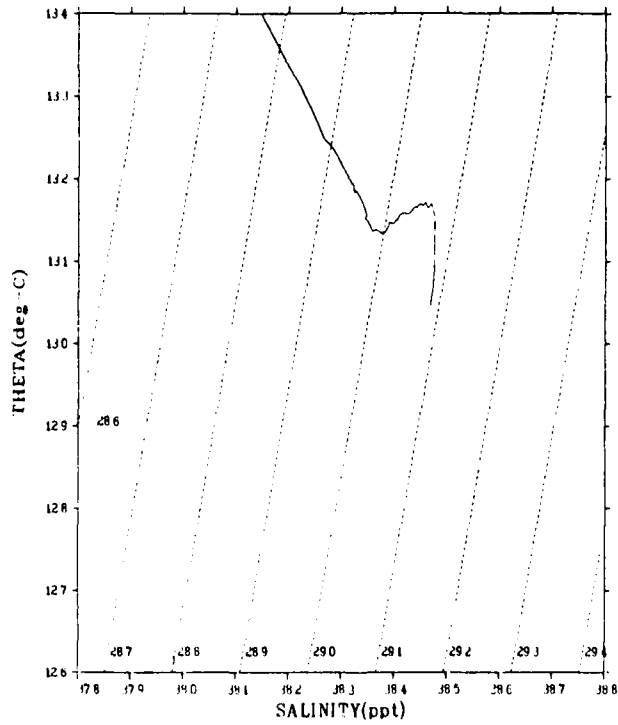
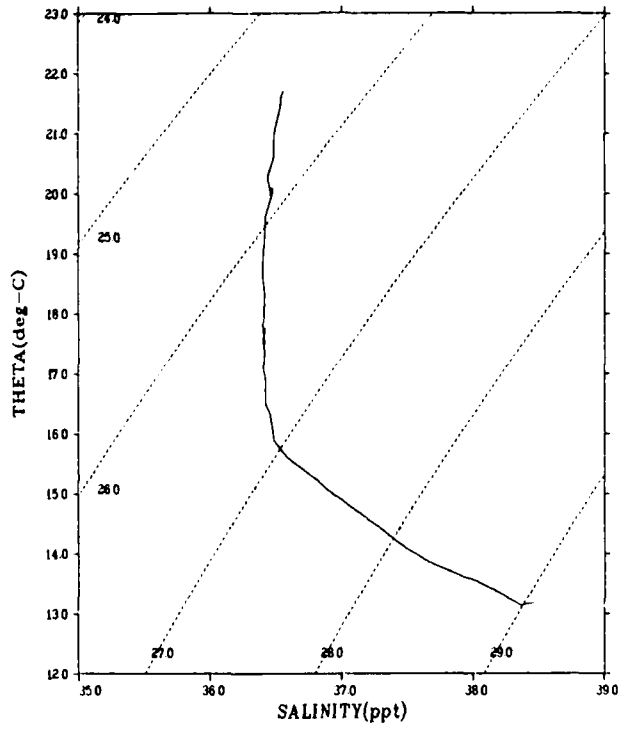


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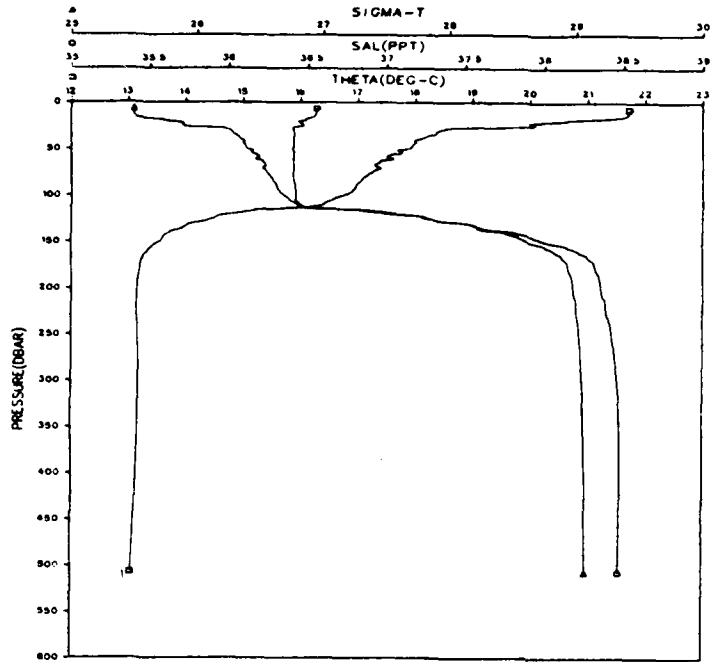
Figures 10c and 10d

ALBORAN SEA CTD DATA
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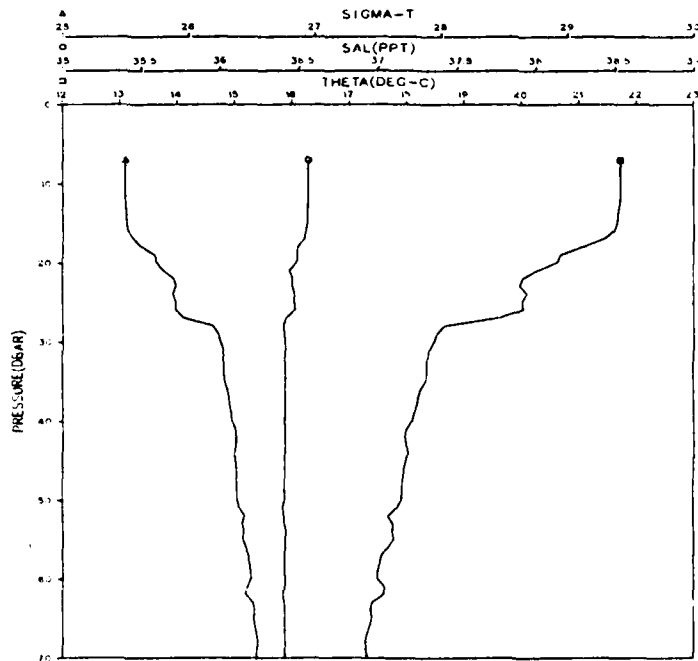


Figures 11a and 11b

CRUISE 131182
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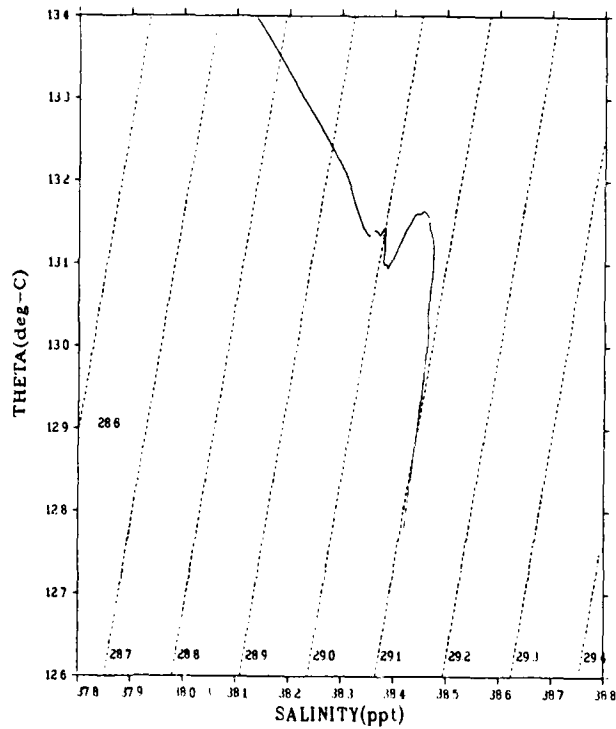
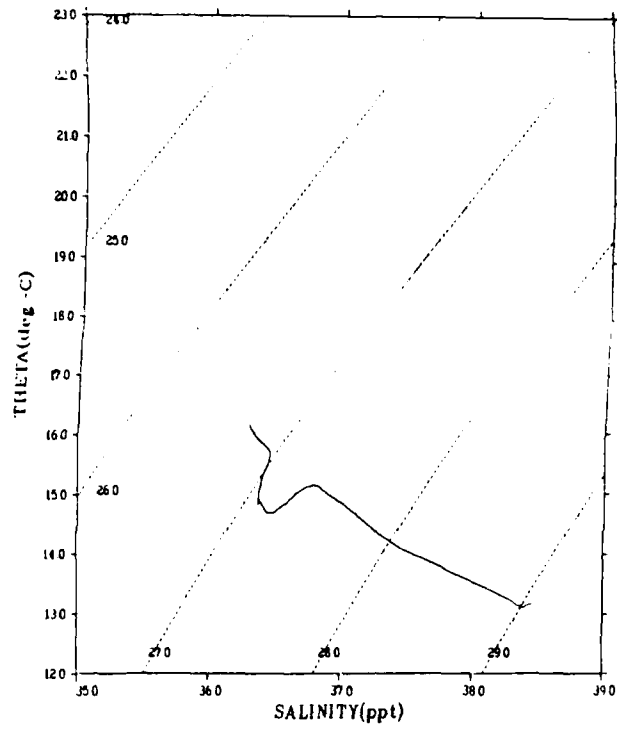


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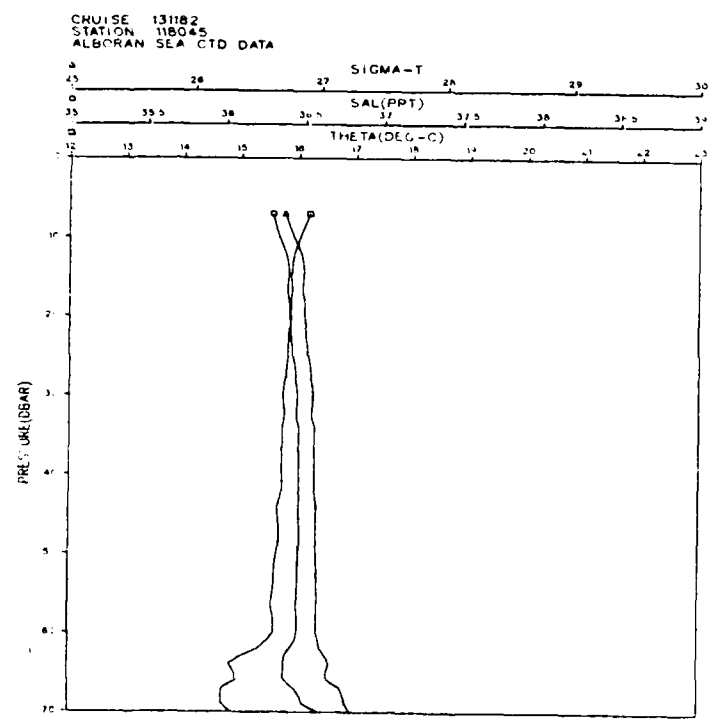
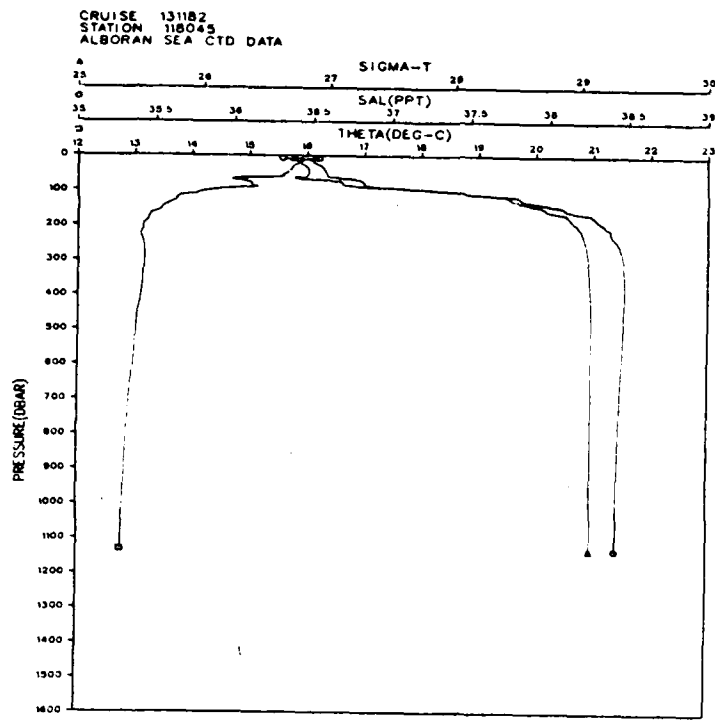


Figures 11c and 11d

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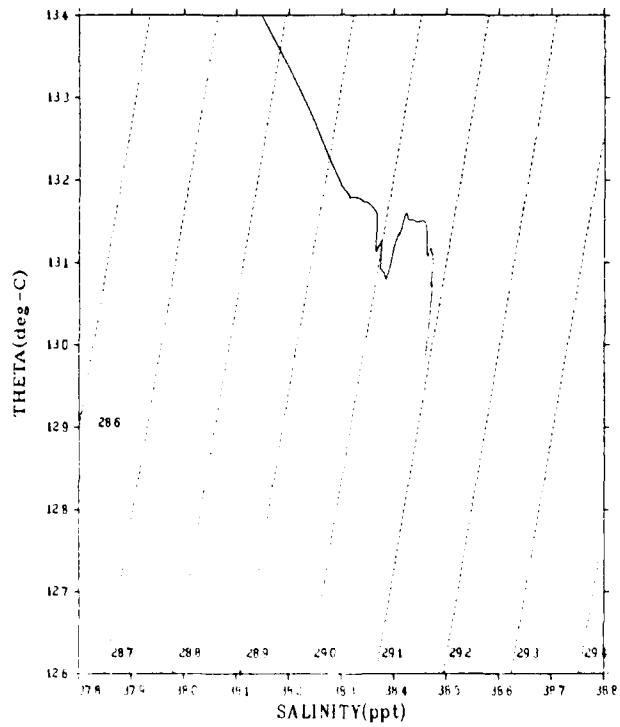
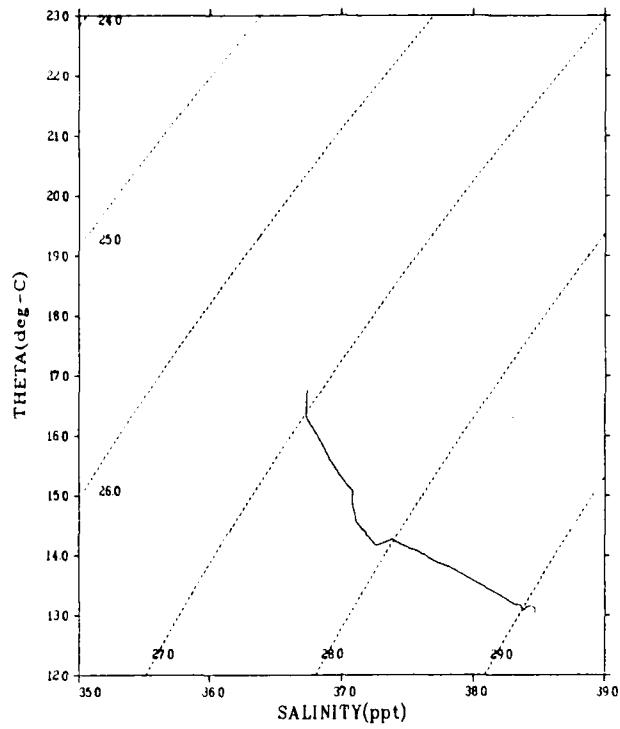


Figures 12a and 12b

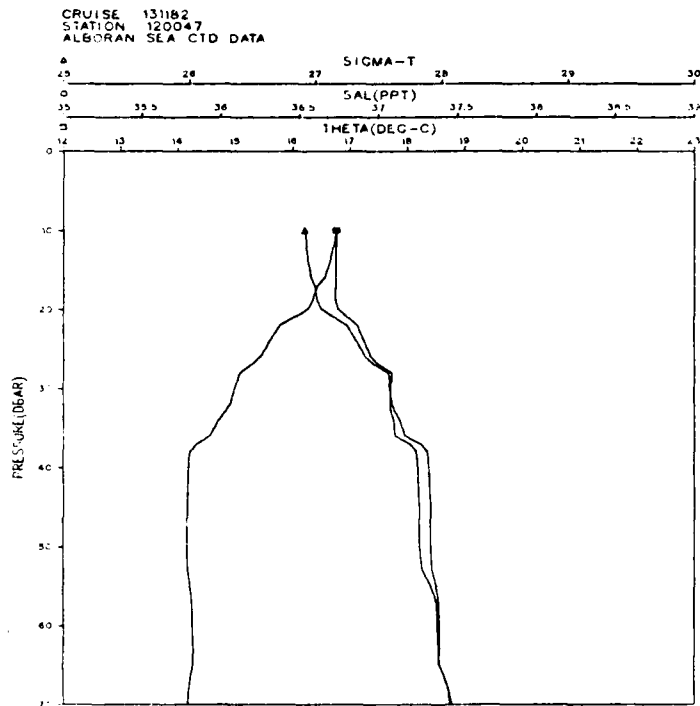
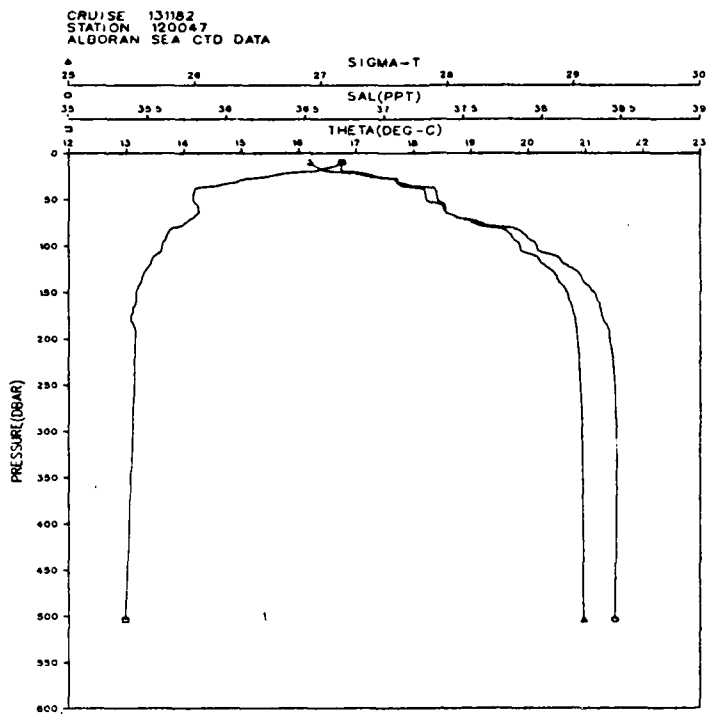


Figures 12c and 12d

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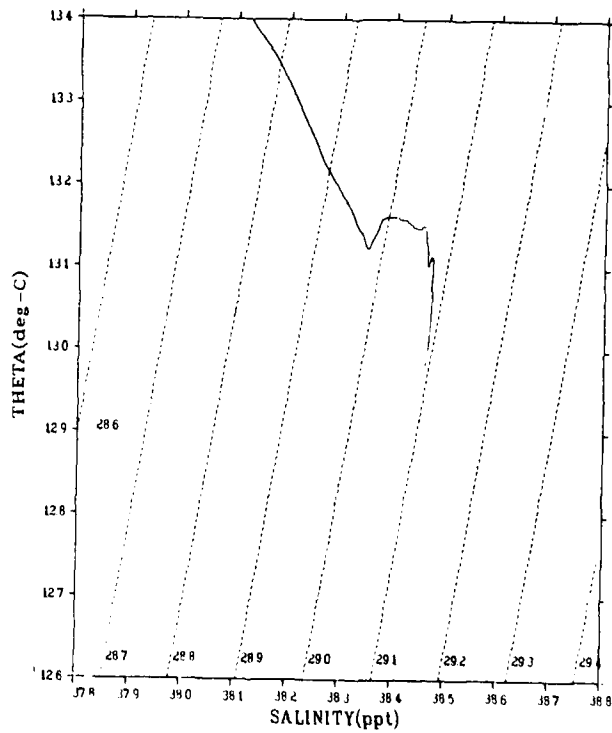
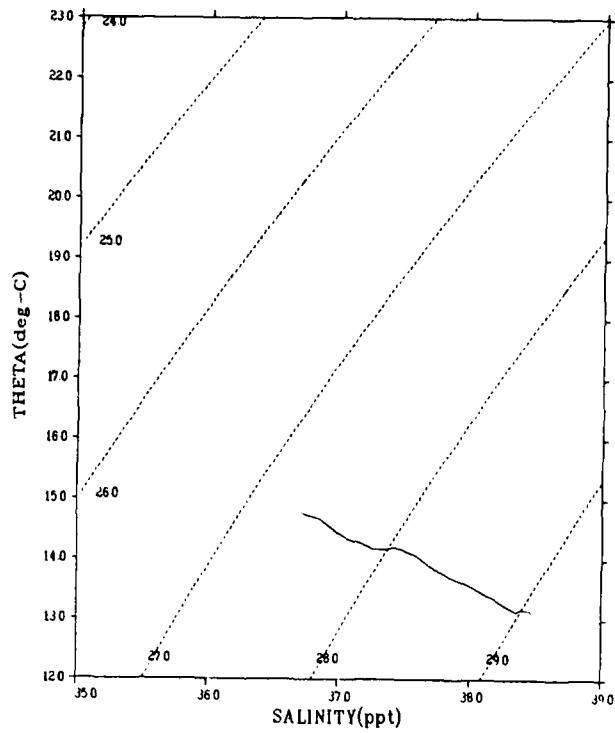


Figures 13a and 13b

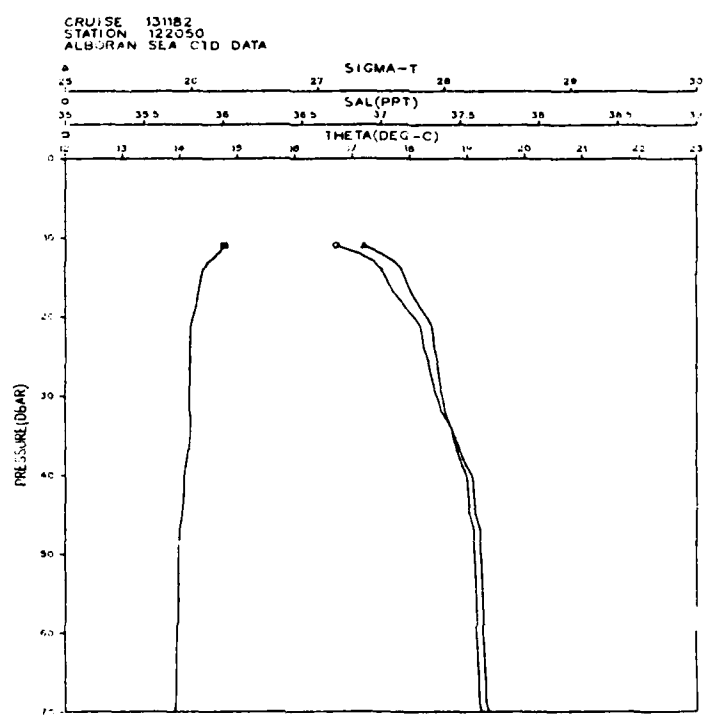
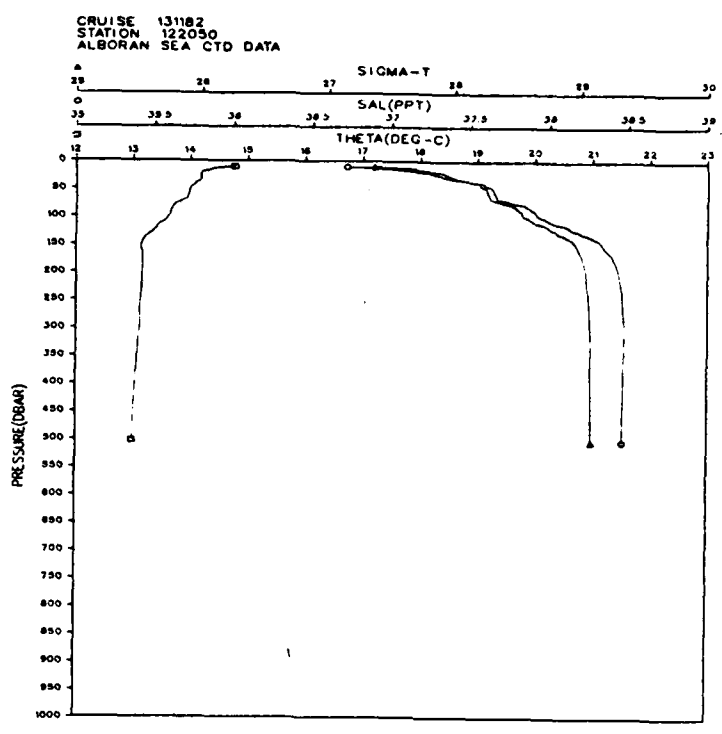


Figures 13c and 13d

ALBORAN SEA CTD DATA
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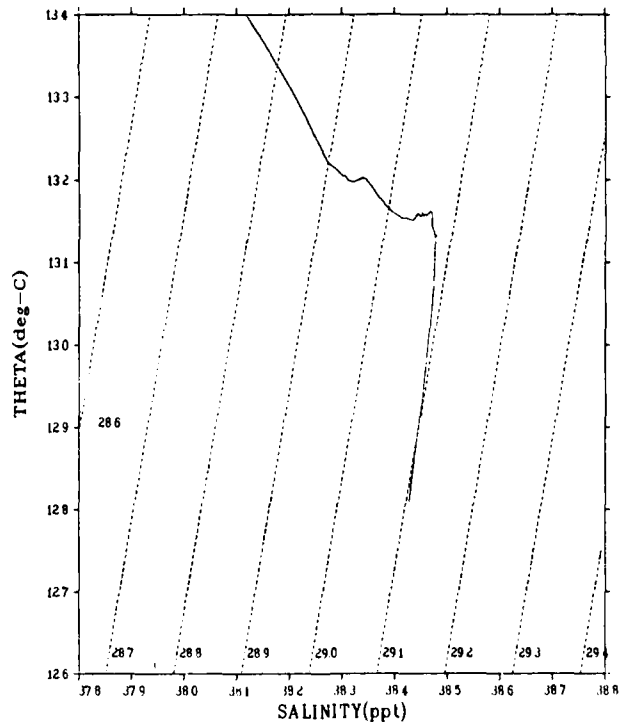
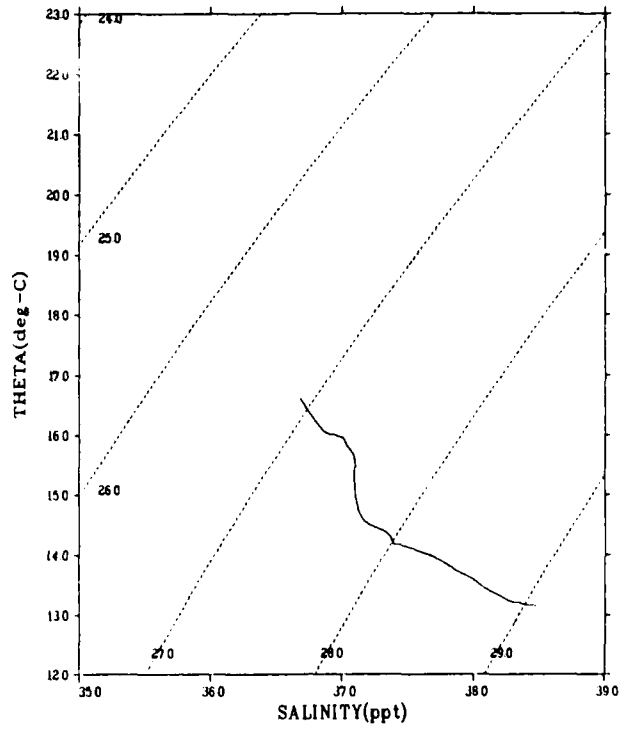


Figures 14a and 14b



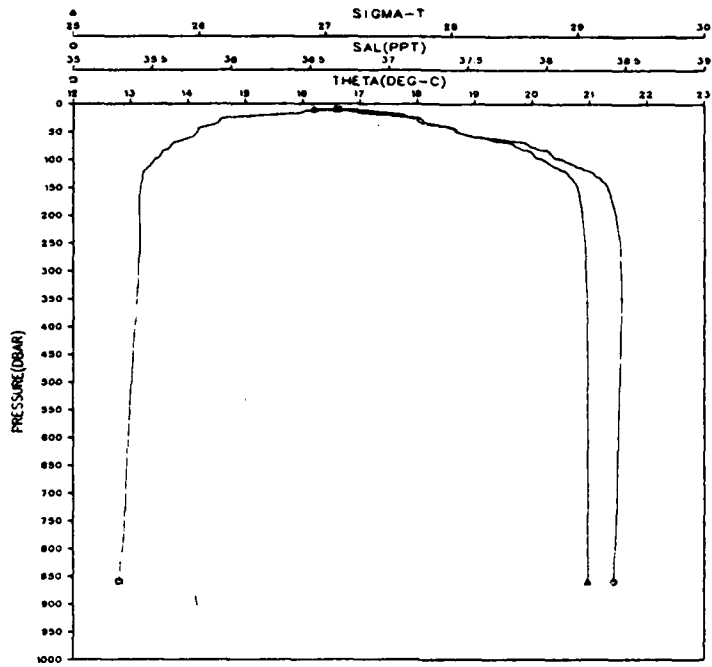
Figures 14c and 14d

ALBORAN SEA CTD DATA
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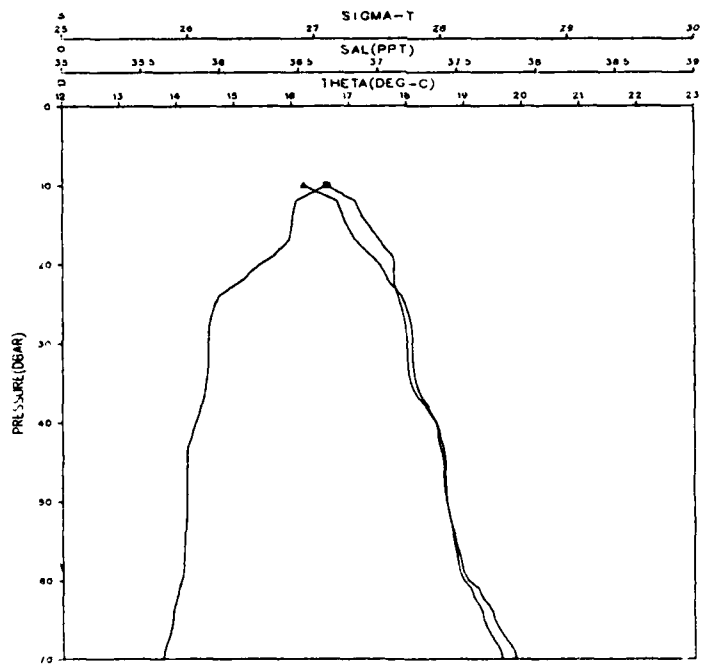


Figures 15a and 15b

CRUISE 131182
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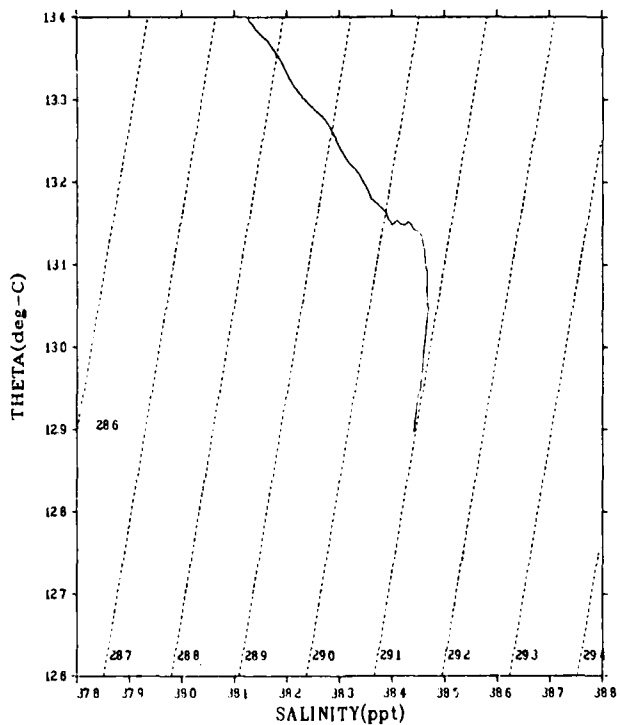
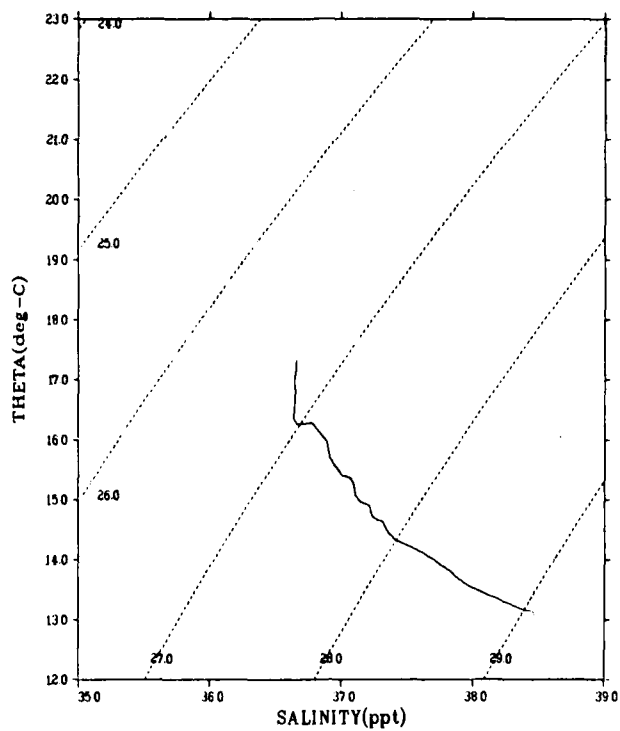


CRUISE 131182
STATION 124052
ALBORAN SEA CTD DATA



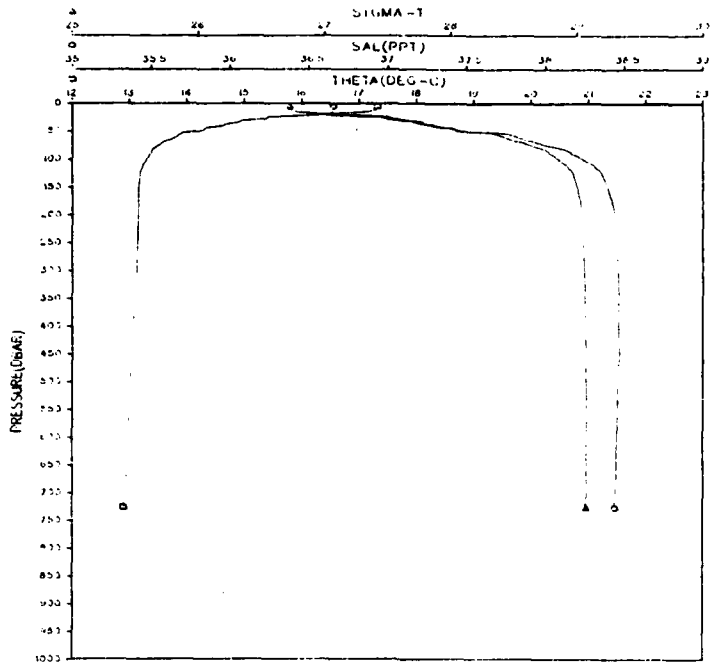
Figures 15c and 15d

ALBORAN SEA CTD DATA
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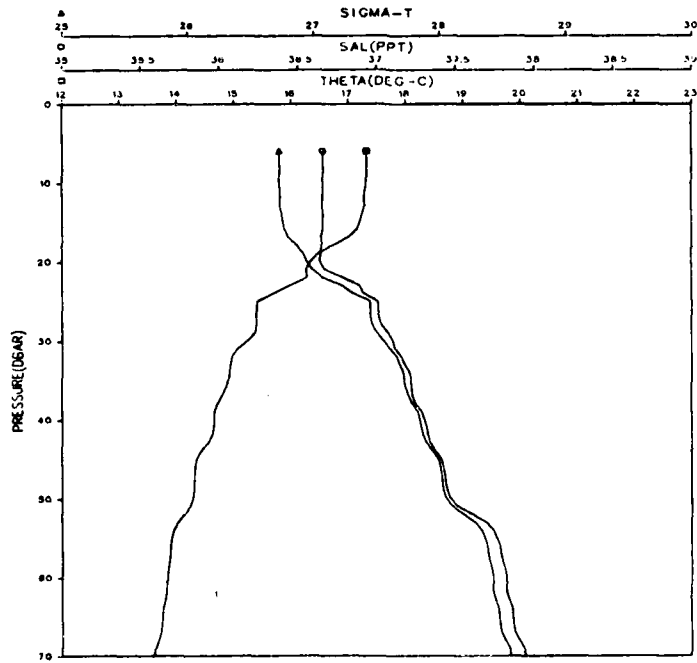


Figures 16a and 16b

CRUISE 131182
 STATION 126054
 ALBORAN SEA CTD DATA

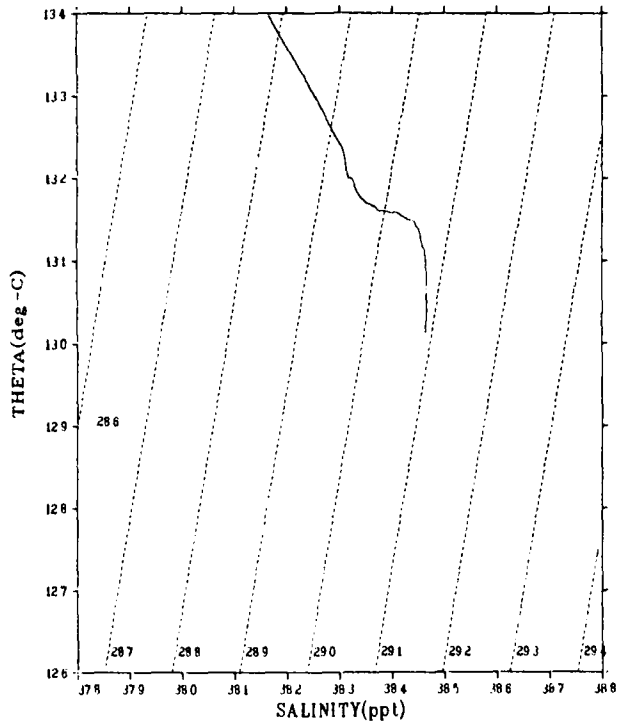
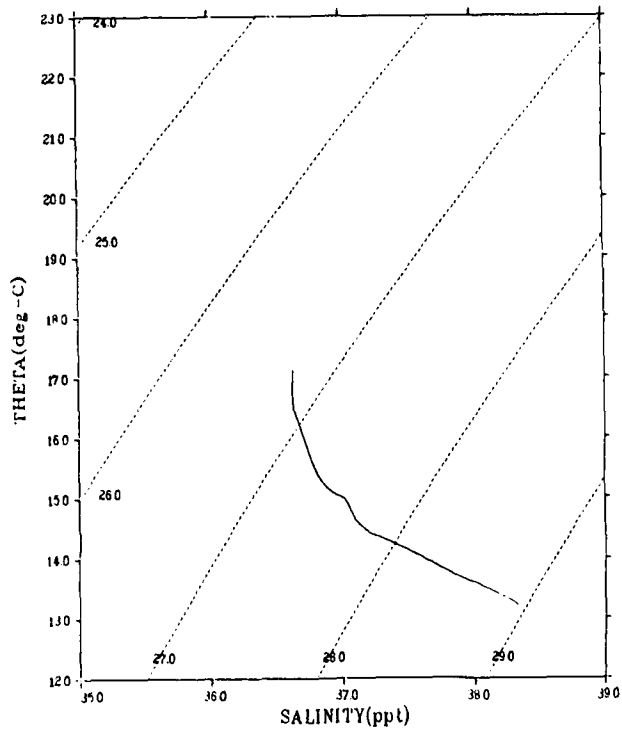


CRUISE 131182
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 ALBORAN SEA CTD DATA



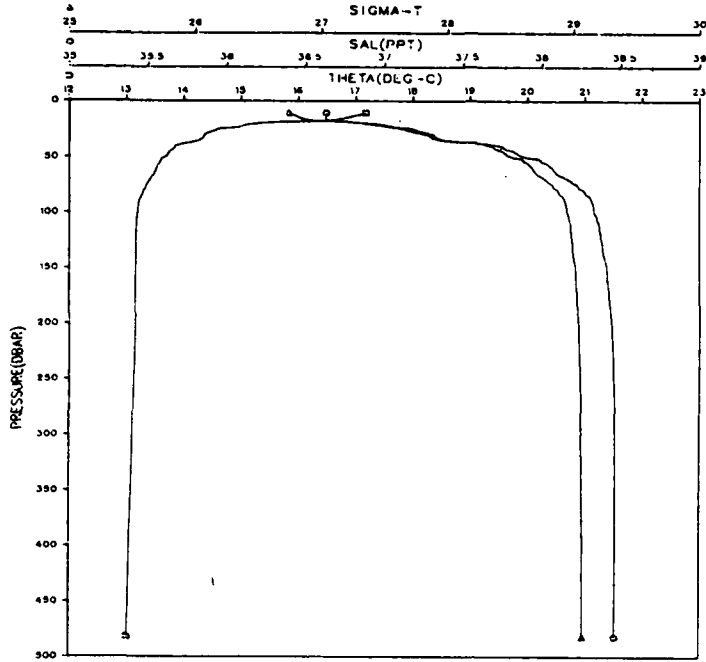
Figures 16c and 16d

ALBORAN SEA CTD DATA
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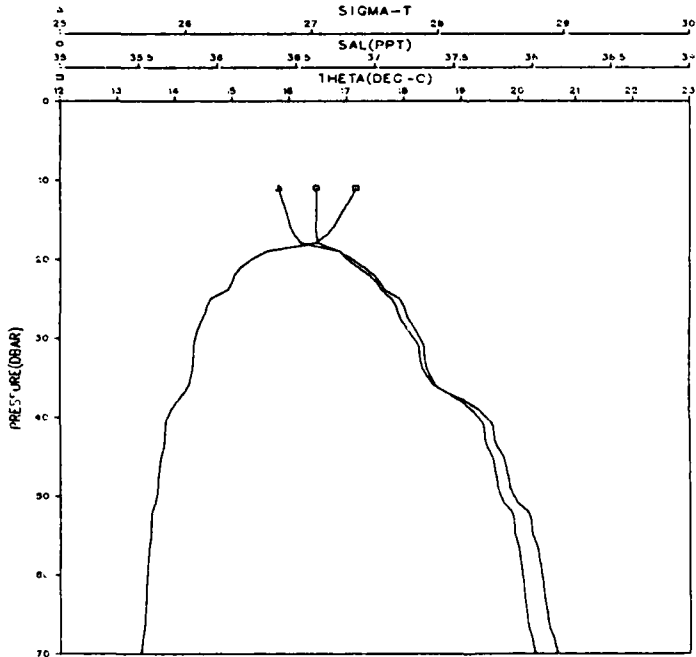


Figures 17a and 17b

CRUISE 131182
 STATION 128056
 ALBORAN SEA CTD DATA

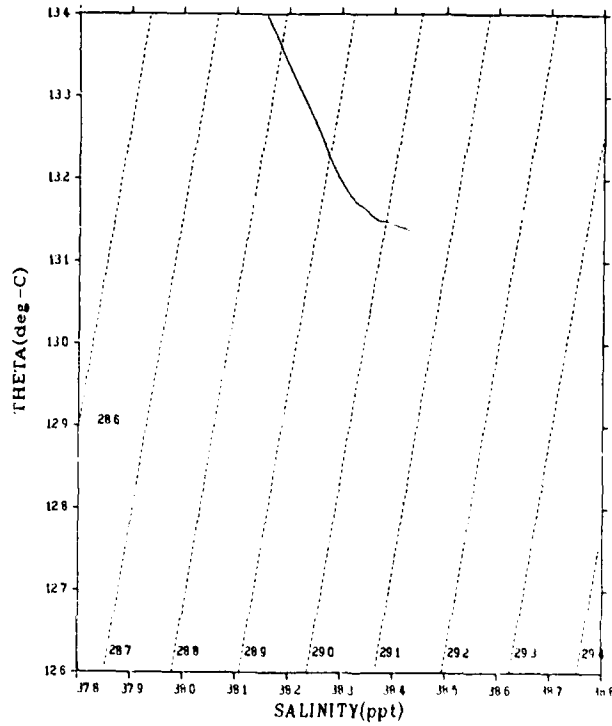
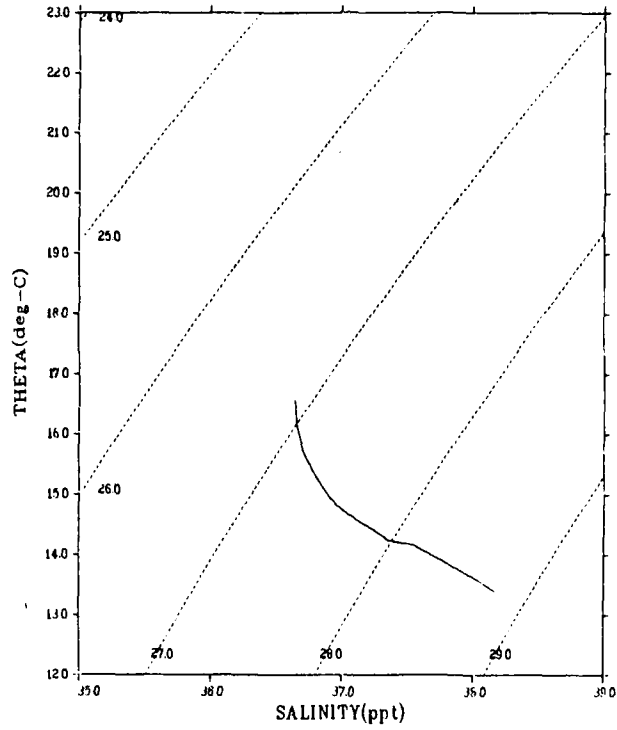


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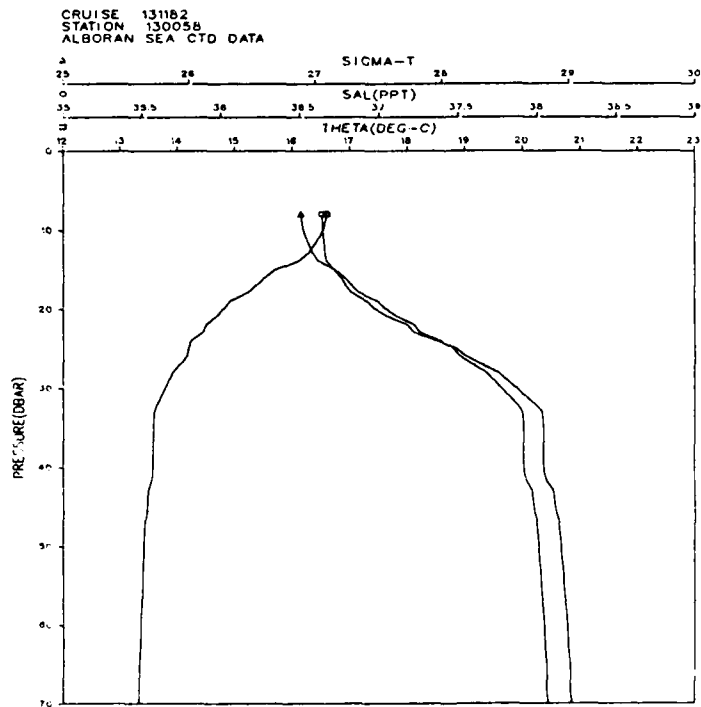
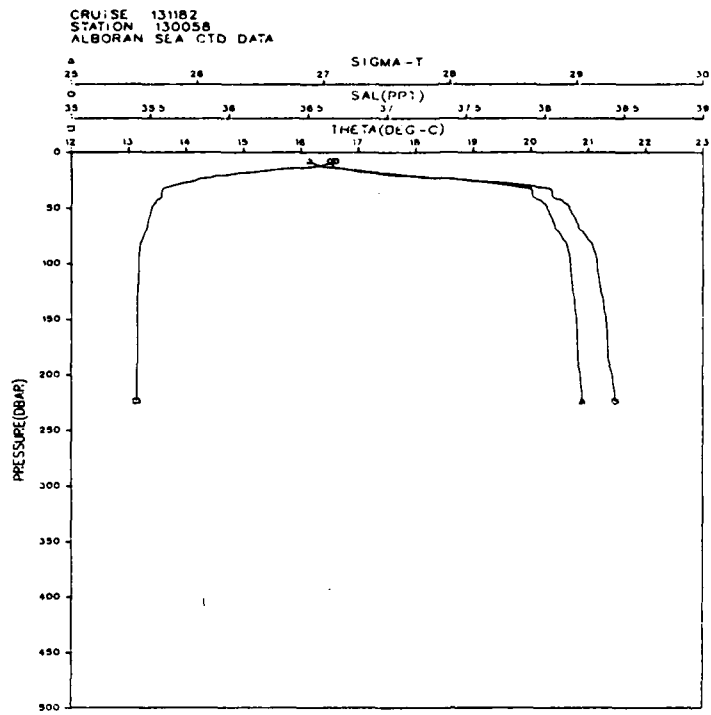


Figures 17c and 17d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 130058

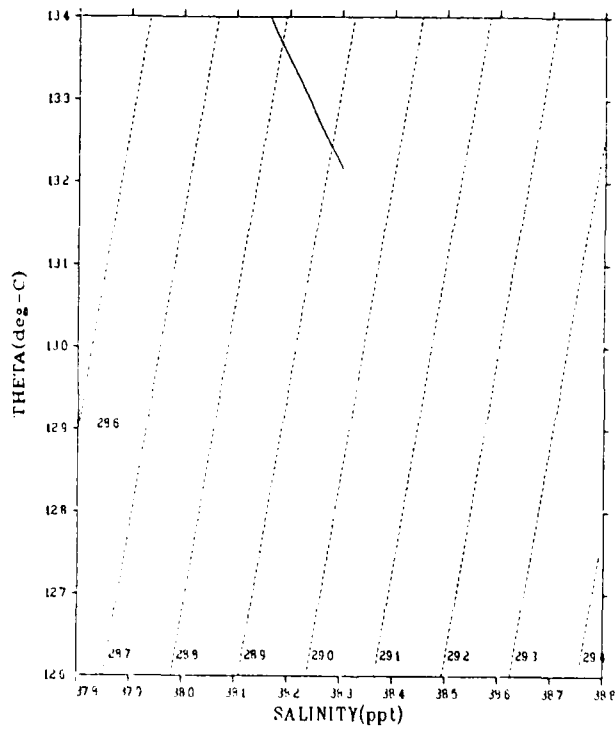
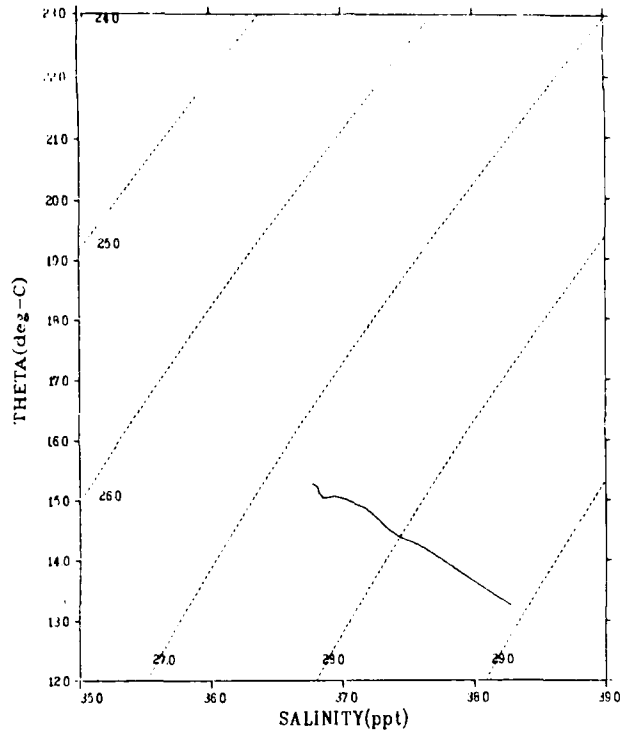


Figures 18a and 18b

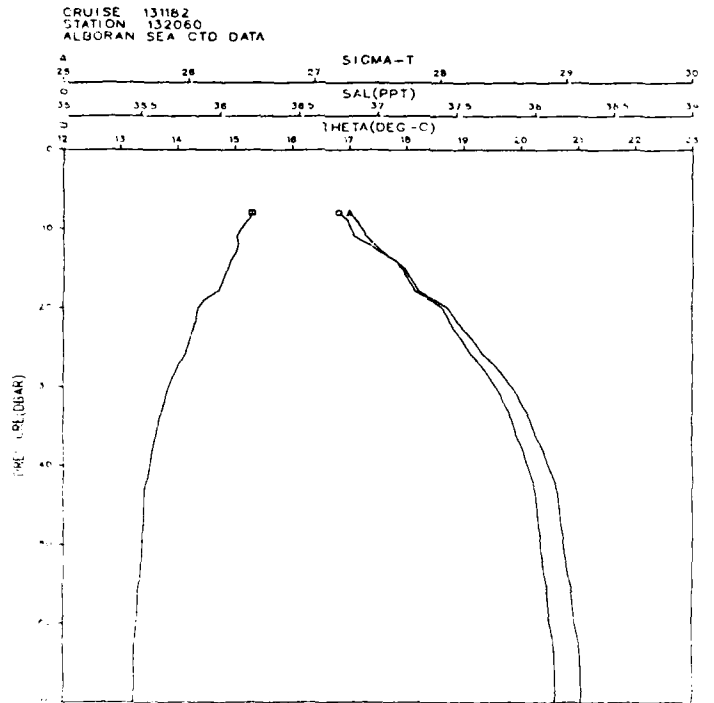
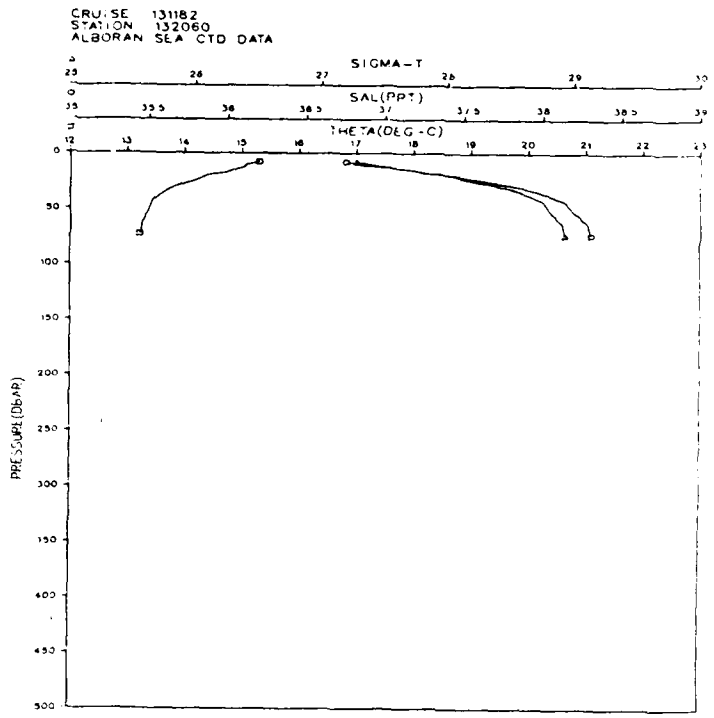


Figures 18c and 18d

ALBORAN SEA CTD DATA
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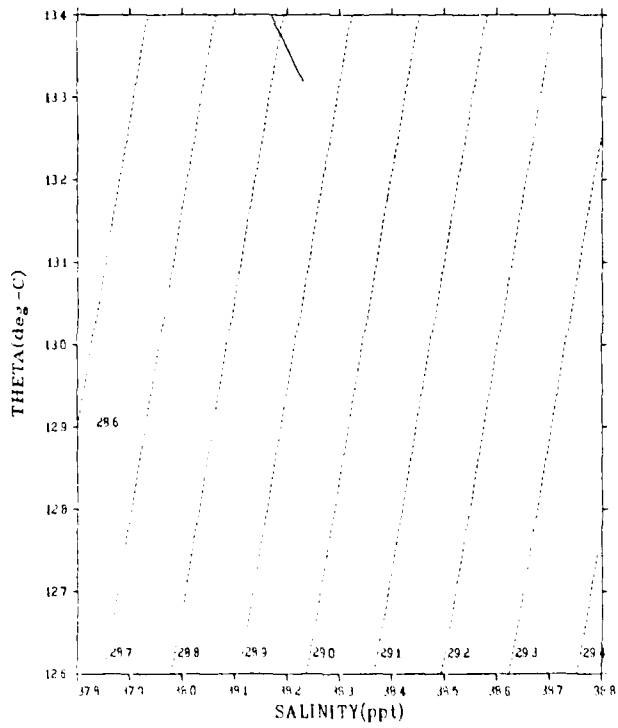
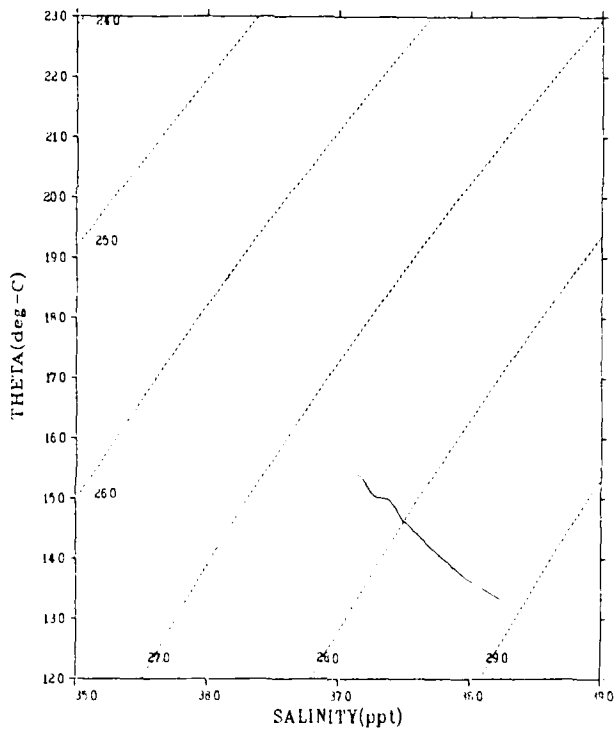


Figures 19a and 19b



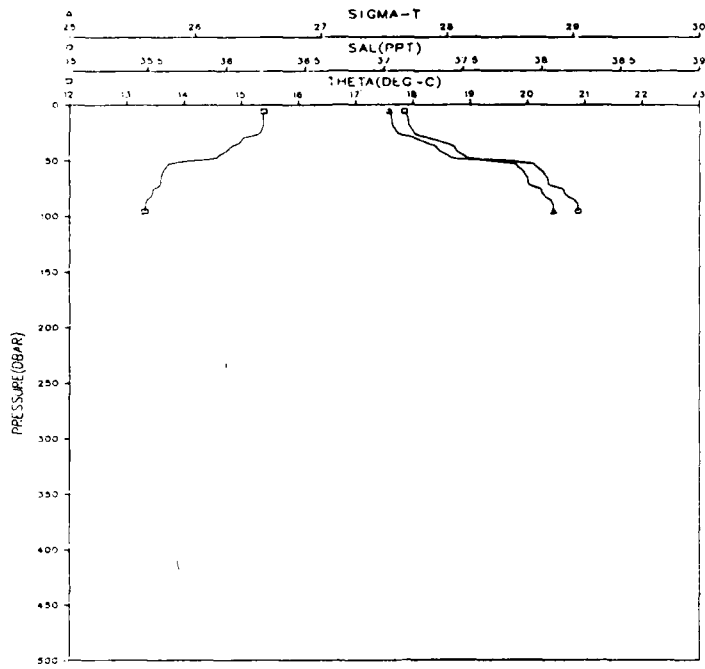
Figures 19c and 19d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 164092

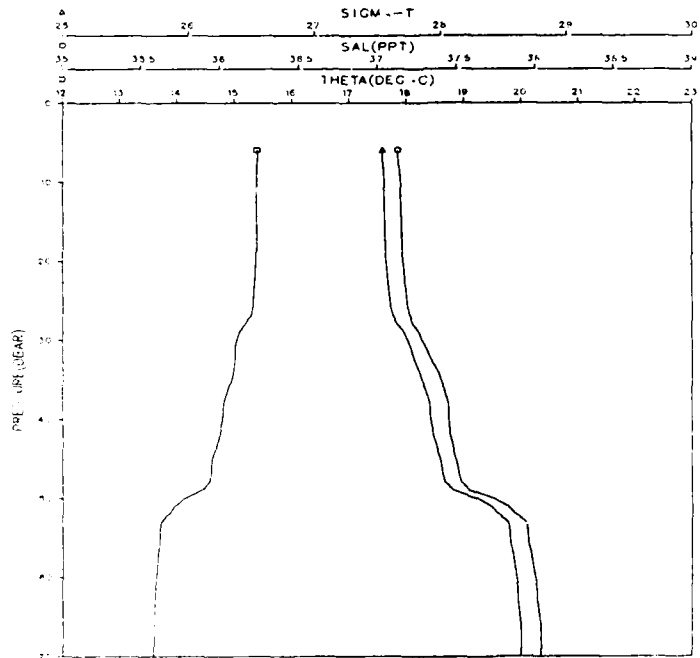


Figures 20a and 20b

CRUISE 131182
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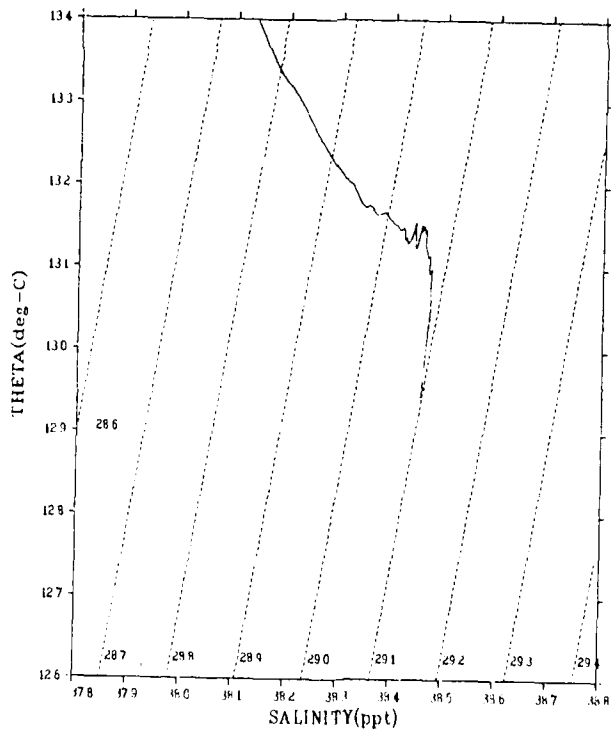
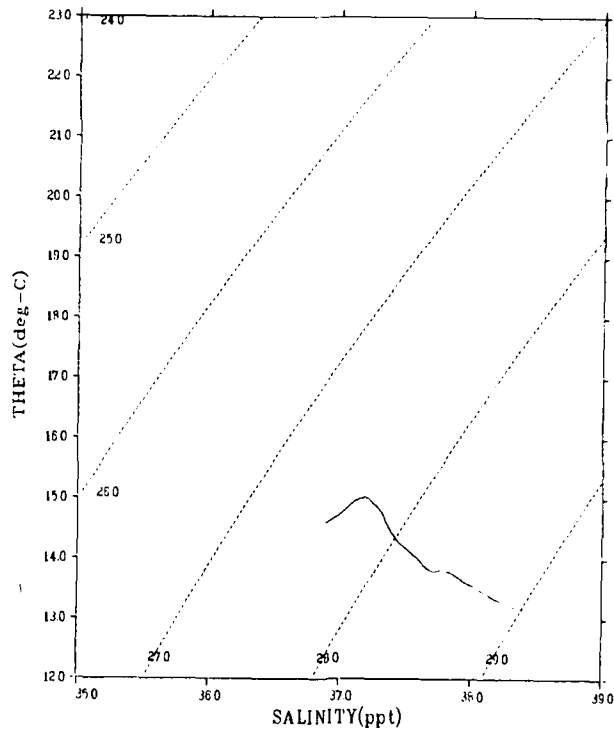


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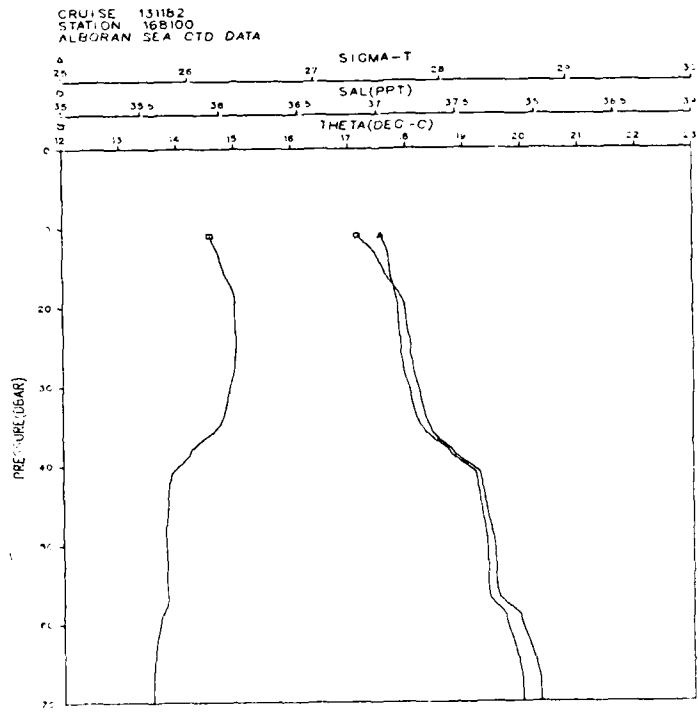
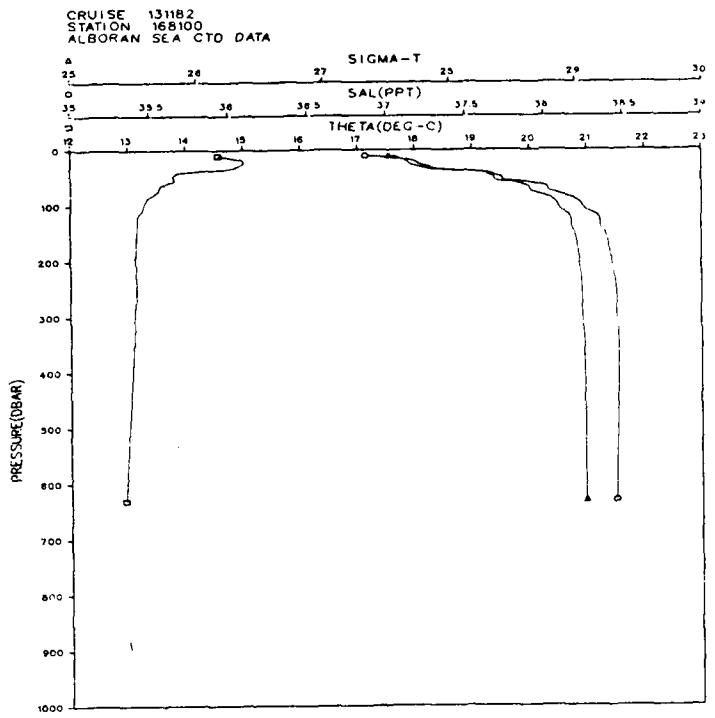


Figures 20c and 20d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 168100

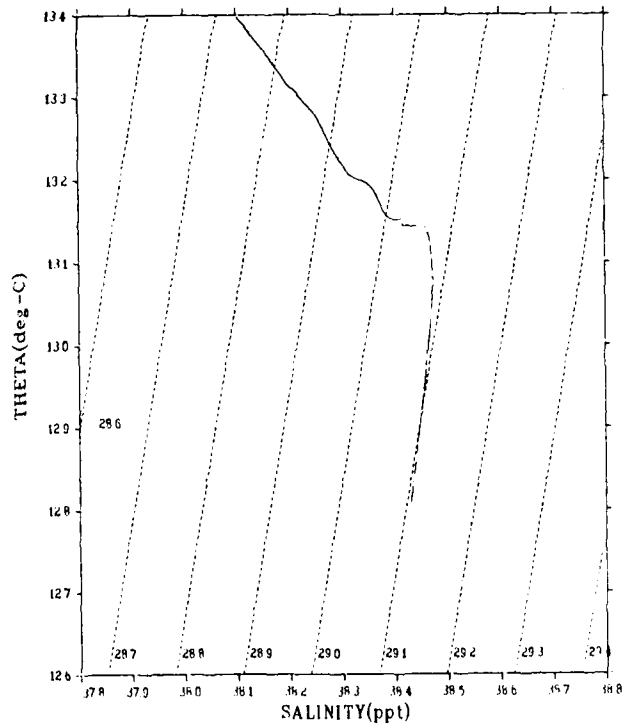
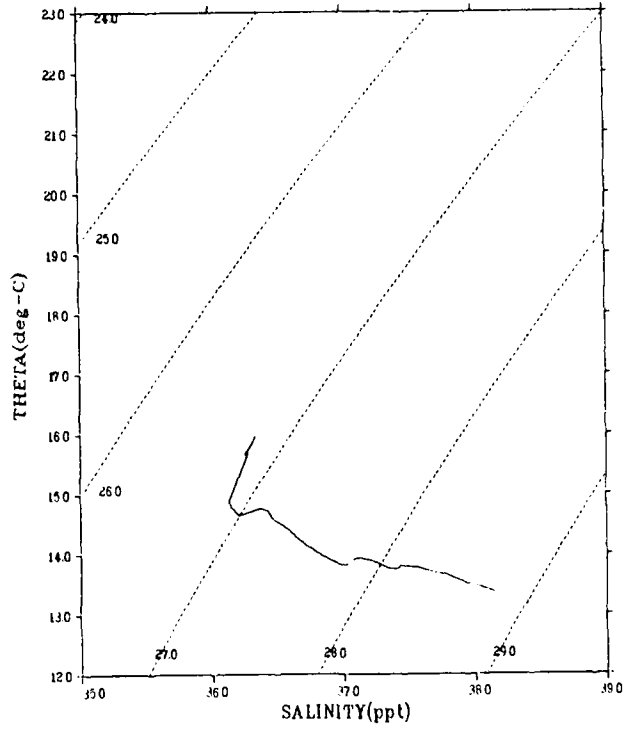


Figures 21a and 21b

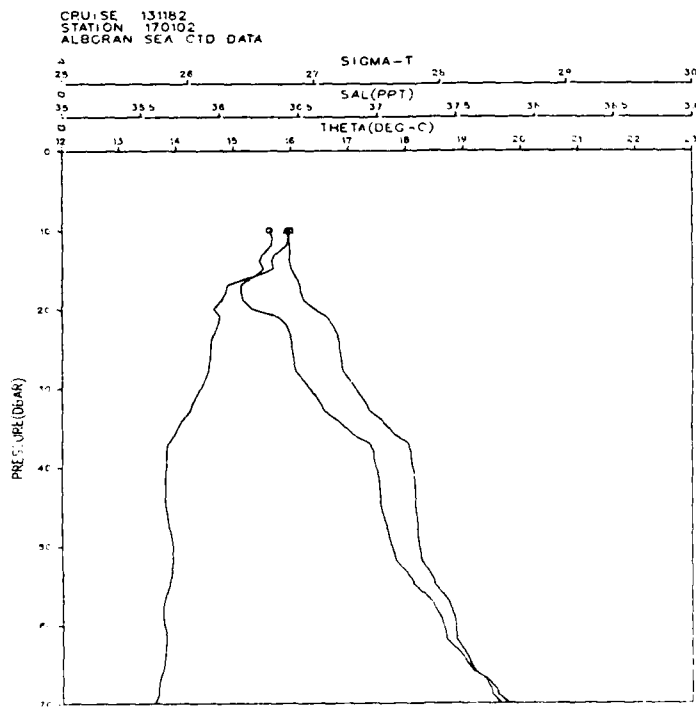
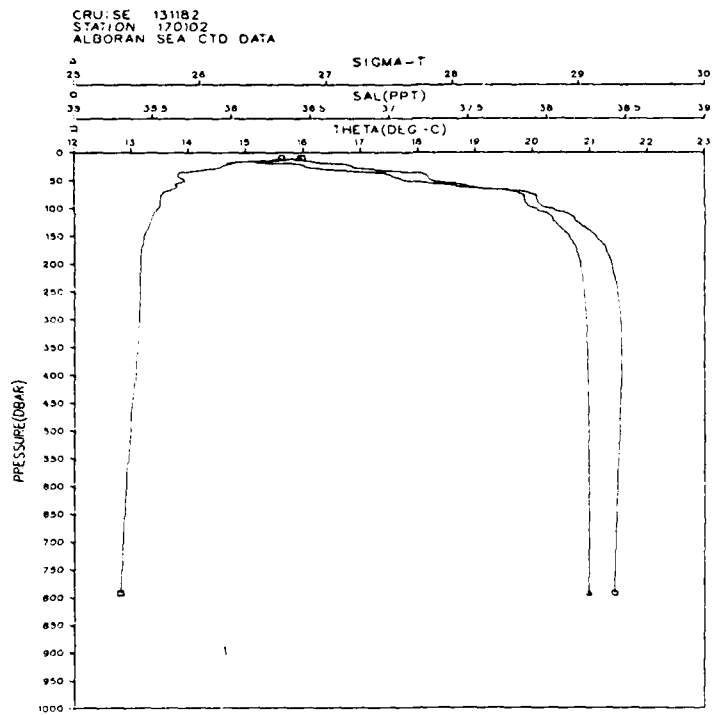


Figures 21c and 21d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 170102

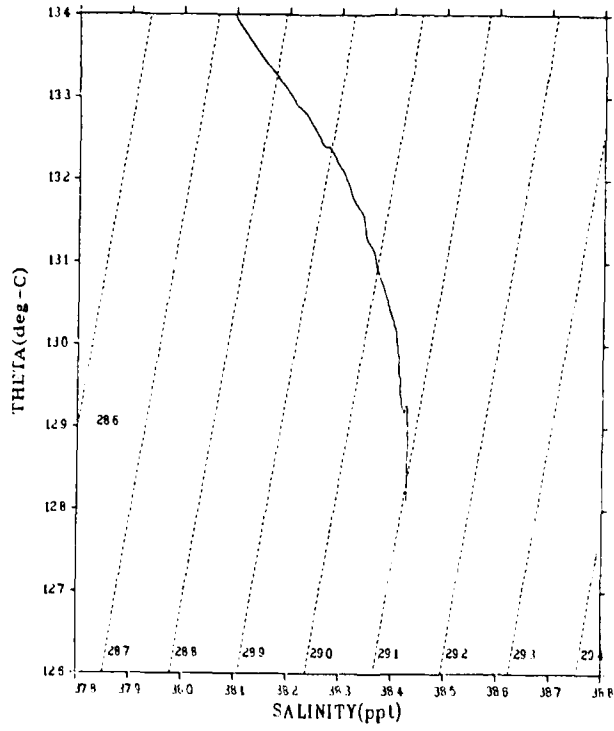
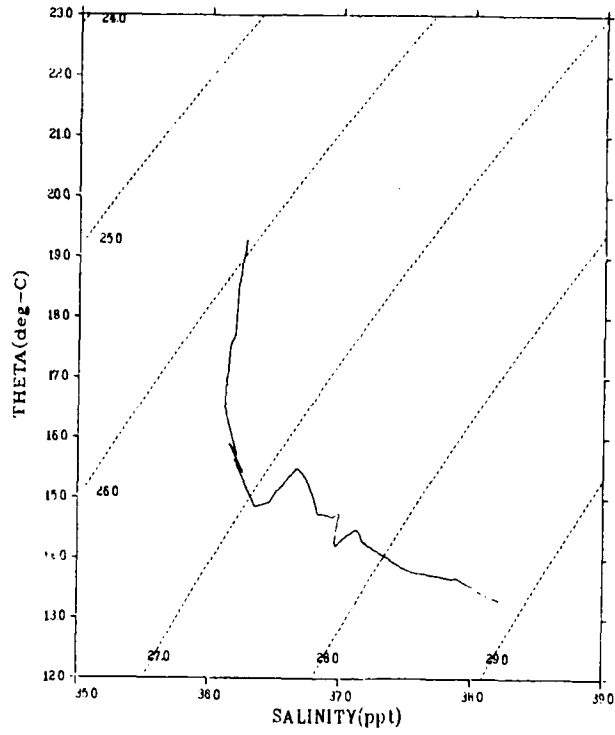


Figures 22a and 22b

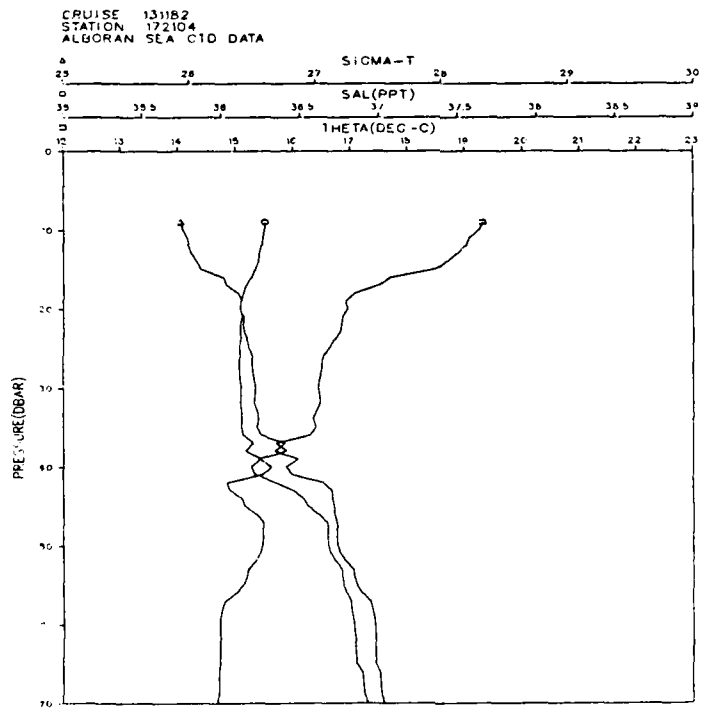
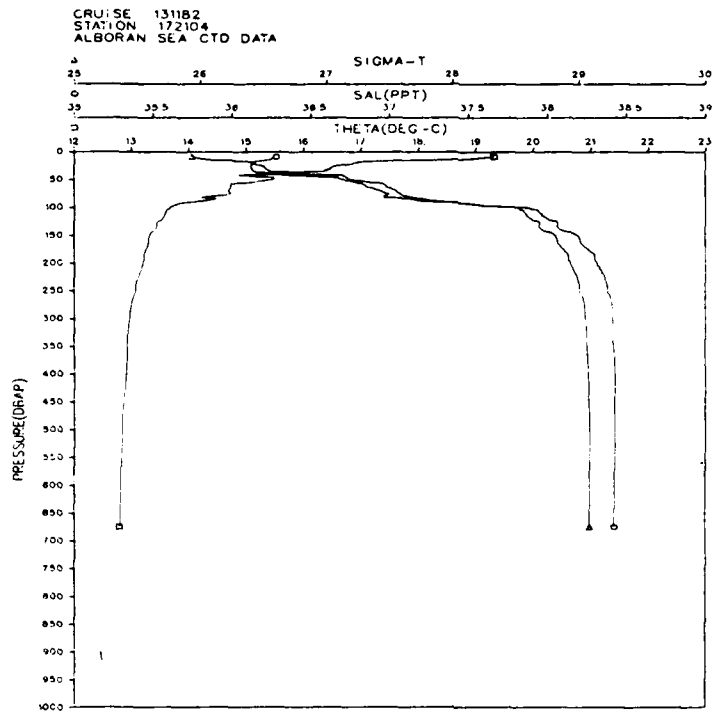


Figures 22c and 22d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 172104

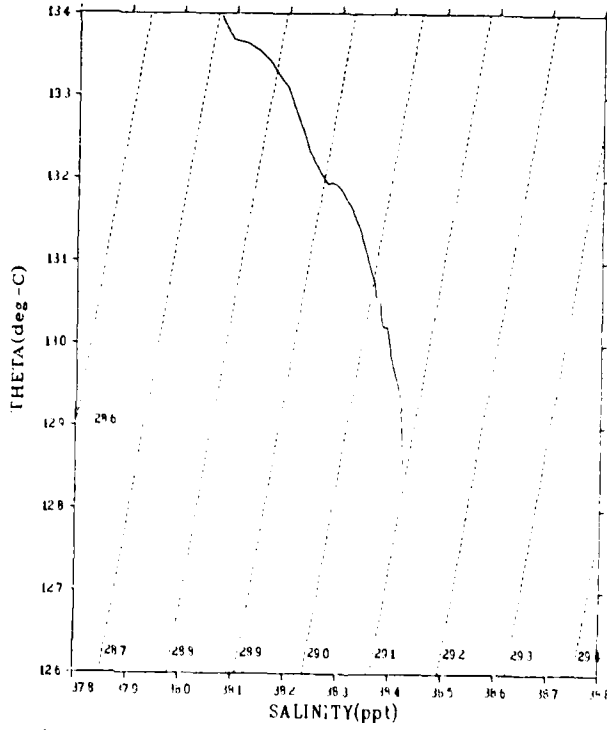
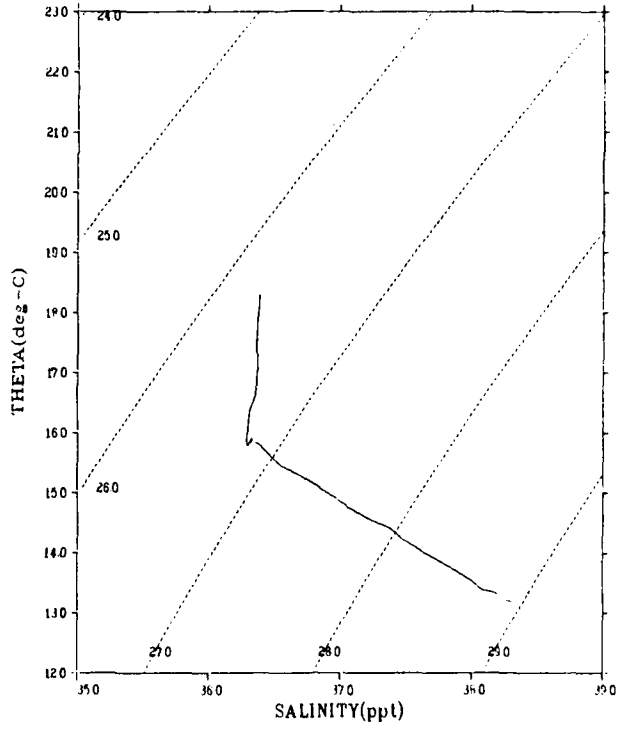


Figures 23a and 23b

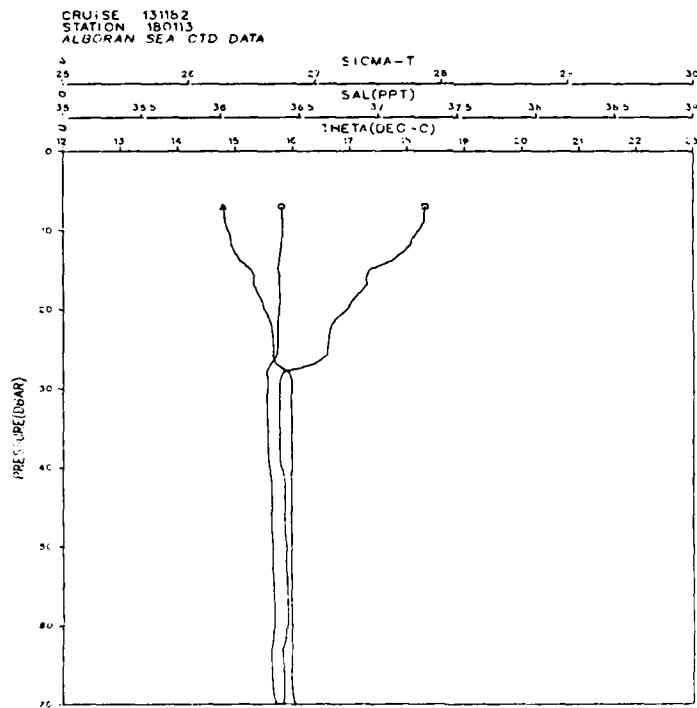
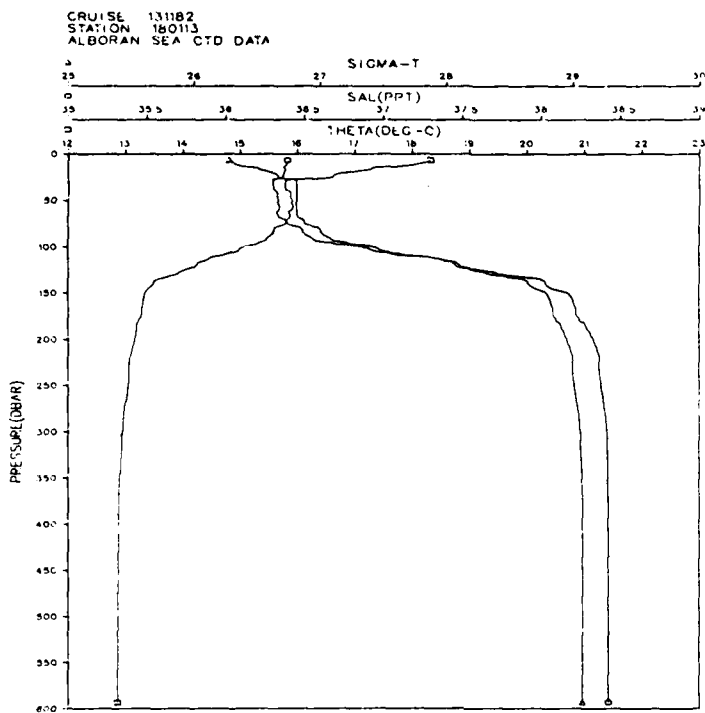


Figures 23c and 23d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 180113

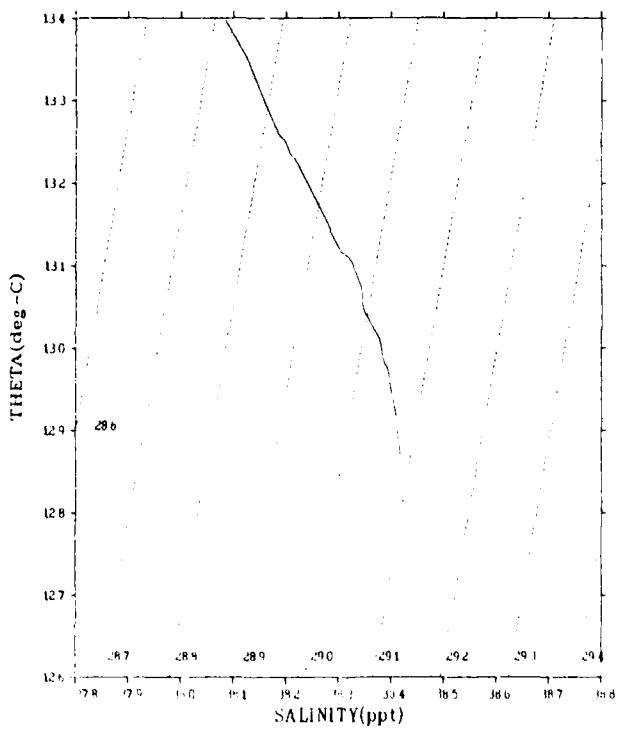
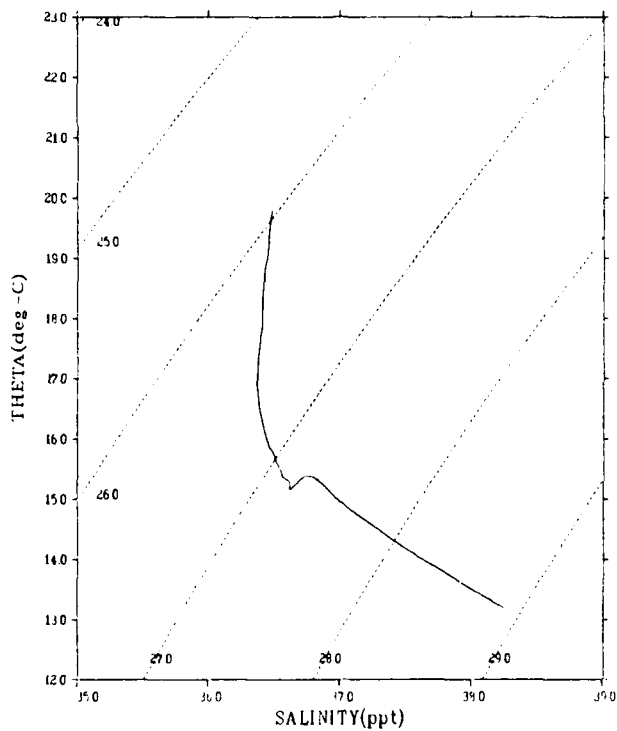


Figures 24a and 24b

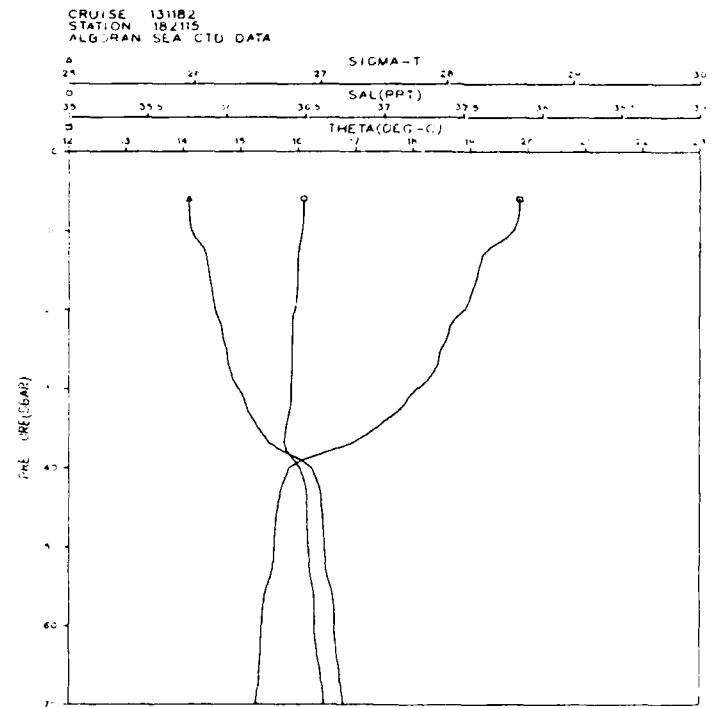
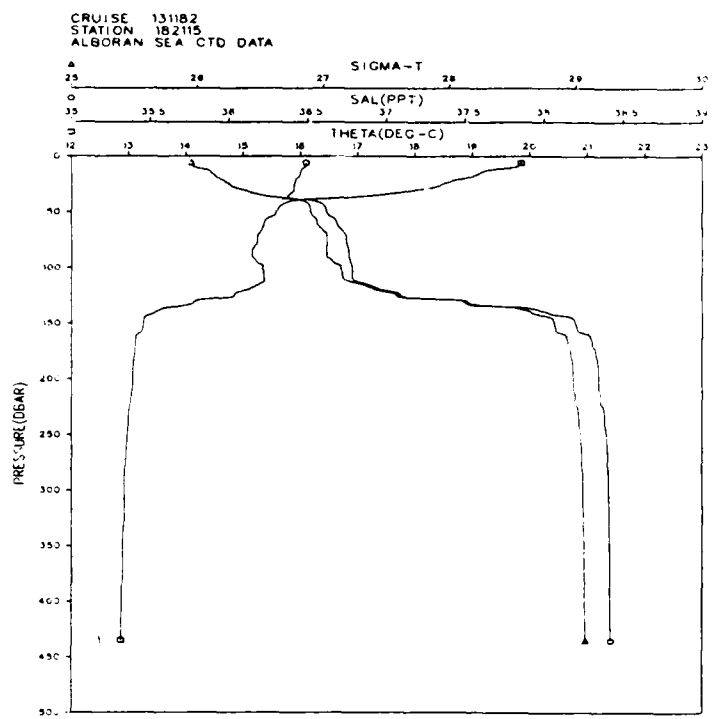


Figures 24c and 24d

ALBORAN SEA CTD DATA
CRUISE 13118.2 STATION 182115

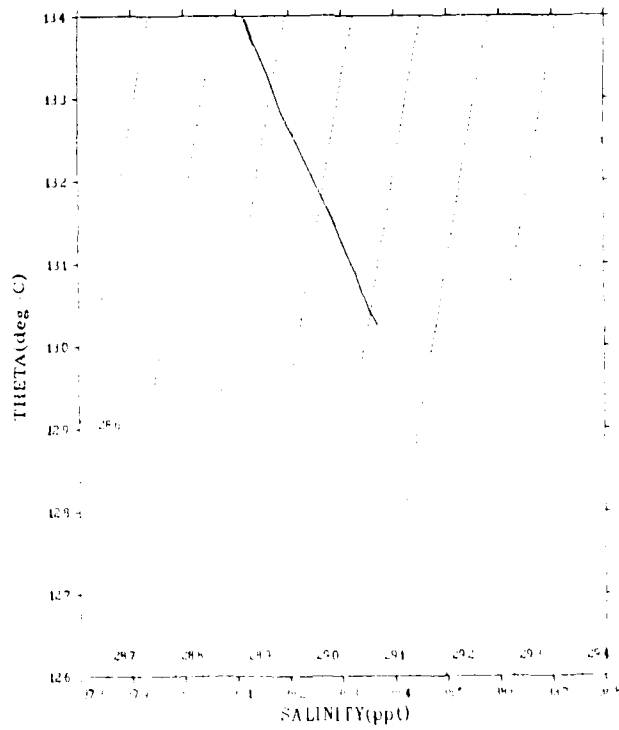
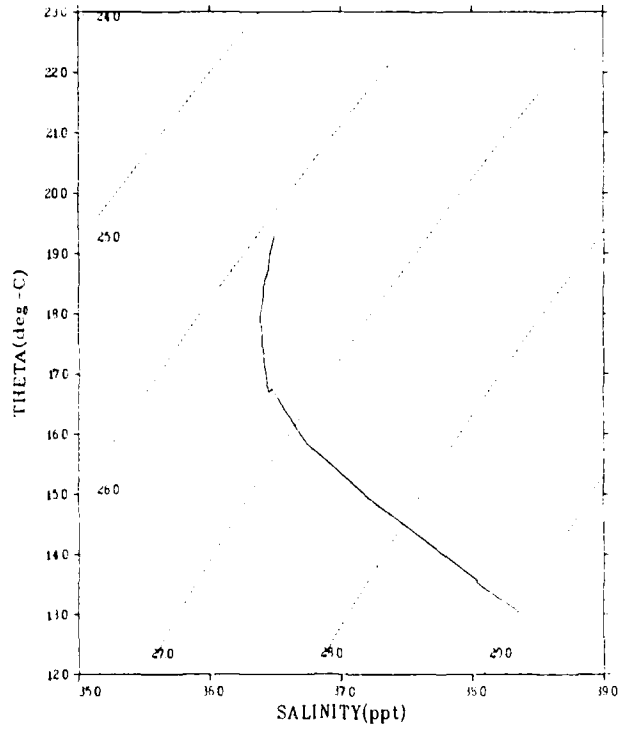


Figures 25a and 25b



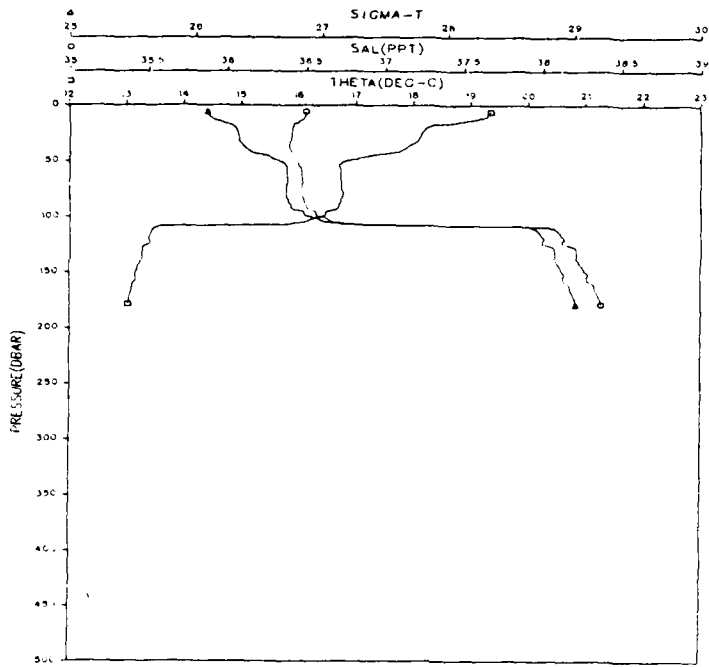
Figures 25c and 25d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 184117

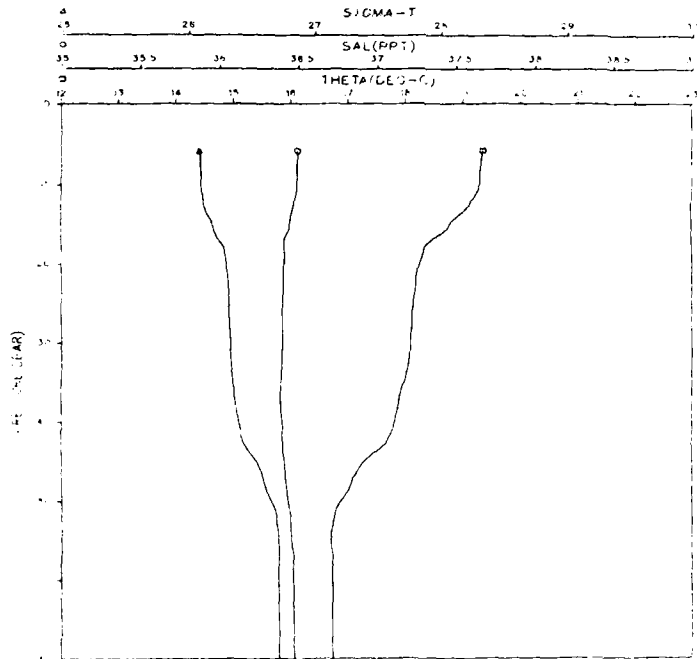


Figures 26a and 26b

CRUISE 131182
 STATION 184117
 ALBORAN SEA CTD DATA

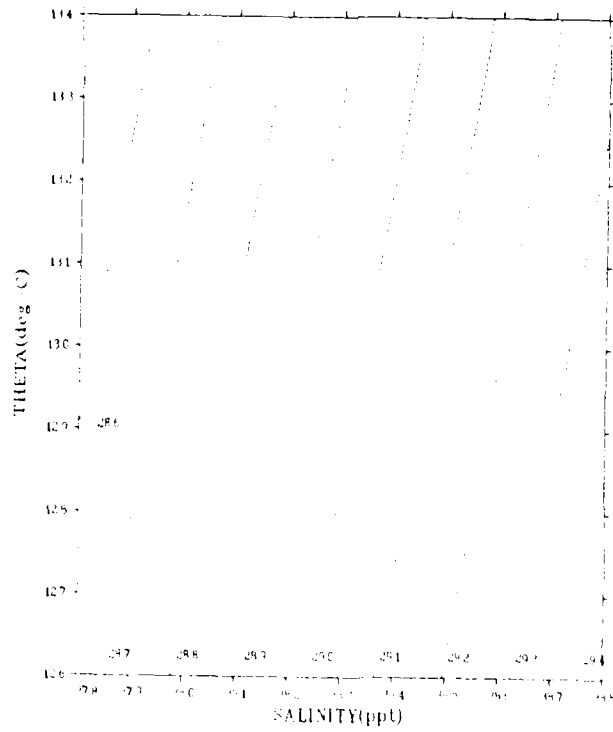
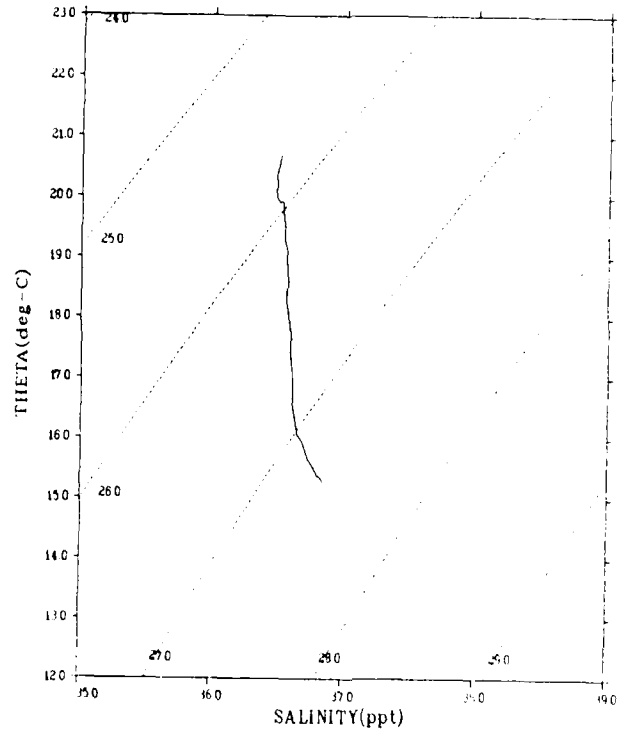


CRUISE 131182
 STATION 184117
 ALBORAN SEA CTD DATA



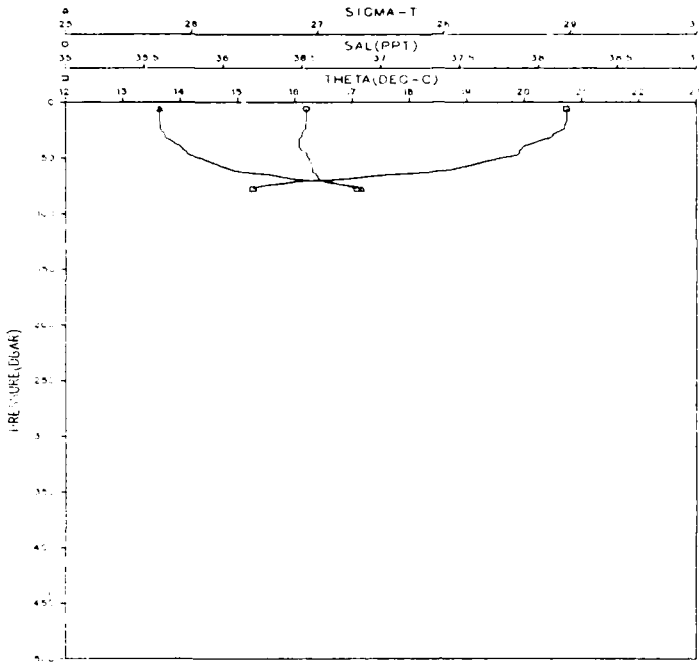
Figures 26c and 26d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 185118

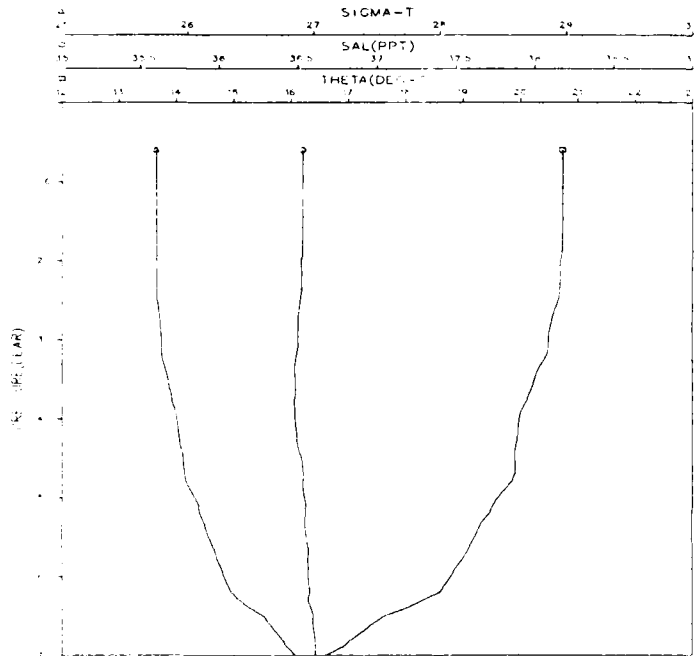


Figures 27a and 27b

CRUISE 131182
 STATION 185118
 ALBORAN SEA CTD DATA

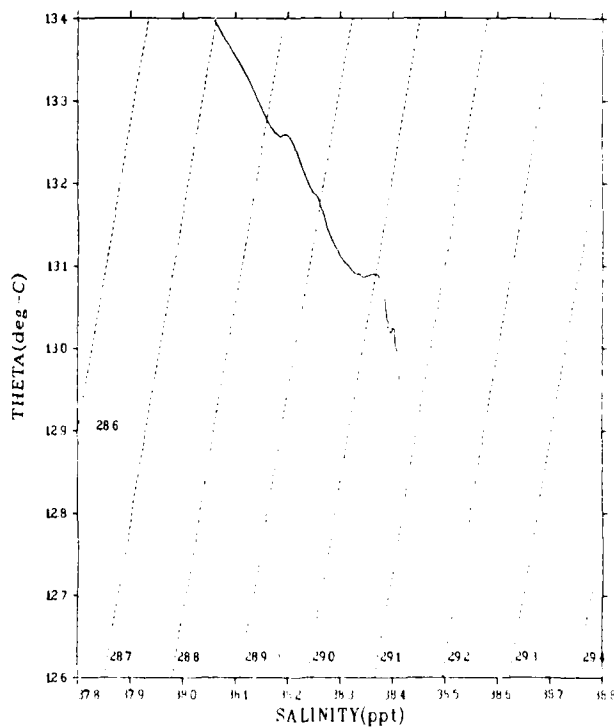
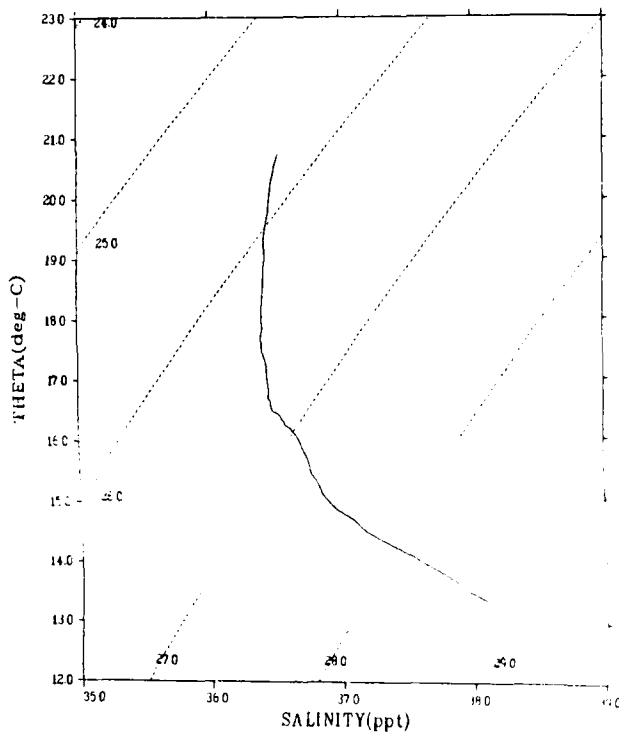


CRUISE 131182
 STATION 185118
 ALBORAN SEA CTD DATA



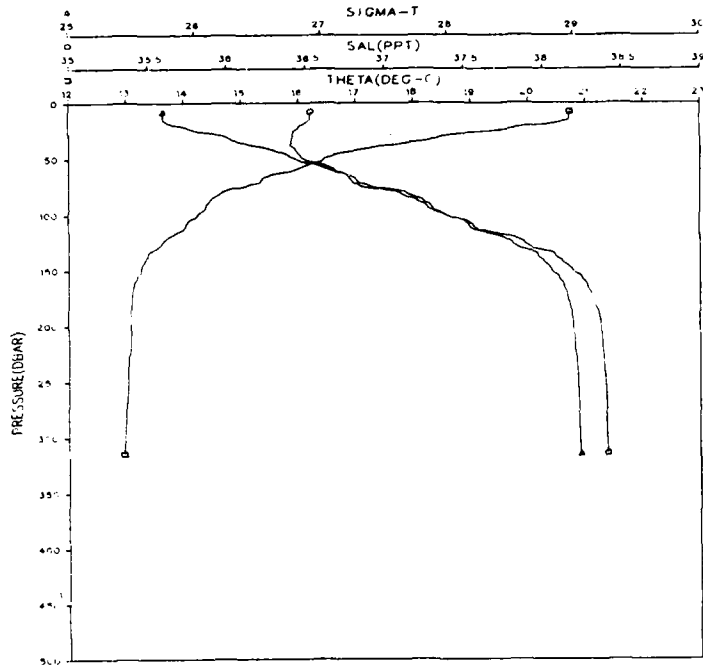
Figures 27c and 27d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 186119

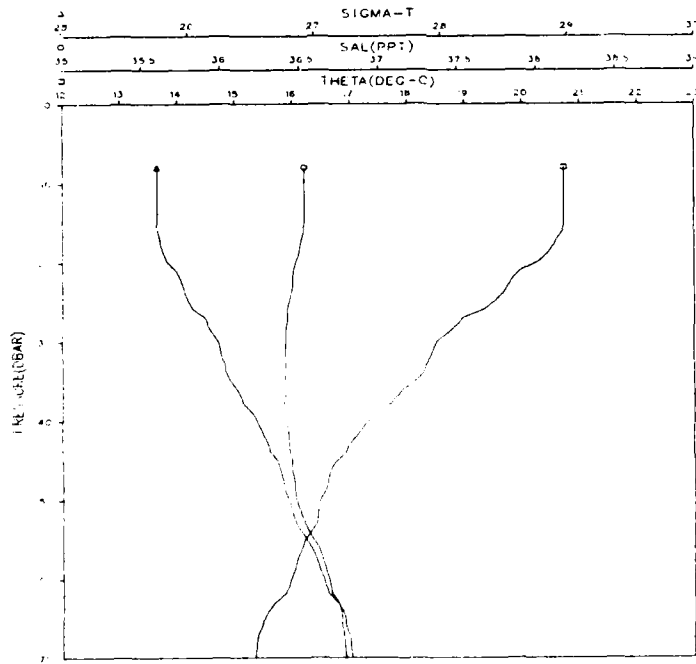


Figures 28a and 28b

CRUISE 131182
 STATION 186119
 ALBORAN SEA CTD DATA

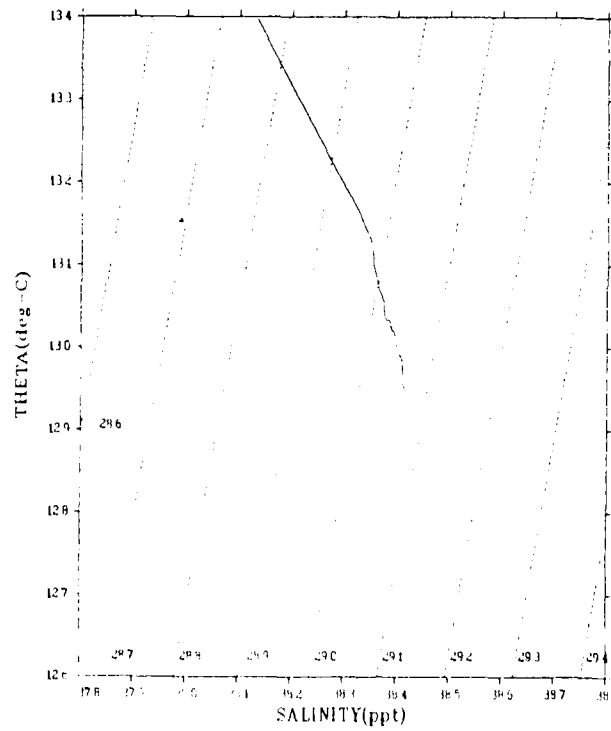
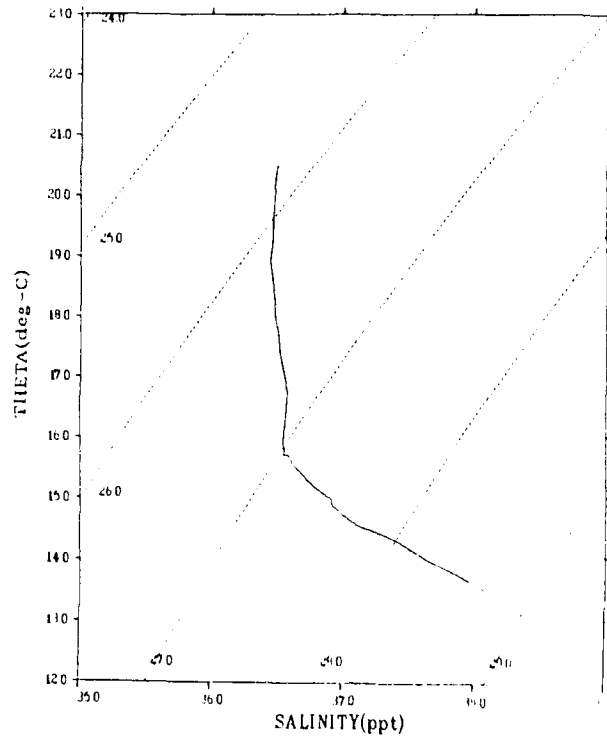


CRUISE 131182
 STATION 186119
 ALBORAN SEA CTD DATA



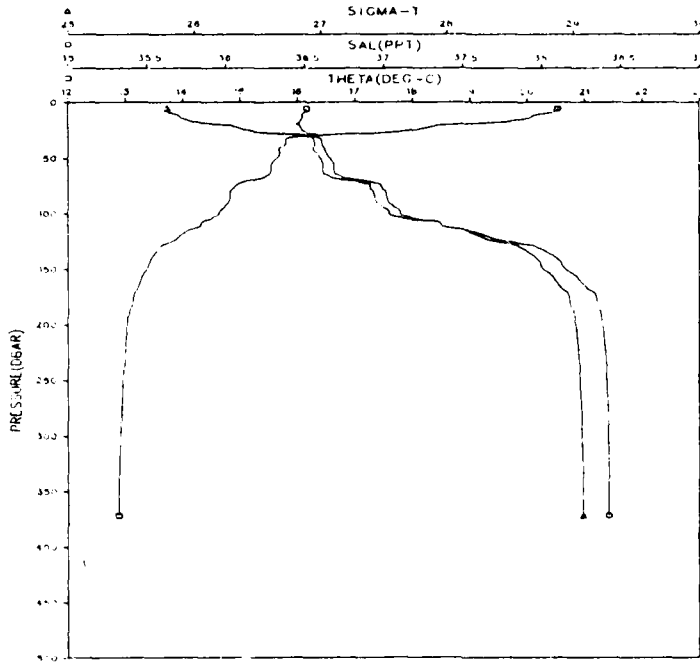
Figures 28c and 28d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 187120

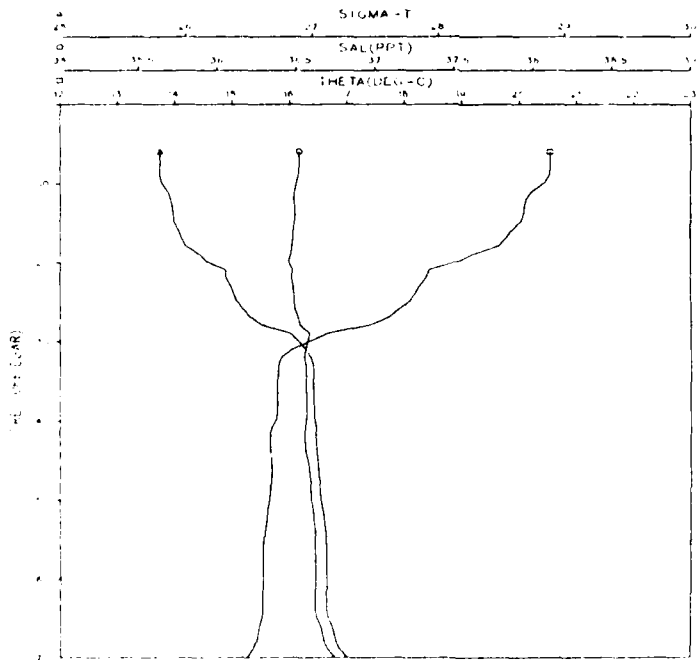


Figures 29a and 29b

CRUISE 131182
 STATION 187120
 ALBORAN SEA CTD DATA

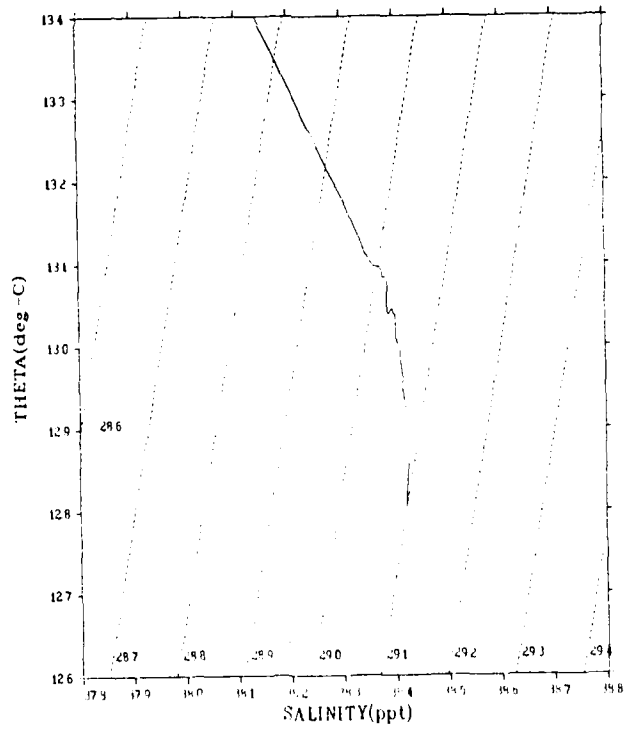
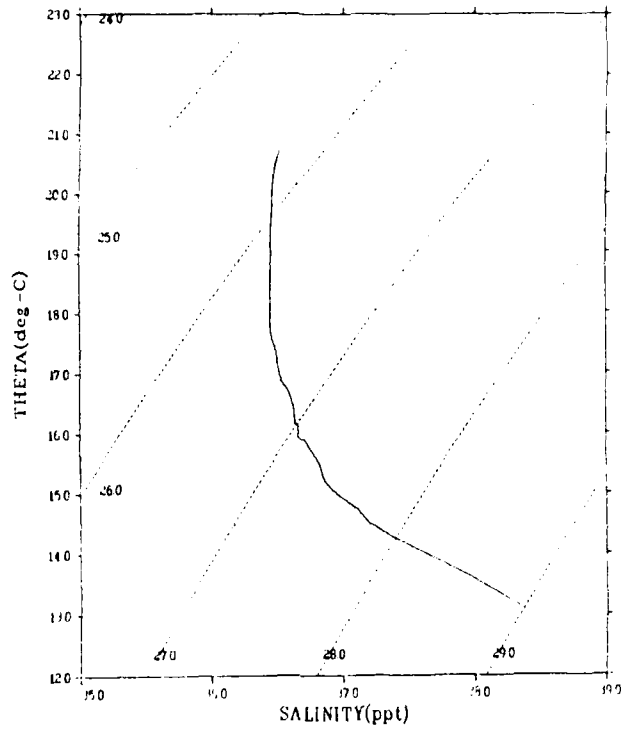


CRUISE 131182
 STATION 187120
 ALBORAN SEA CTD DATA



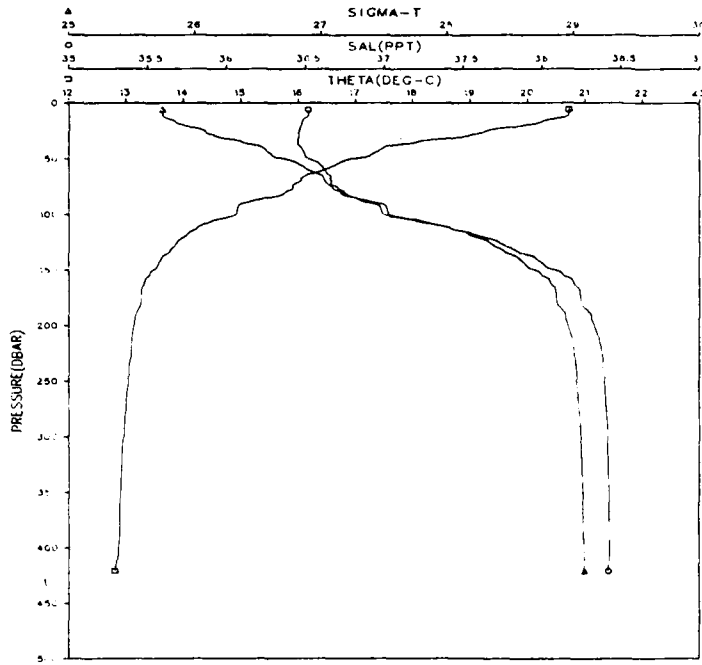
Figures 29c and 29d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 188121

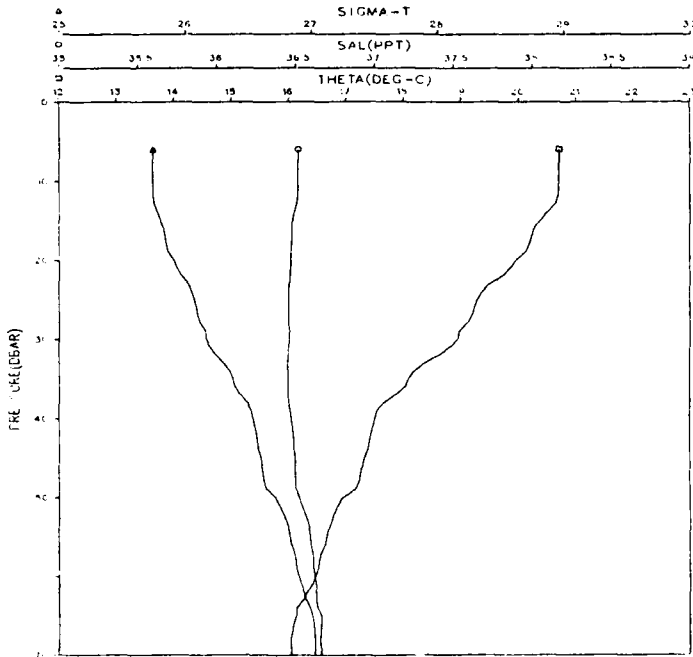


Figures 30a and 30b

CRUISE 131182
 STATION 188121
 ALBORAN SEA CTD DATA

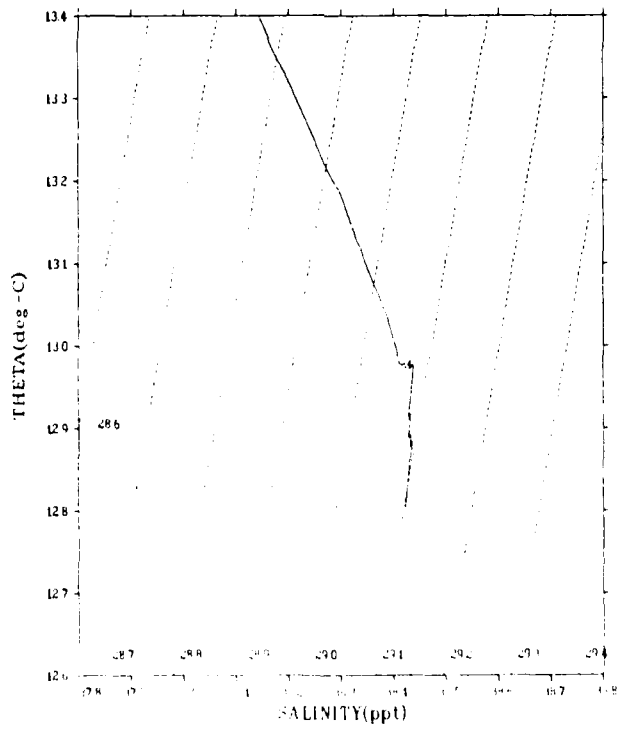
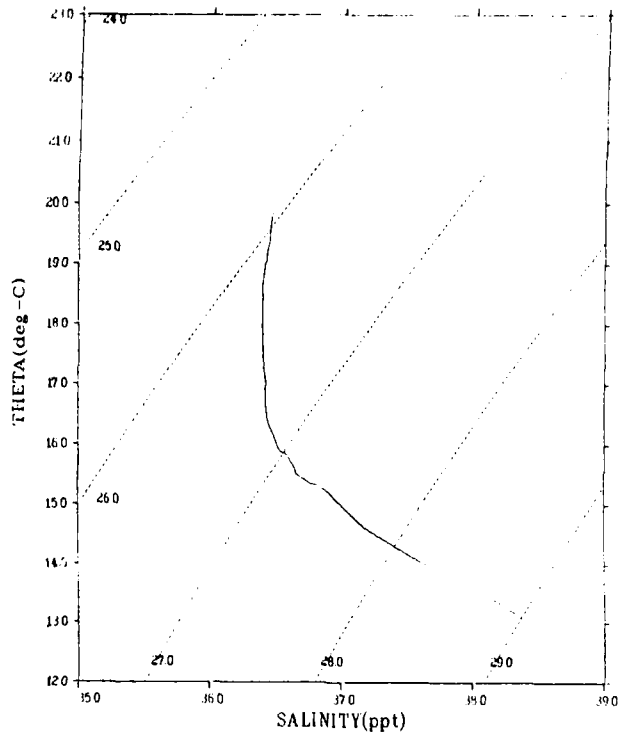


CRUISE 131182
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 ALBORAN SEA CTD DATA

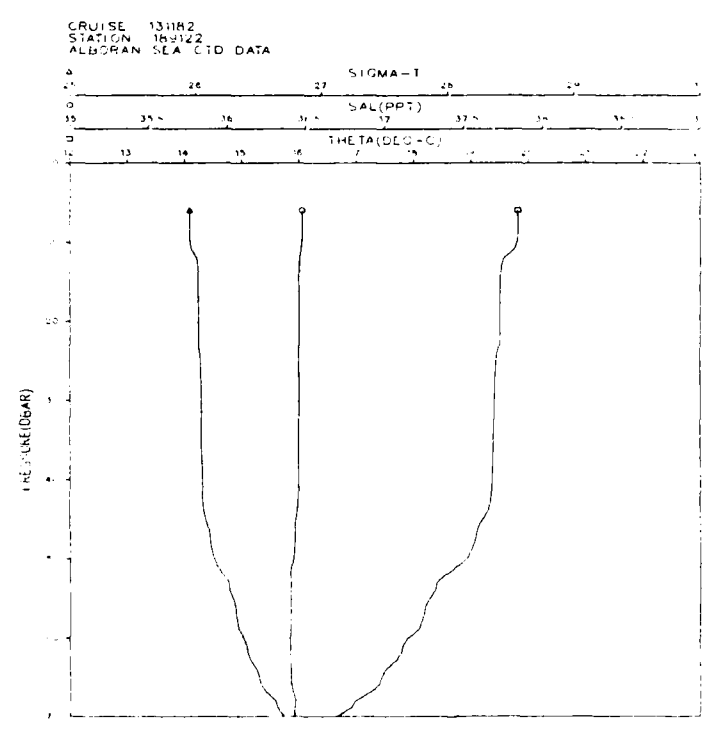
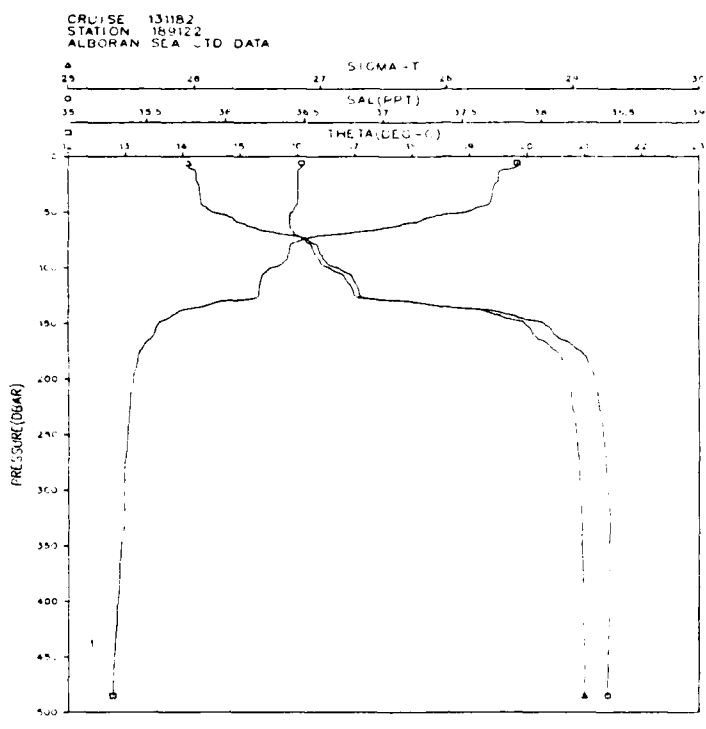


Figures 30c and 30d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 189122

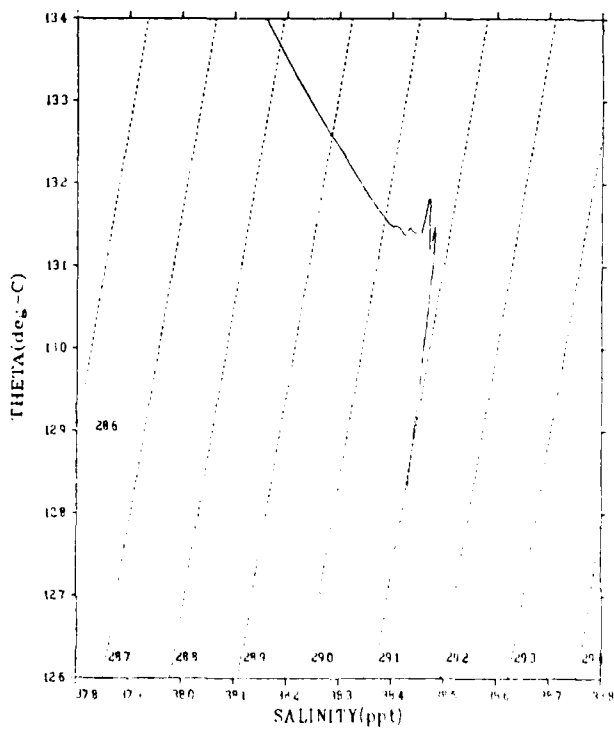
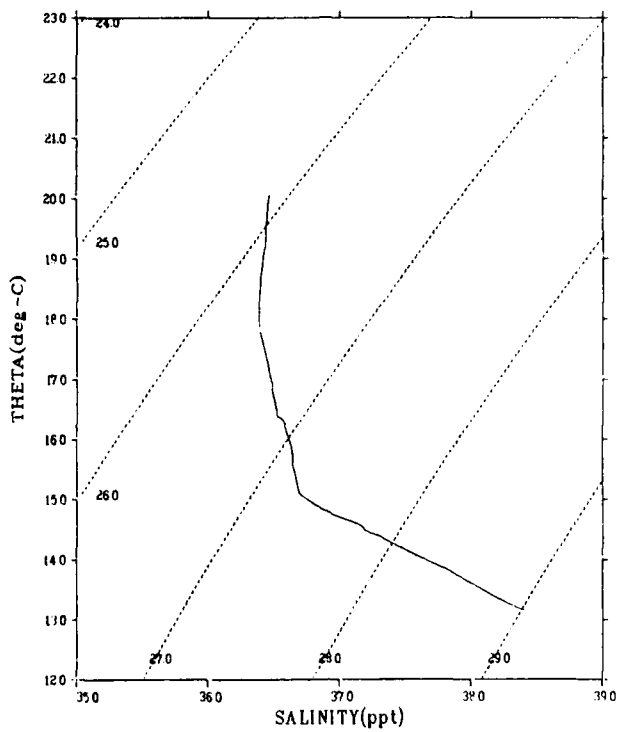


Figures 31a and 31b

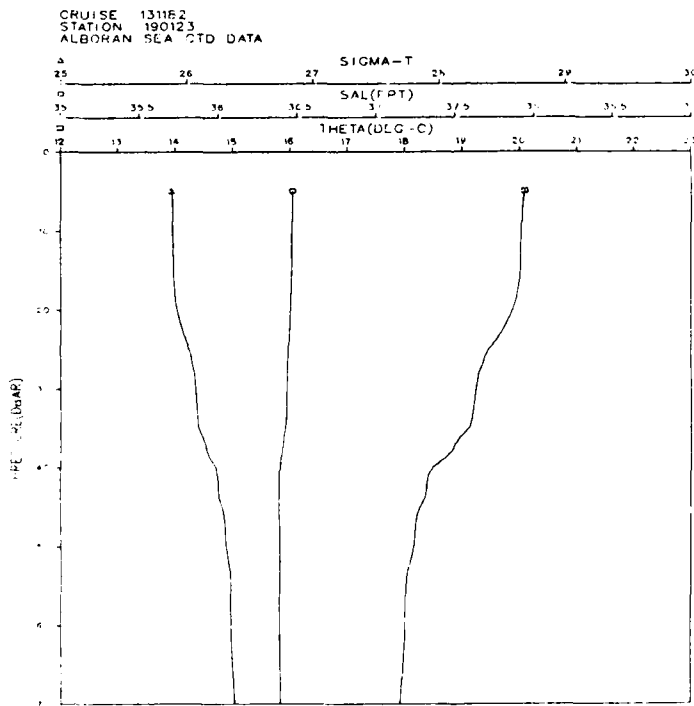
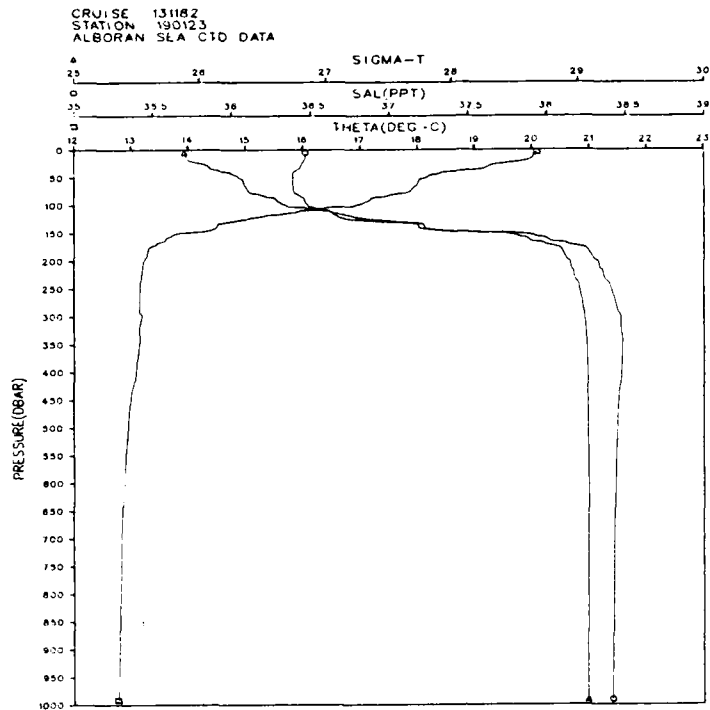


Figures 31c and 31d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 190123

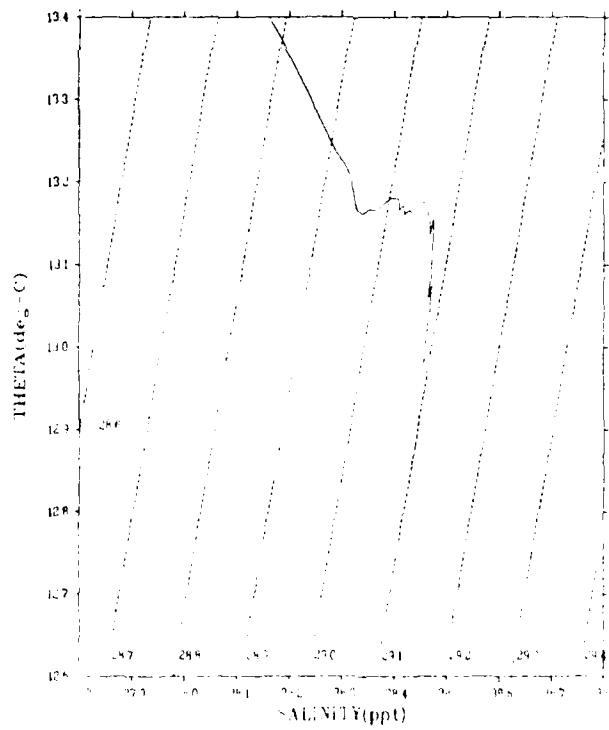
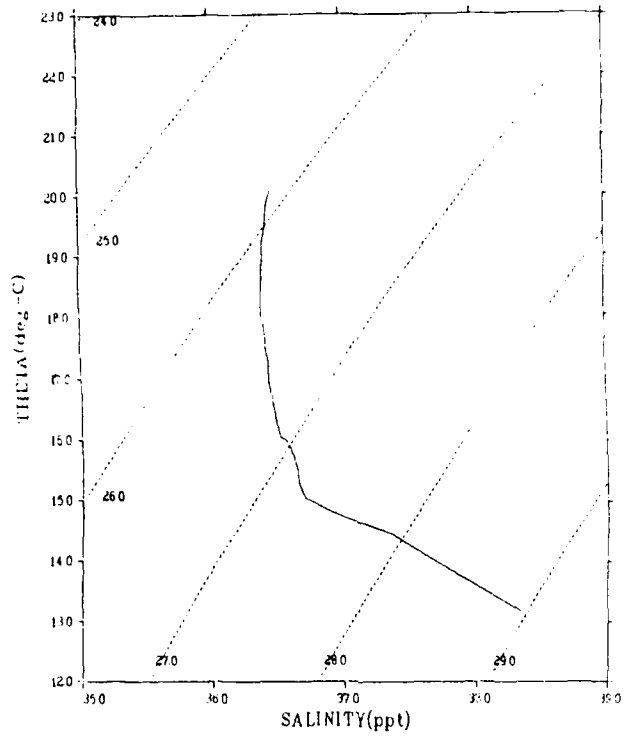


Figures 32a and 32b

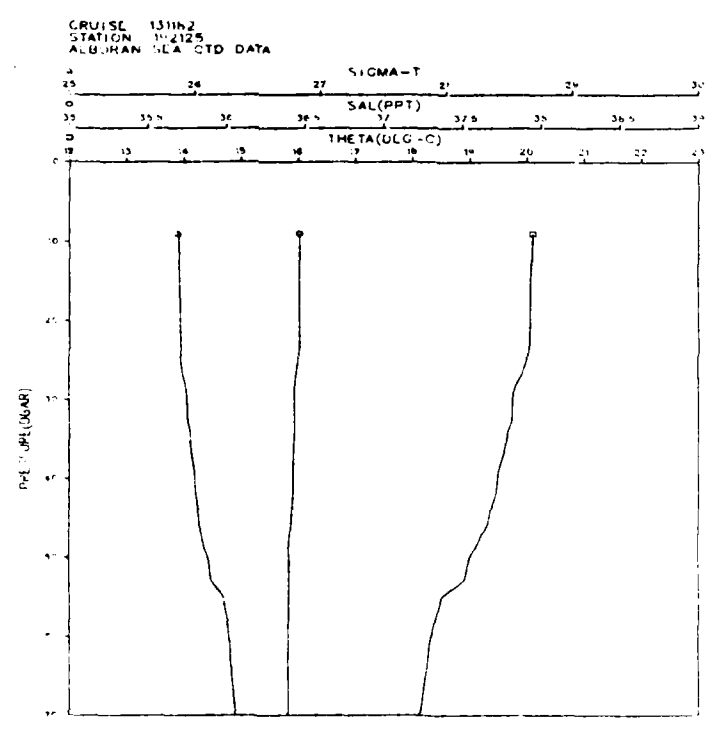
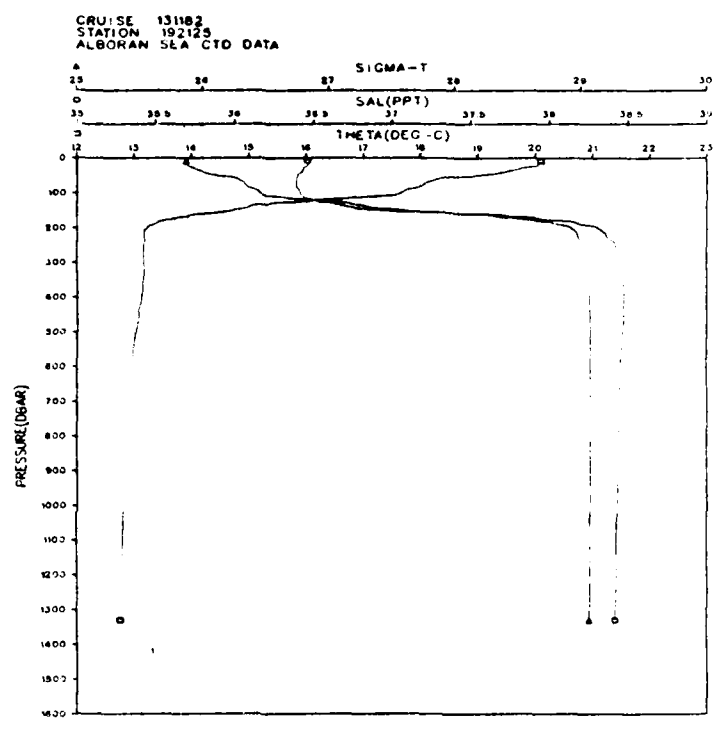


Figures 32c and 32d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 192125

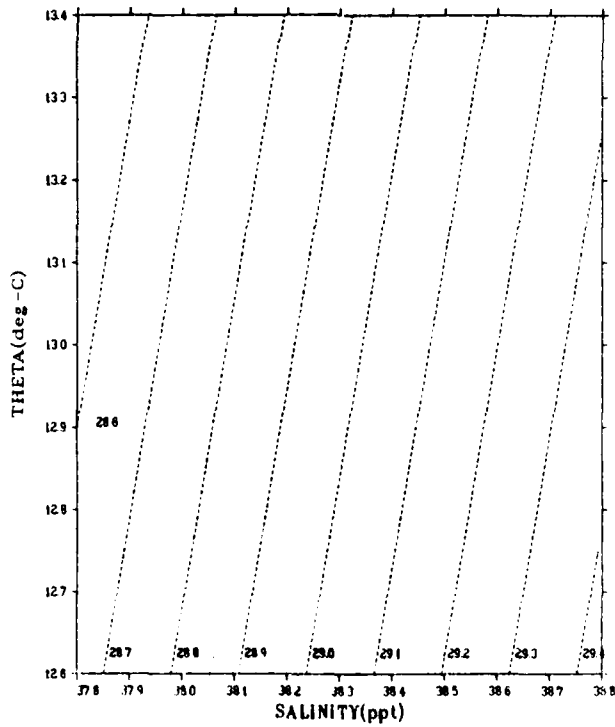
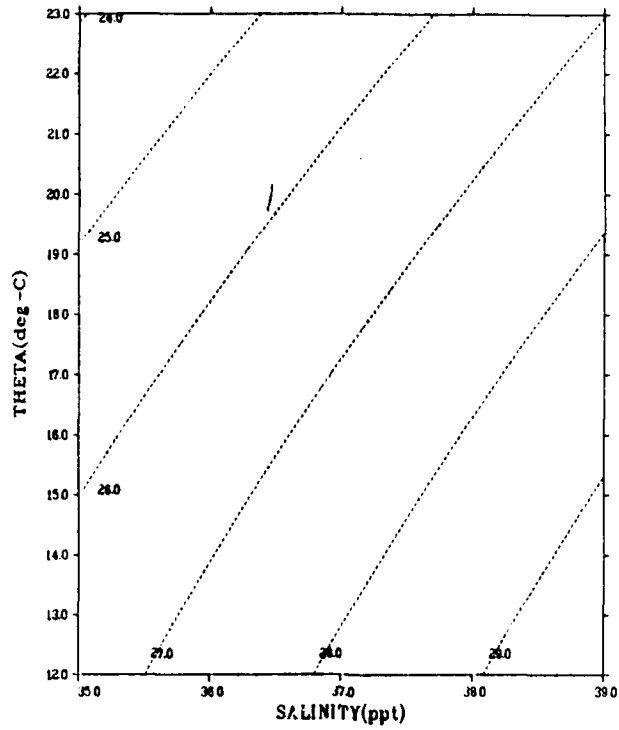


Figures 33a and 33b

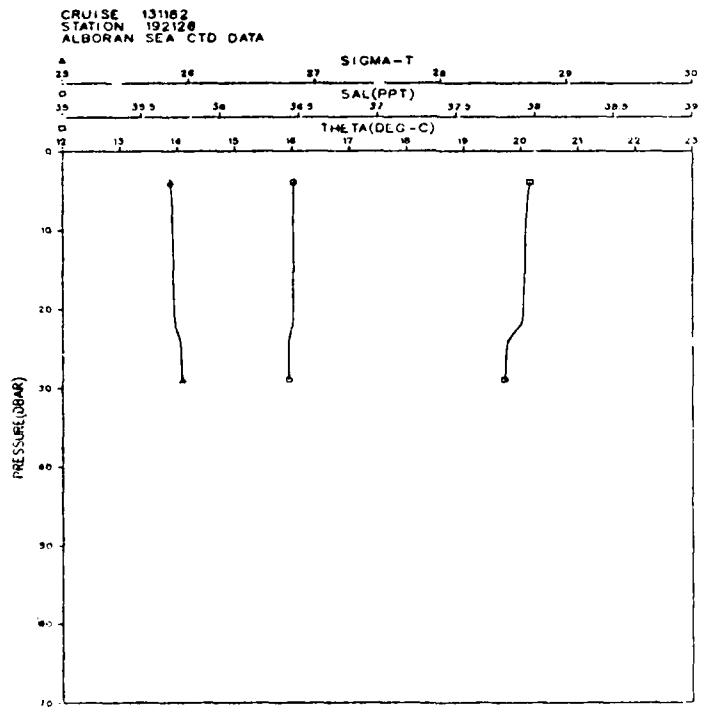
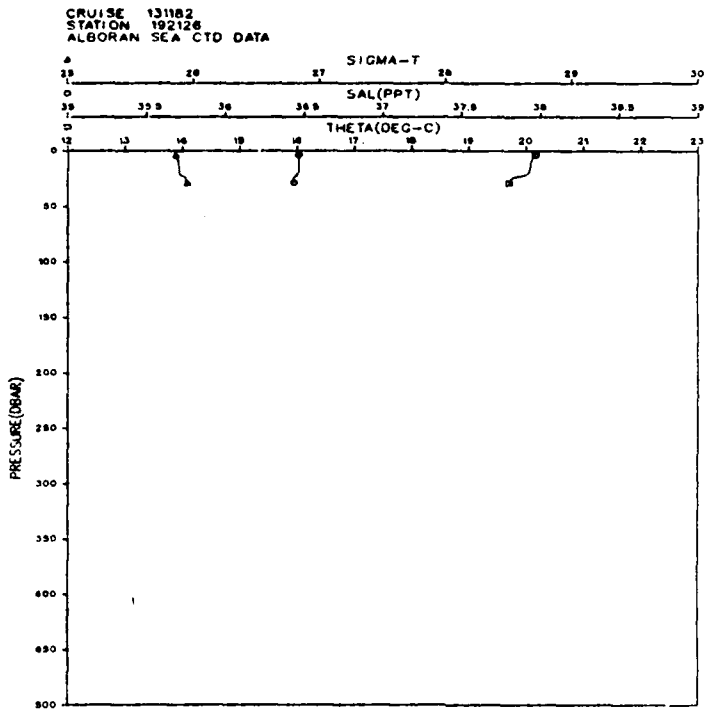


Figures 33c and 33d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 192126

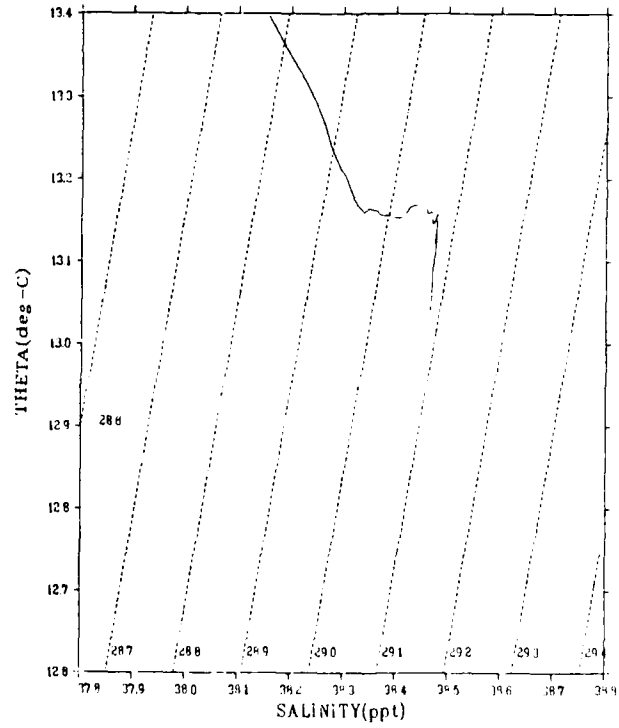
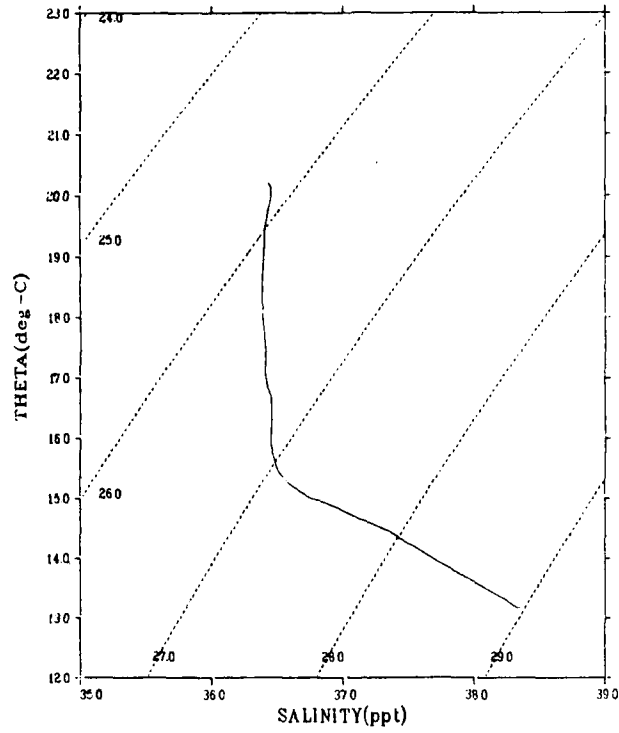


Figures 34a and 34b



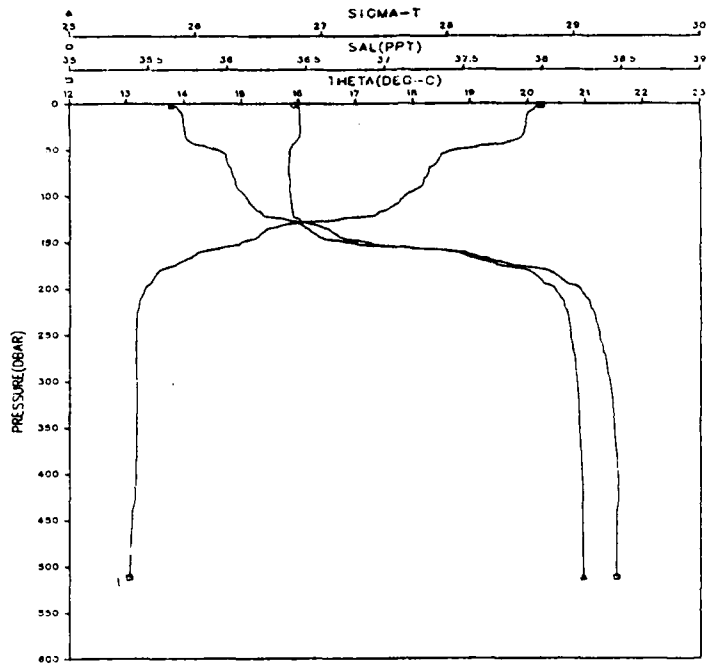
Figures 34c and 34d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 196130

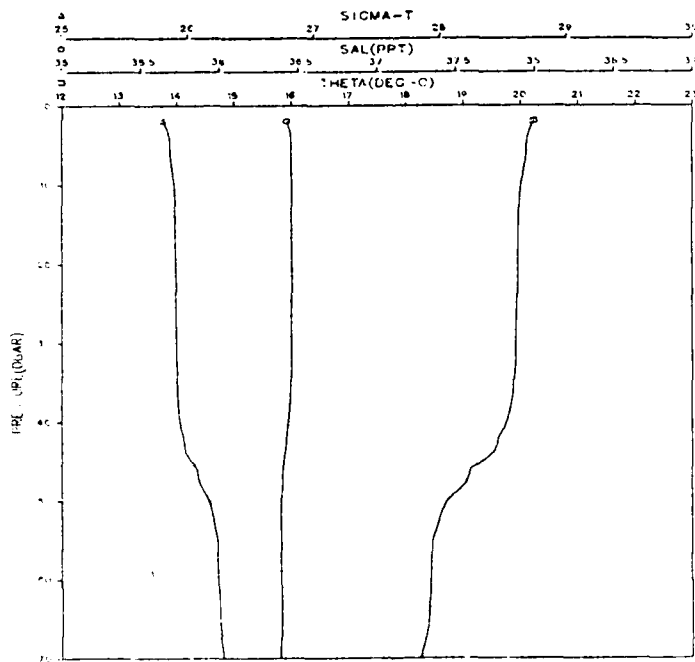


Figures 35a and 35b

CRUISE 131182
 STATION 196130
 ALBORAN SEA CTD DATA

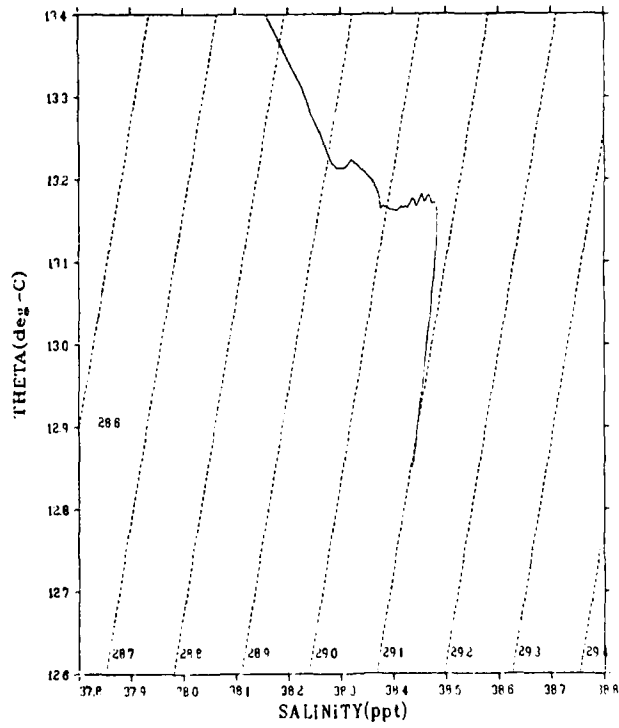
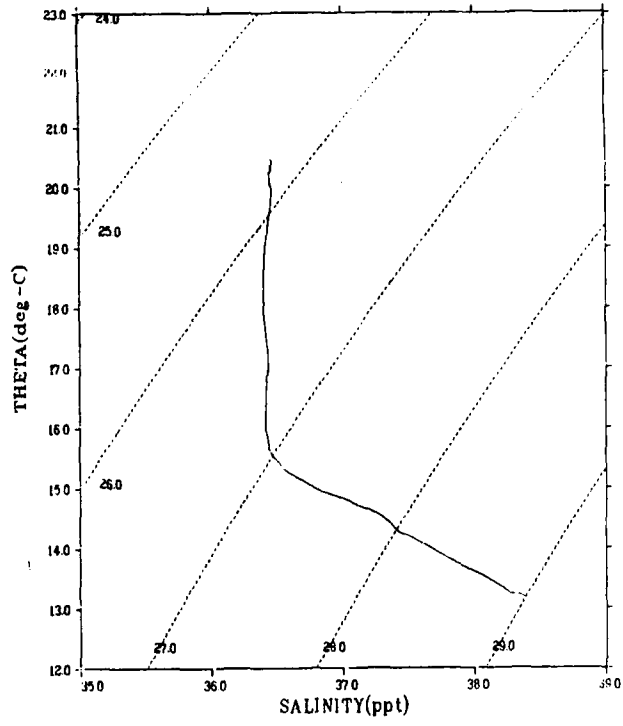


CRUISE 131182
 STATION 196130
 ALBORAN SEA CTD DATA

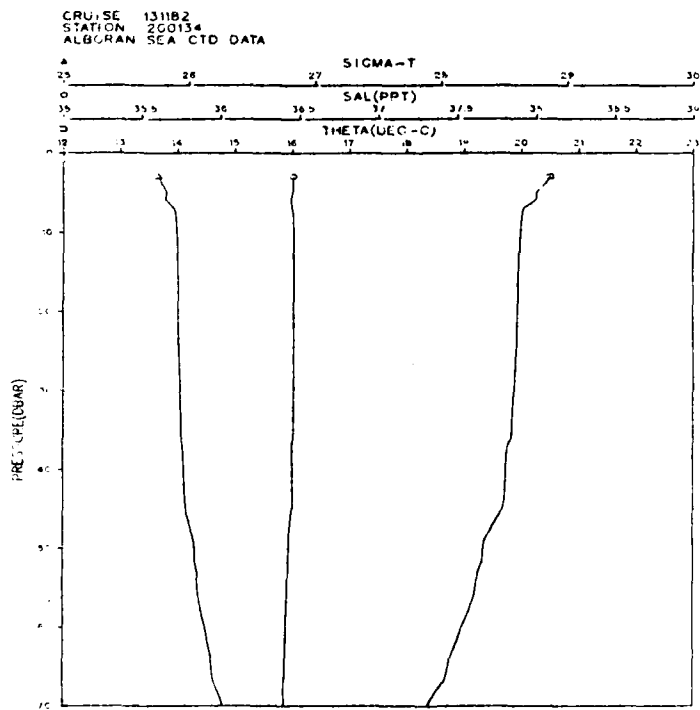
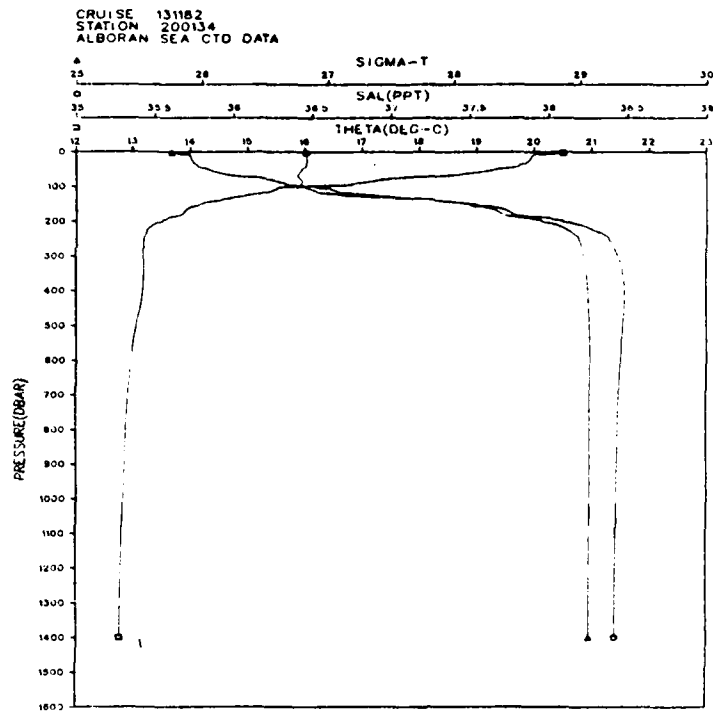


Figures 35c and 35d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 200134

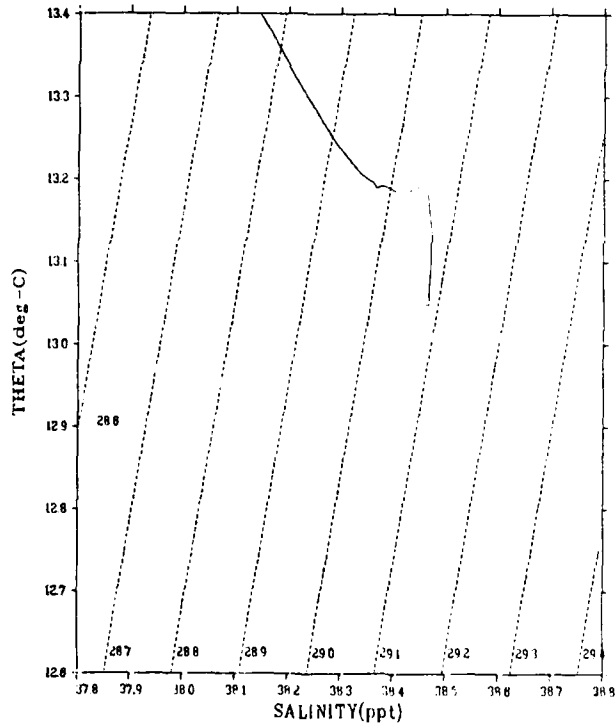
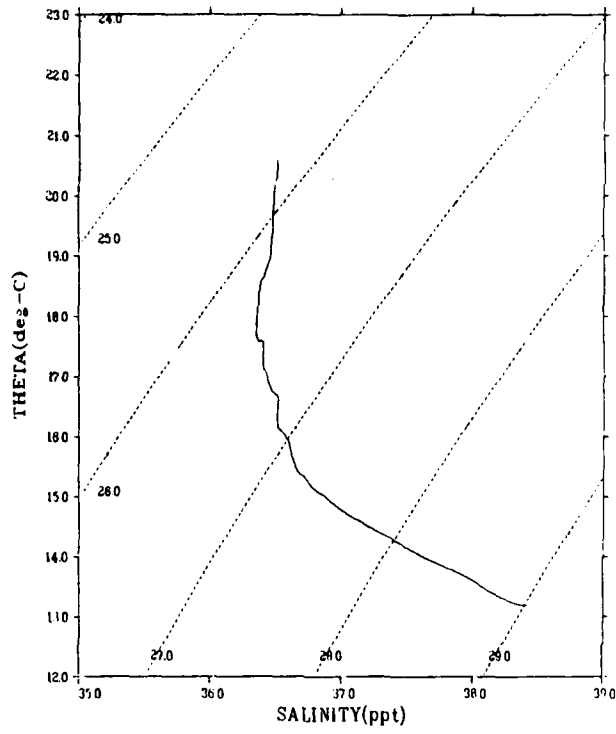


Figures 36a and 36b



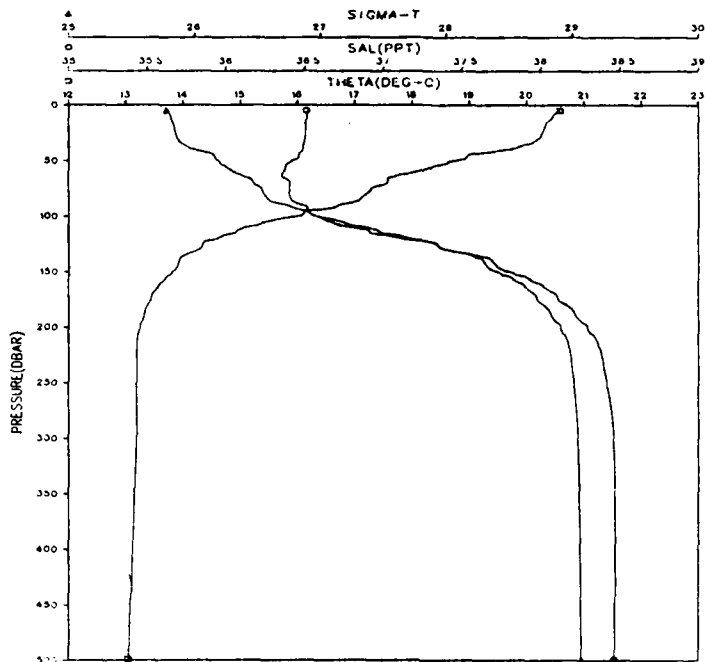
Figures 36c and 36d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 204138

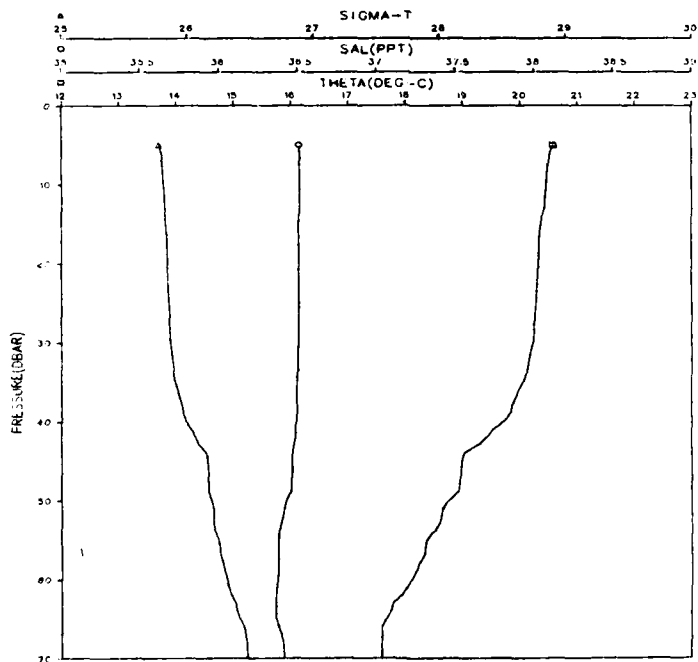


Figures 37a and 37b

CRUISE 131182
STATION 204138
ALBORAN SEA CTD DATA

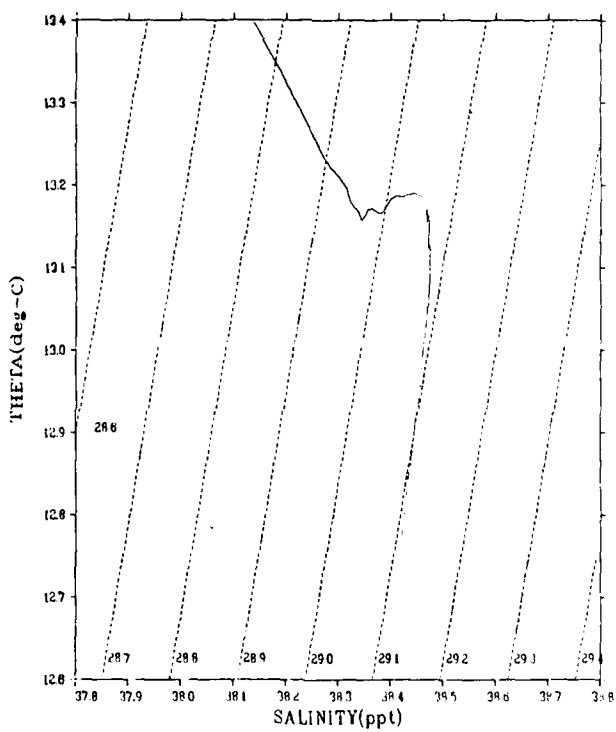
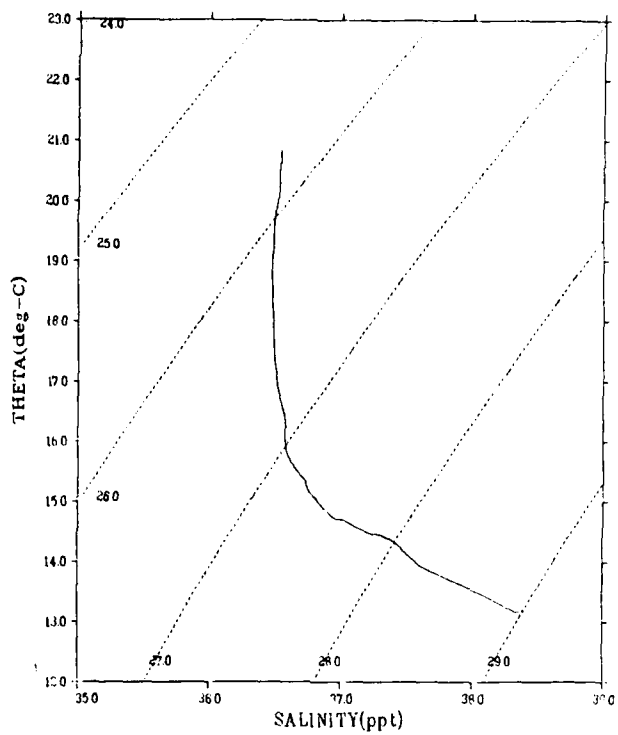


CRUISE 131182
STATION 204138
ALBORAN SEA CTD DATA



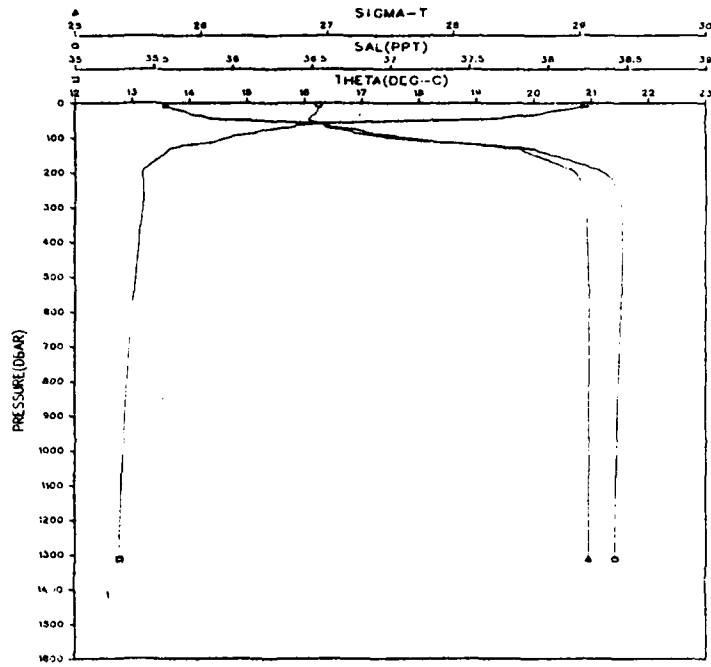
Figures 37c and 37d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 208142

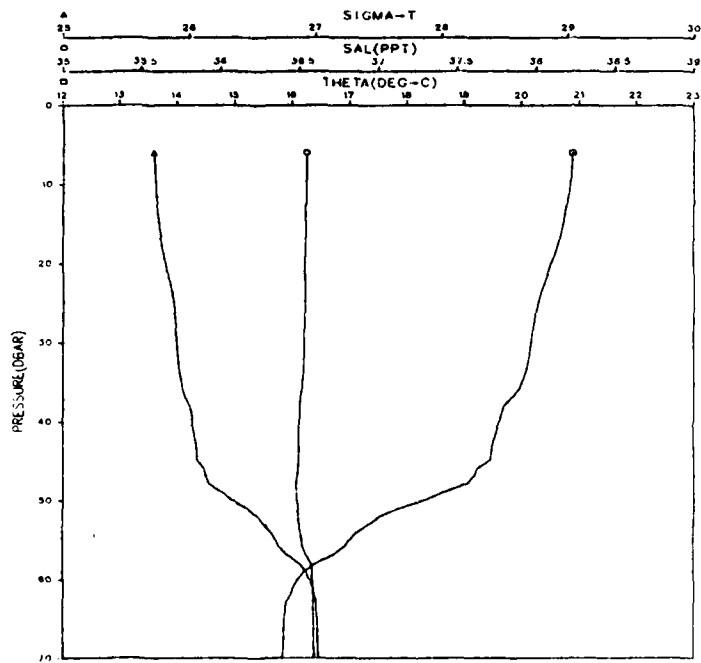


Figures 38a and 38b

CRUISE 131182
 STATION 208142
 ALBORAN SEA CTD DATA

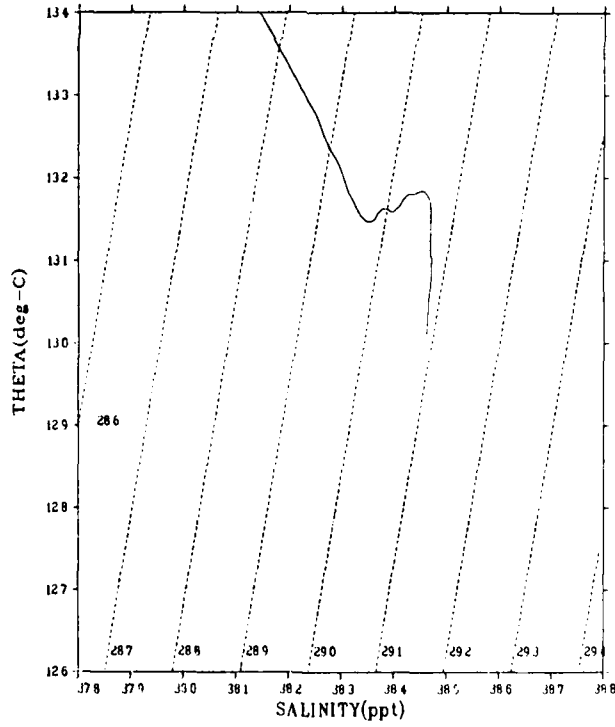
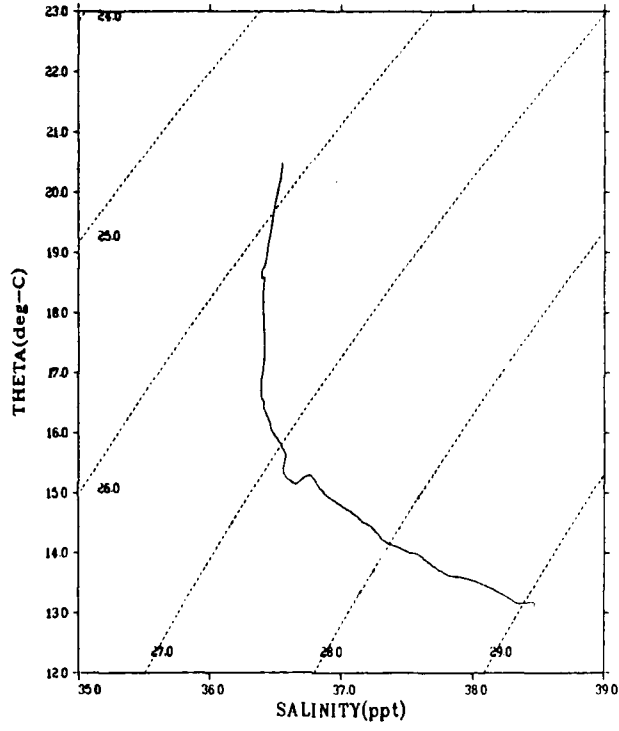


CRUISE 131182
 STATION 208142
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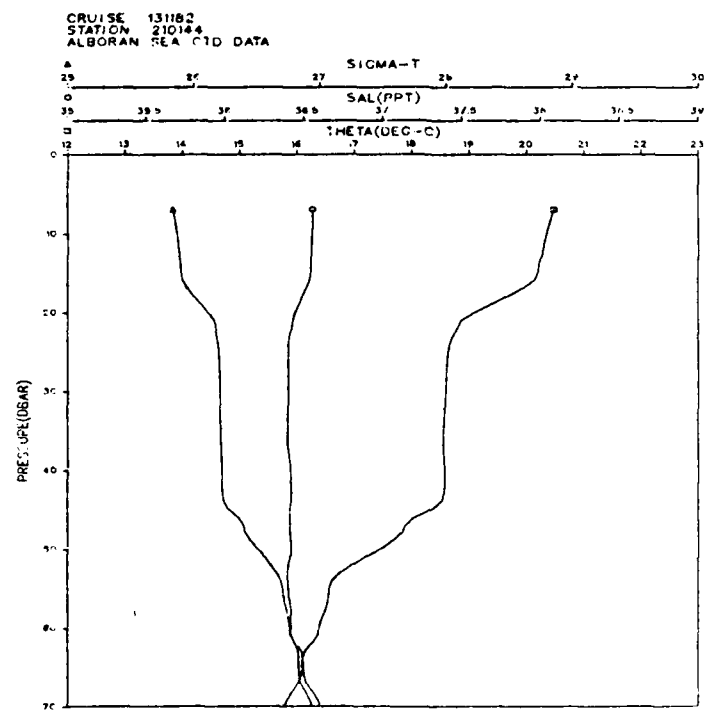
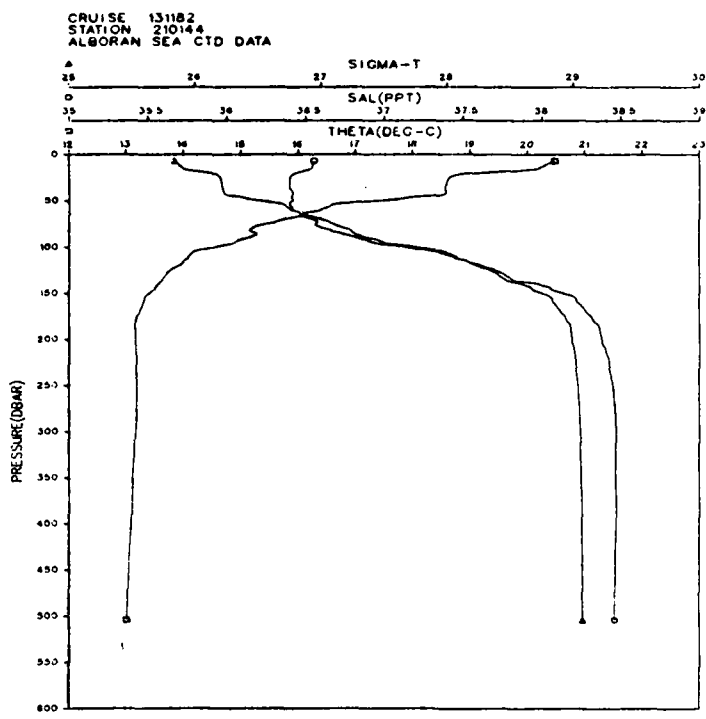


Figures 38c and 38d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 210144

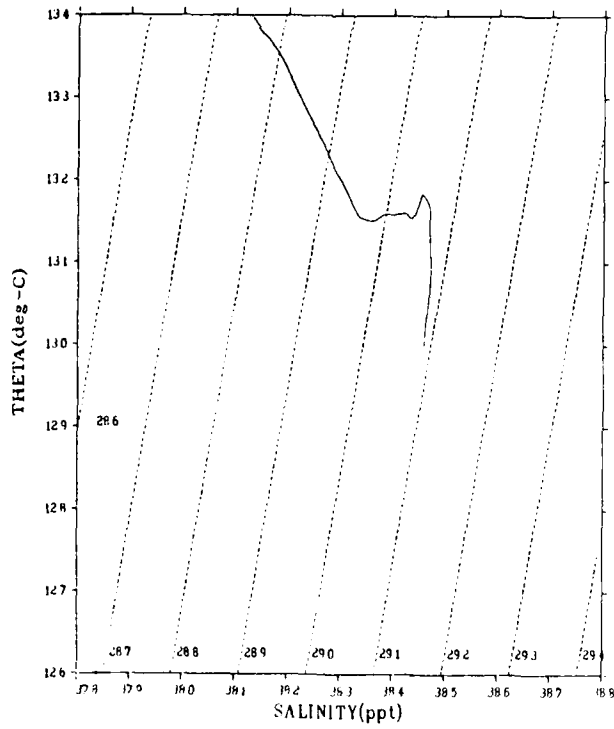
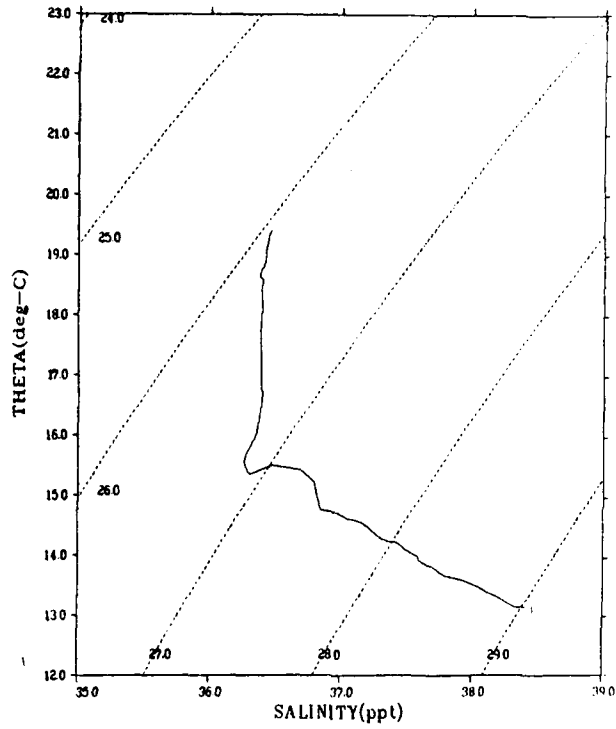


Figures 39a and 39b



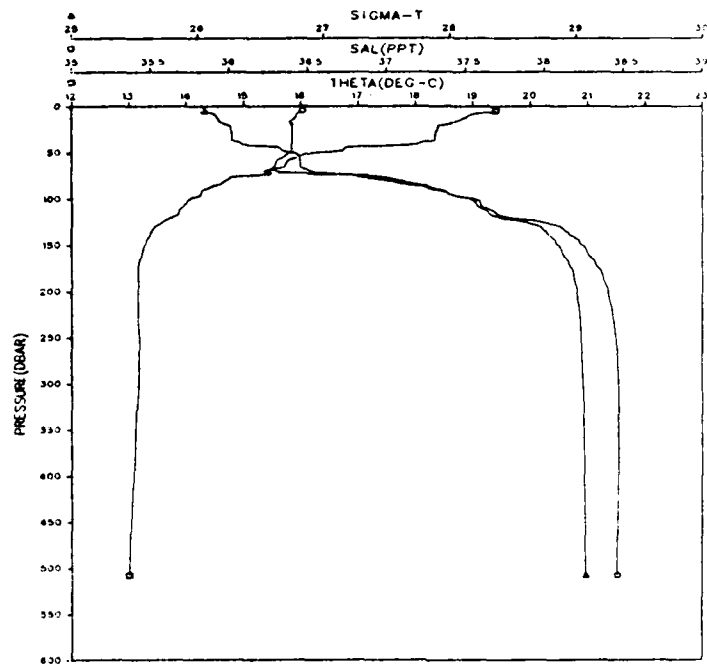
Figures 39c and 39d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 212146

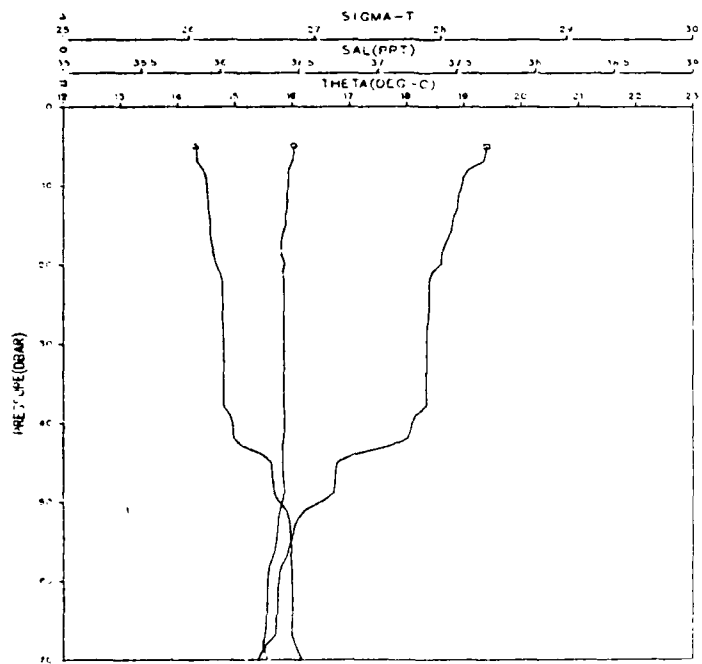


Figures 40a and 40b

CRUISE 131182
 STATION 212146
 ALBORAN SEA CTD DATA

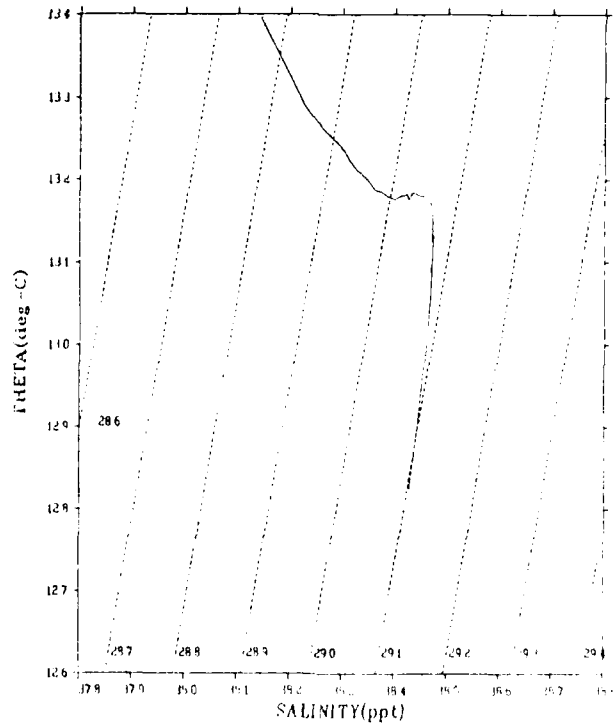
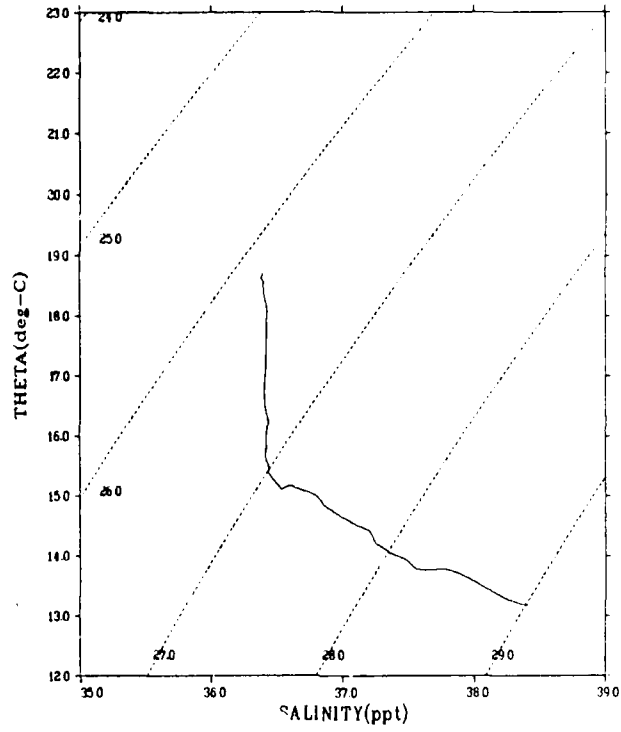


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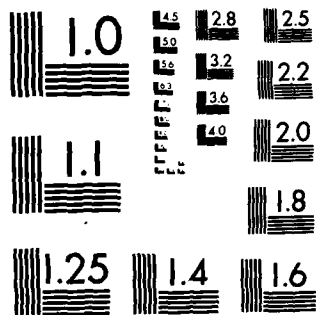


Figures 40c and 40d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 214148

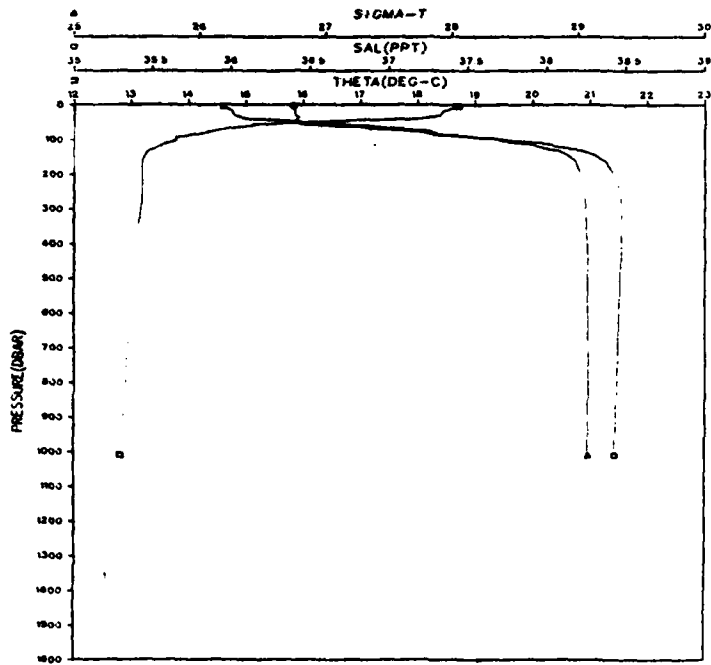


Figures 41a and 41b

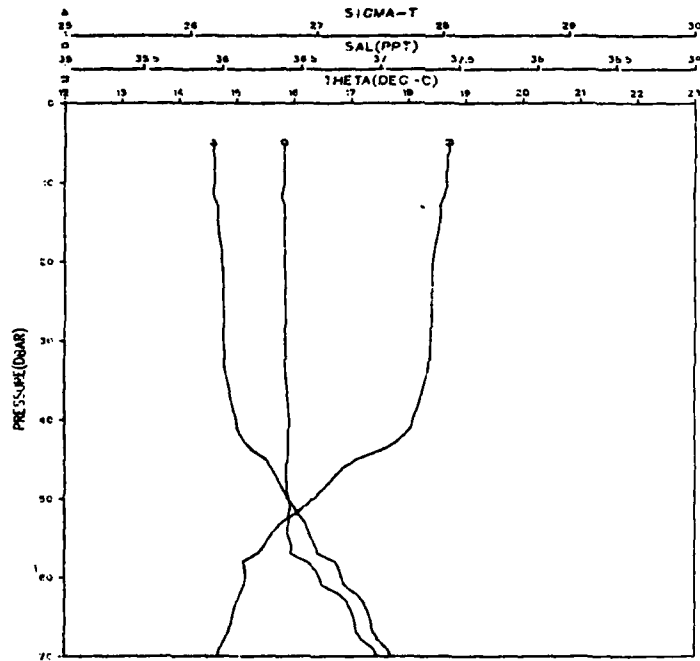


MICROCOPY RESOLUTION TEST CHART
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CRUISE 131182
 STATION 214148
 ALBORAN SEA CTD DATA

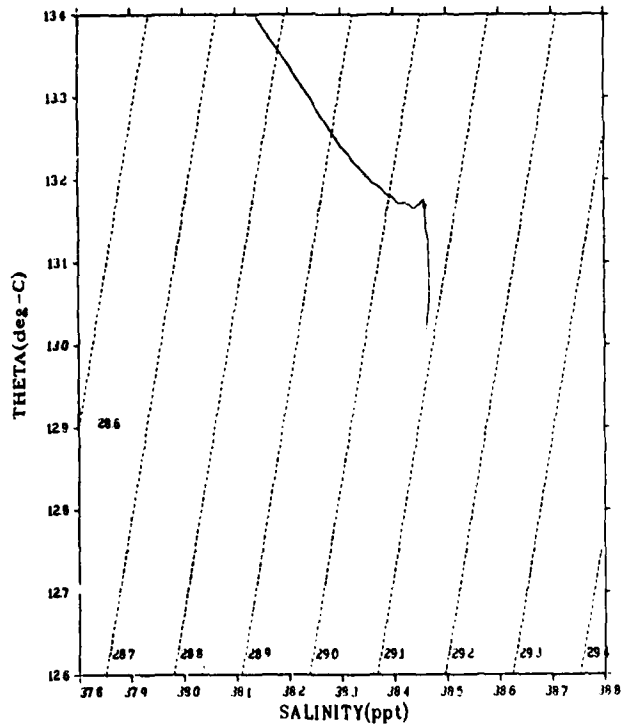
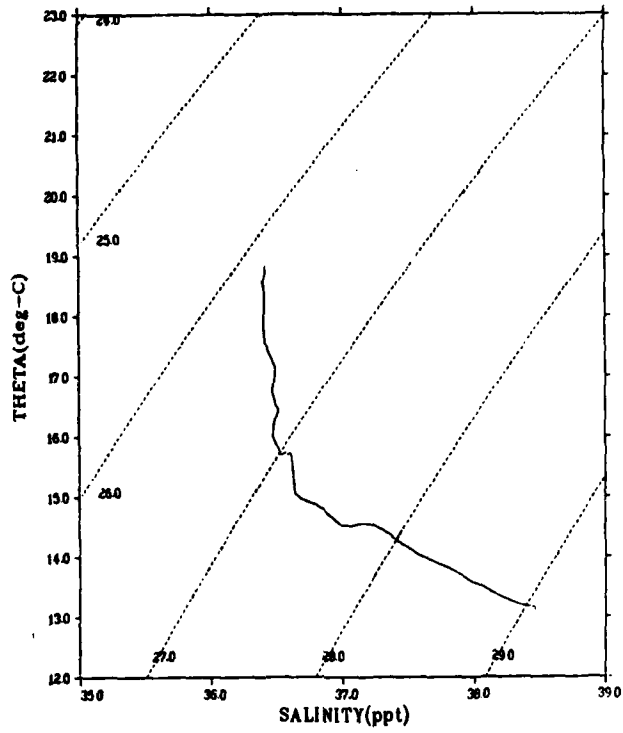


CRUISE 131182
 STATION 214148
 ALBORAN SEA CTD DATA

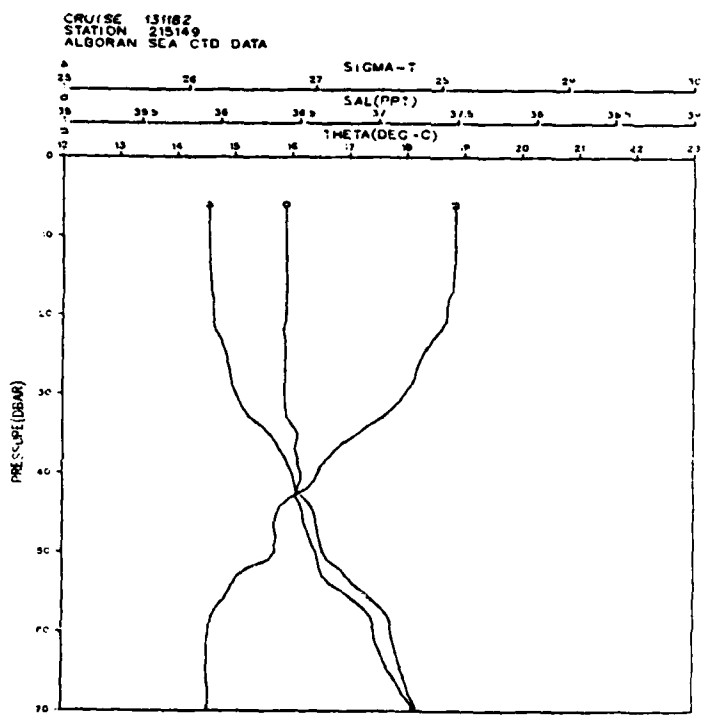
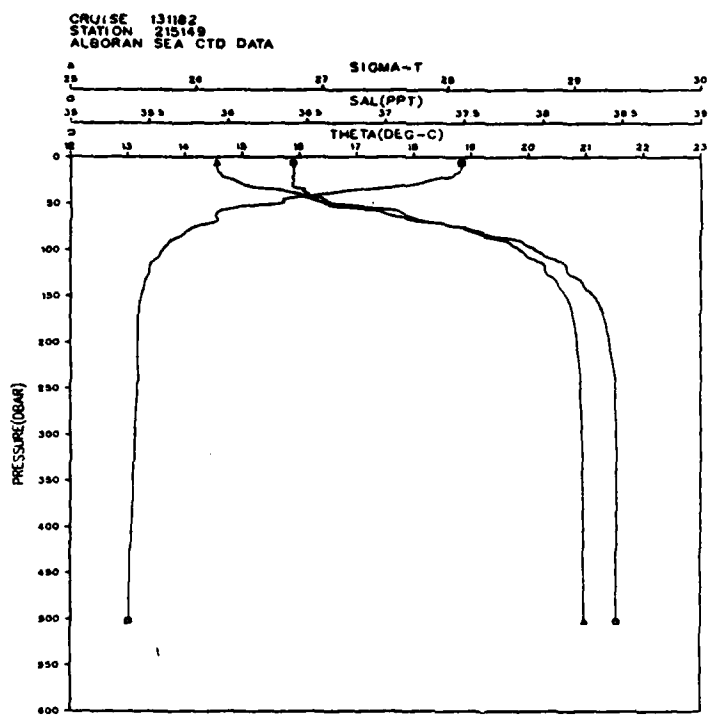


Figures 41c and 41d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 215149

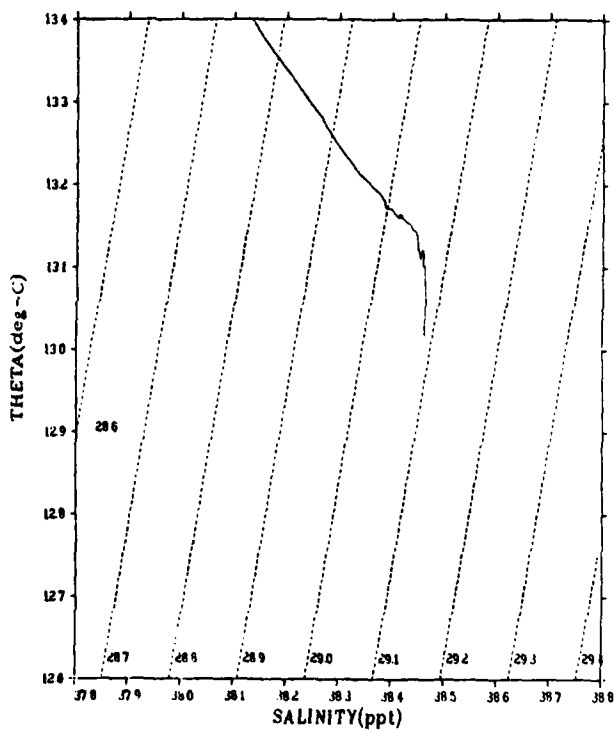
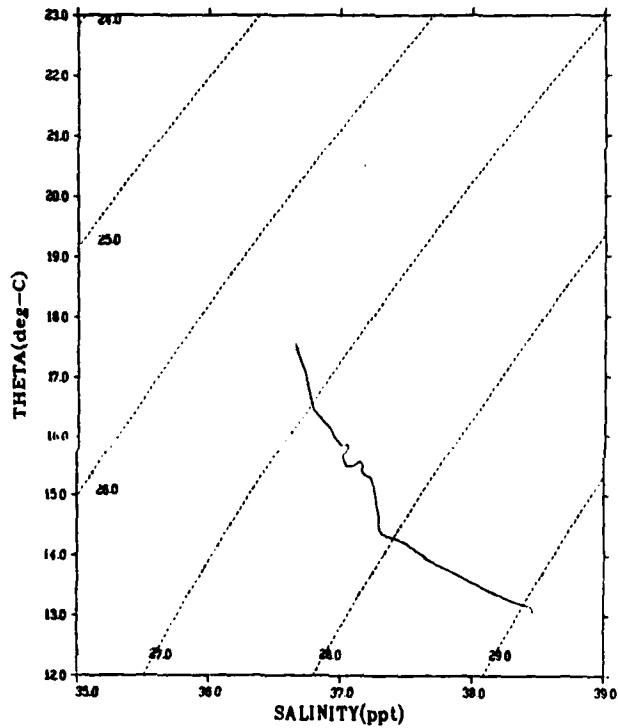


Figures 42a and 42b

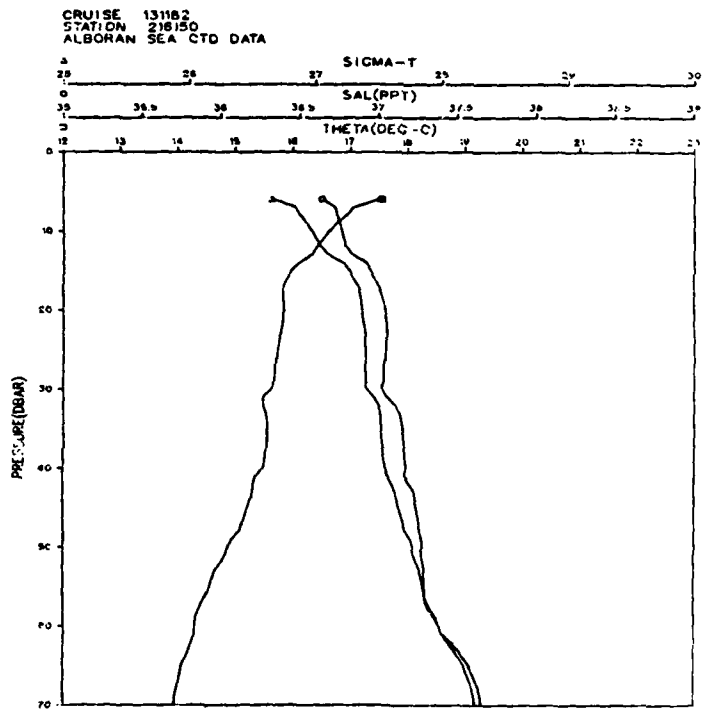
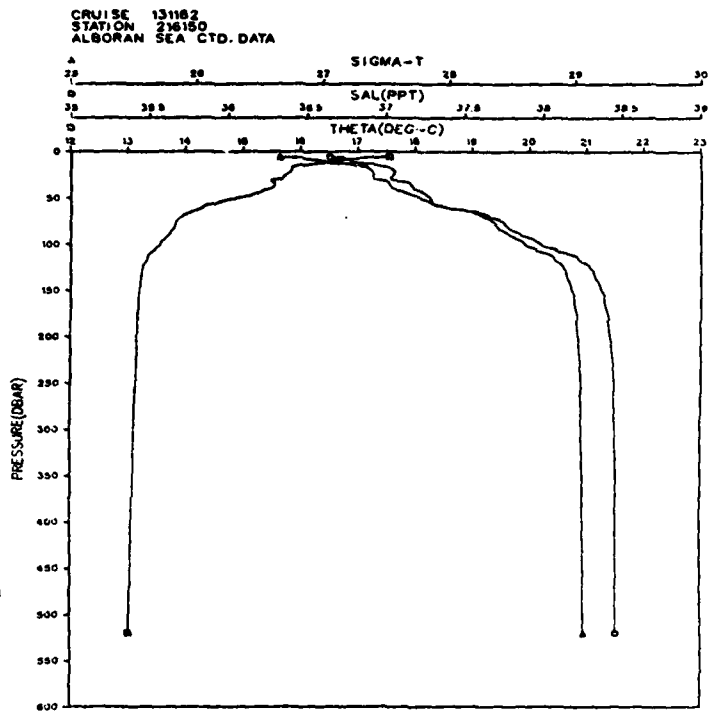


Figures 42c and 42d

ALBORAN SEA CTD DATA
 CRUISE 131182 STATION 216150

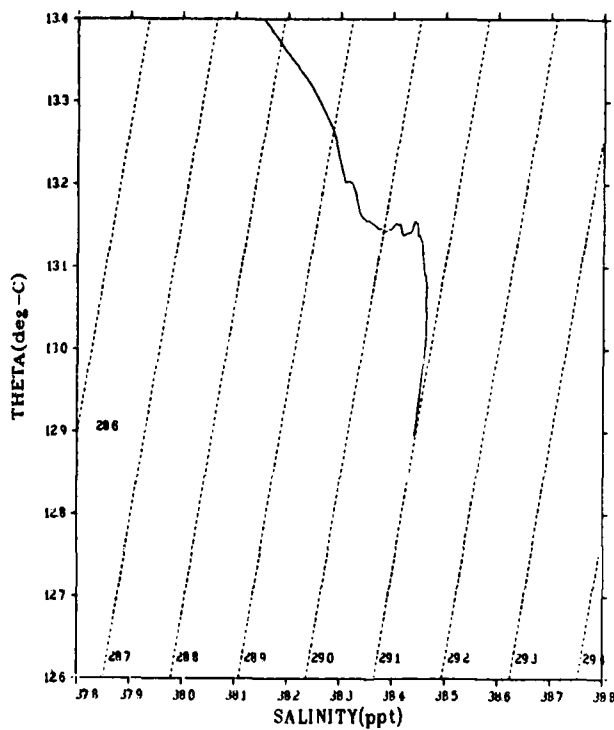
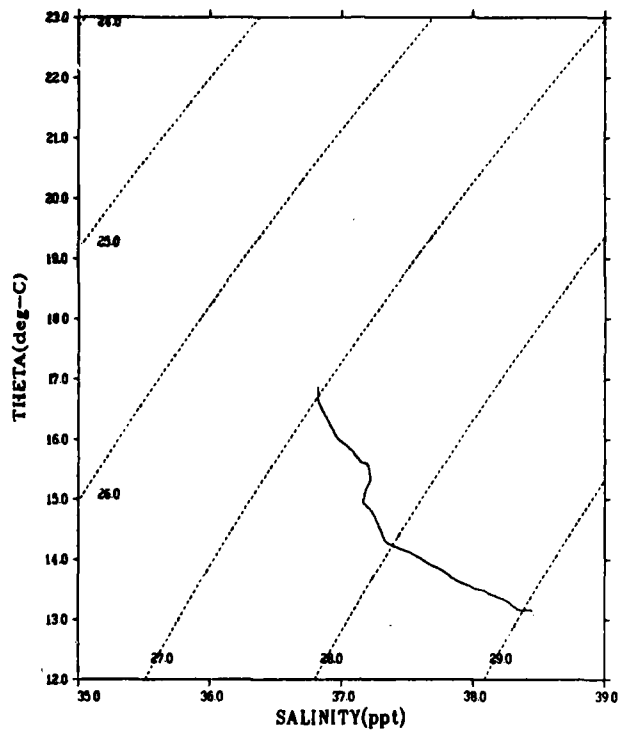


Figures 43a and 43b

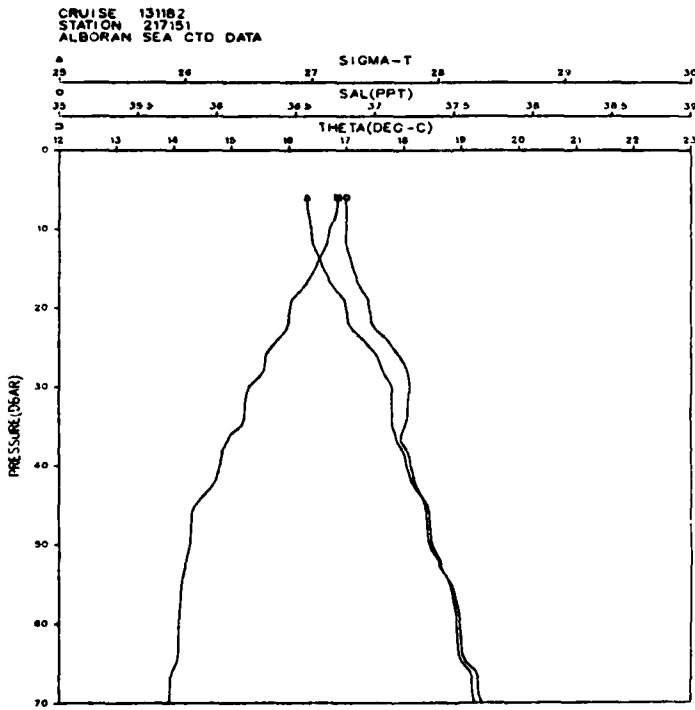
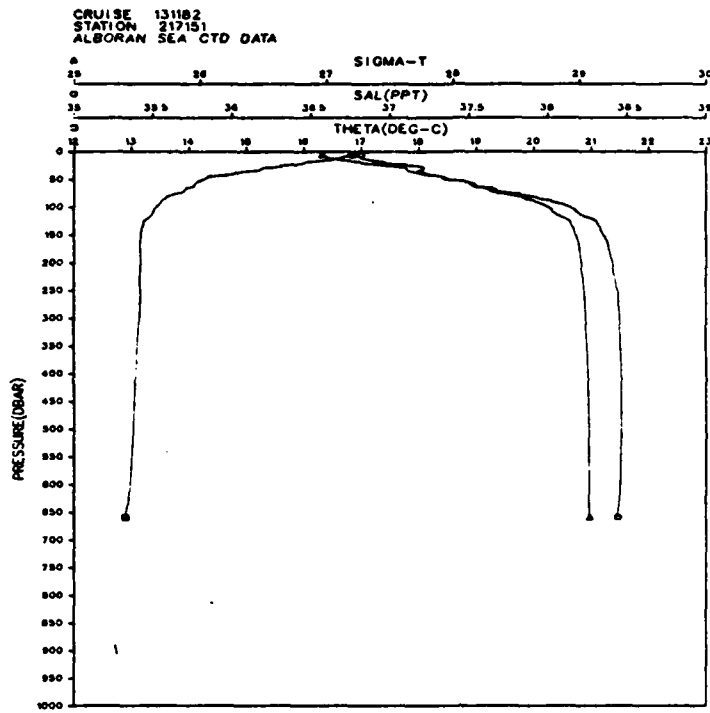


Figures 43c and 43d

ALBORAN SEA CTD DATA
 CRUISE 131182 STATION 217151

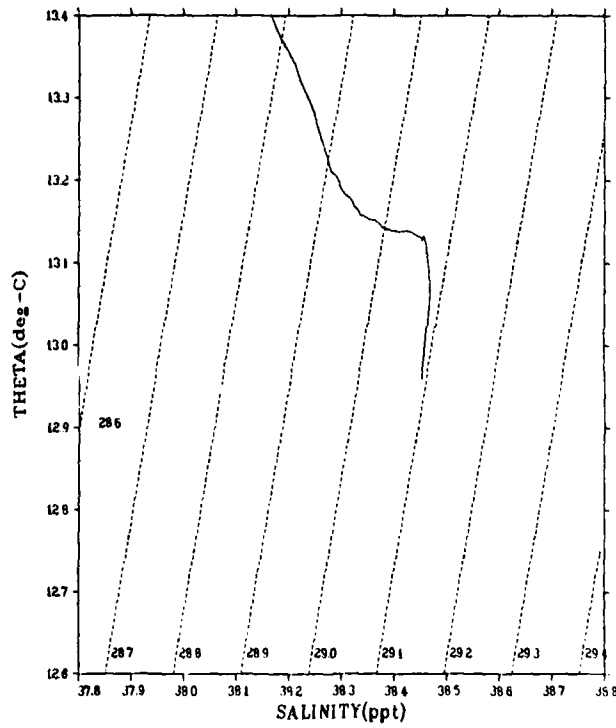
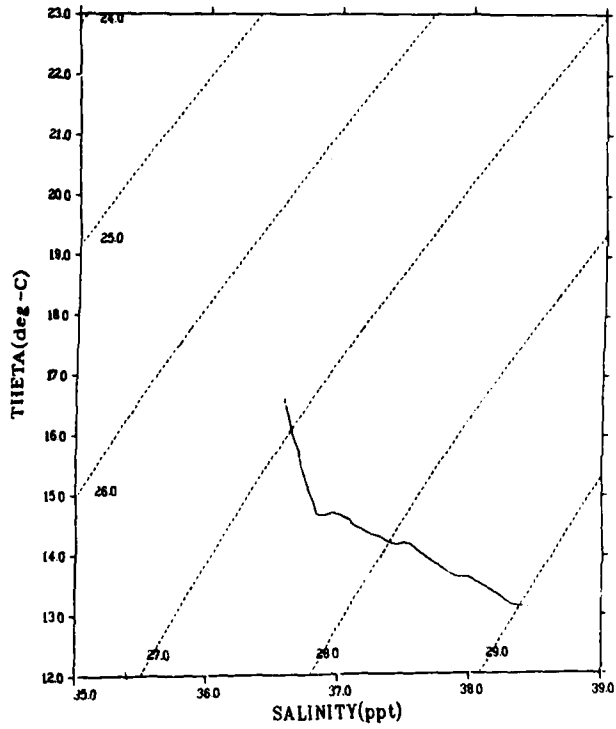


Figures 44a and 44b



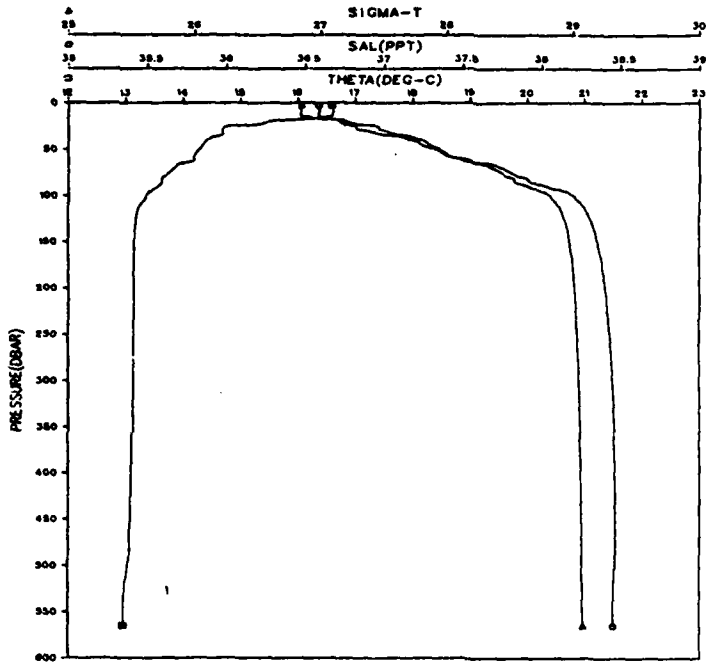
Figures 44c and 44d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 218152

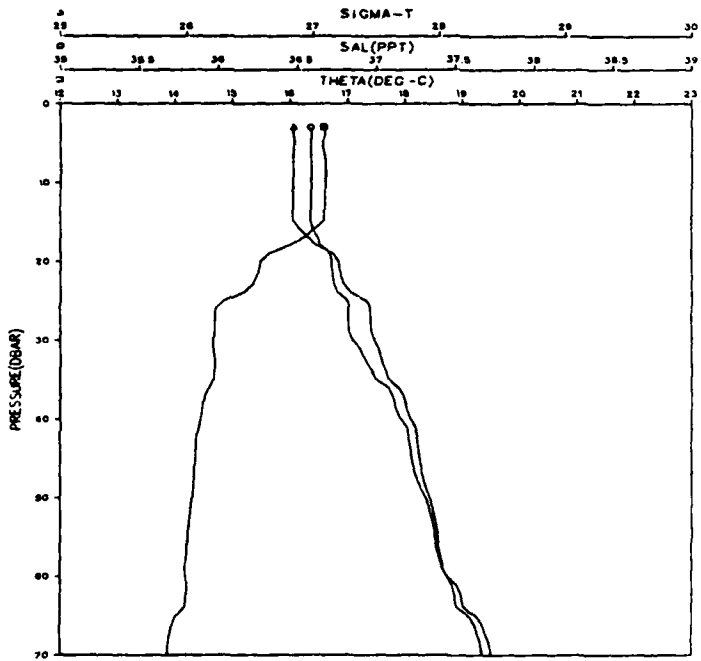


Figures 45a and 45b

CRUISE 131182
STATION 218152
ALBORAN SEA CTD DATA

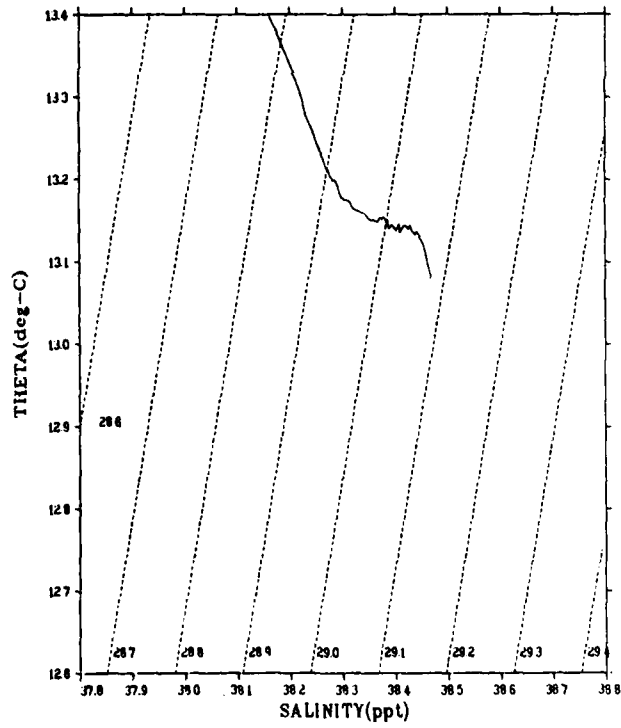
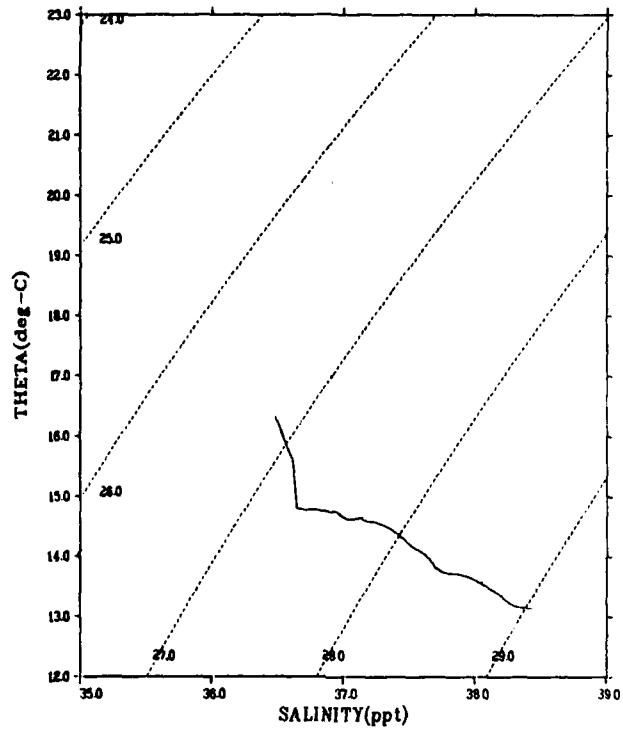


CRUISE 131182
STATION 218152
ALBORAN SEA CTD DATA



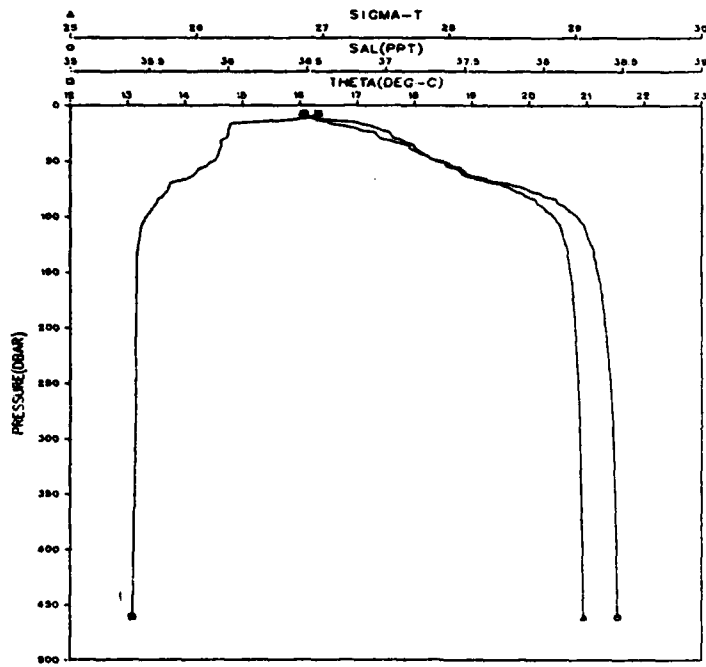
Figures 45c and 45d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 219153

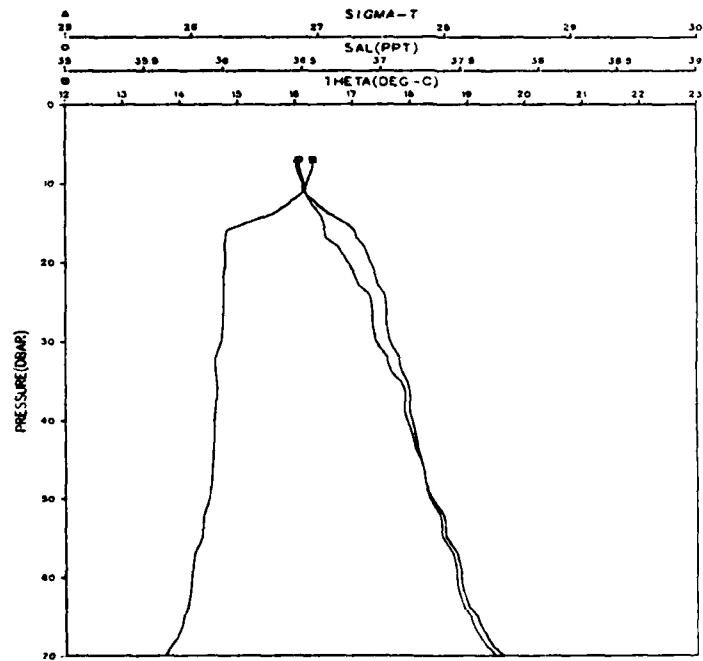


Figures 46a and 46b

CRUISE 131182
STATION 219153
ALBORAN SEA CTD DATA

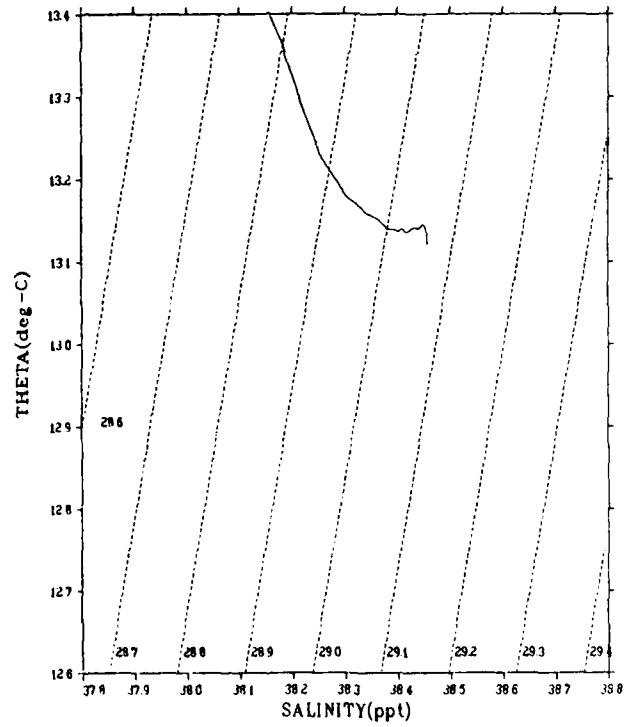
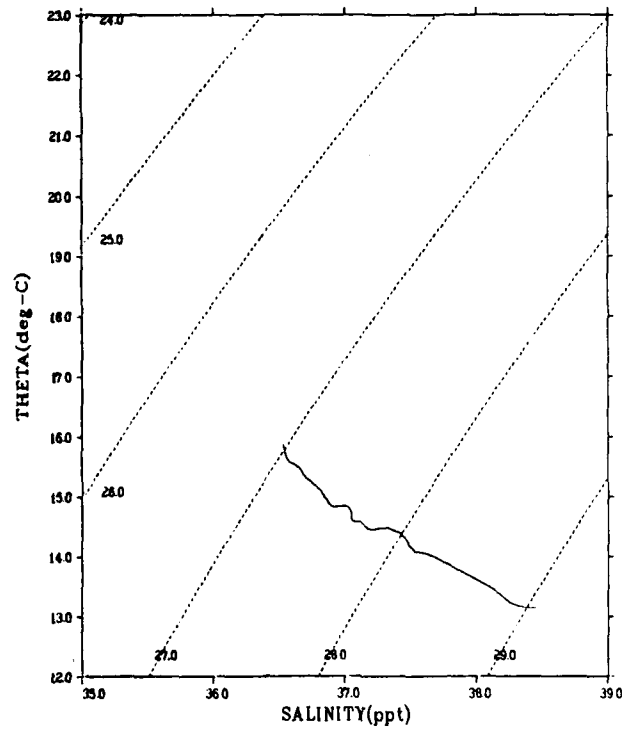


CRUISE 131182
STATION 219153
ALBORAN SEA CTD DATA



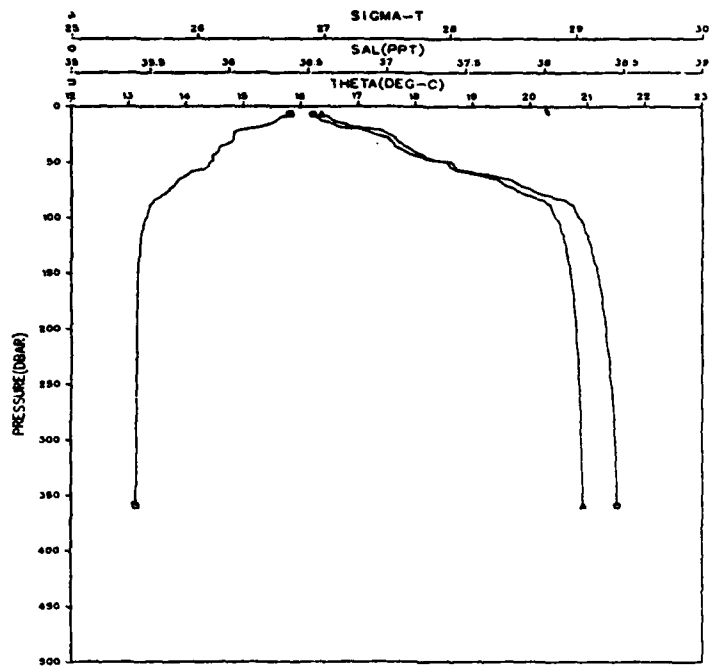
Figures 46c and 46d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 220154

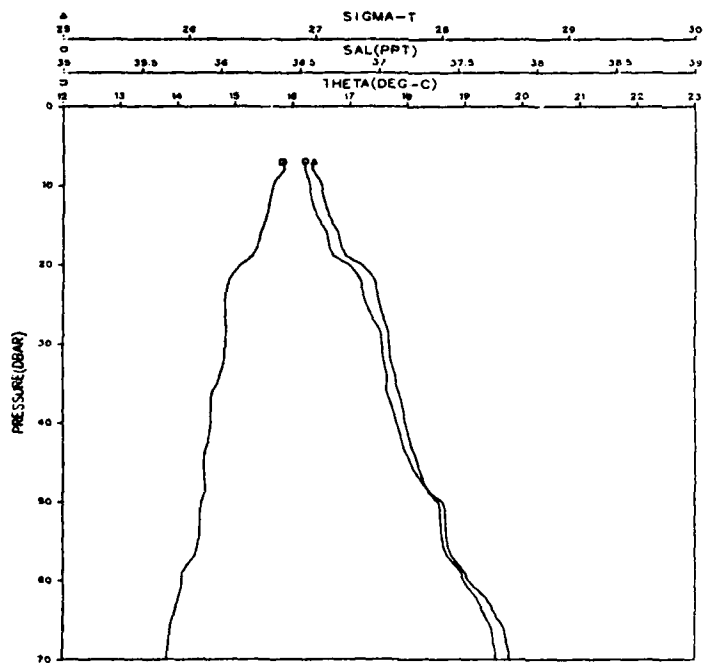


Figures 47a and 47b

CRUISE 13182
STATION 220154
ALBORAN SEA CTD DATA

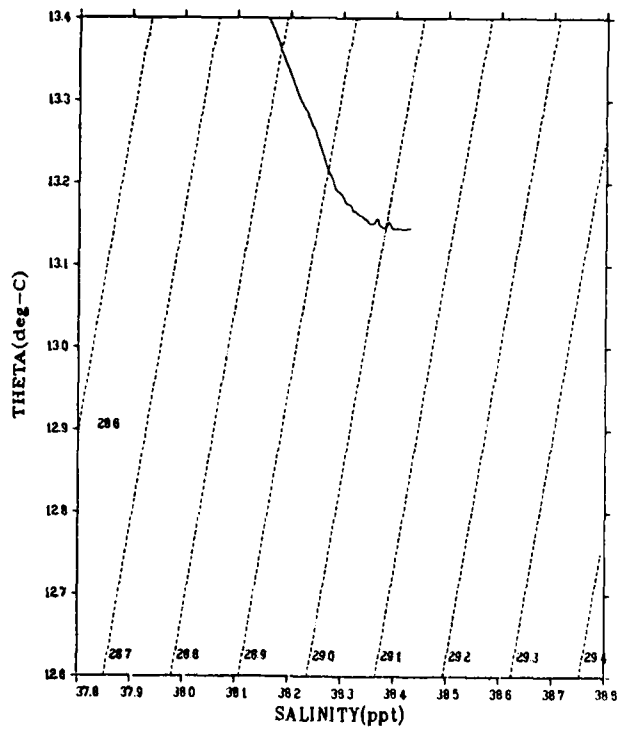
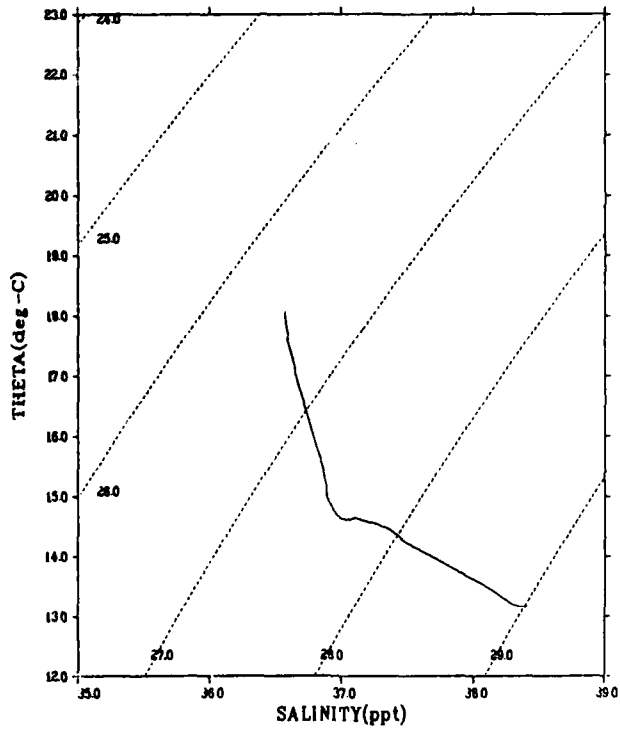


CRUISE 13182
STATION 220154
ALBORAN SEA CTD DATA



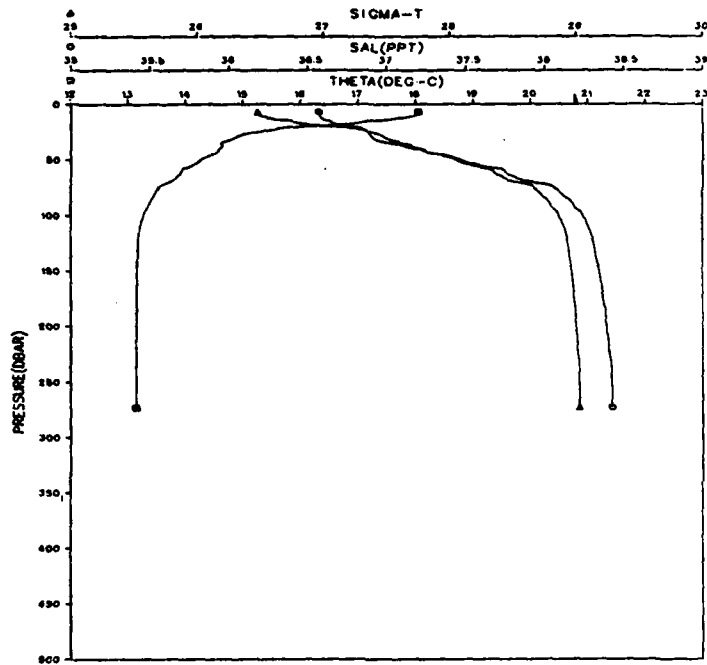
Figures 47c and 47d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 221155

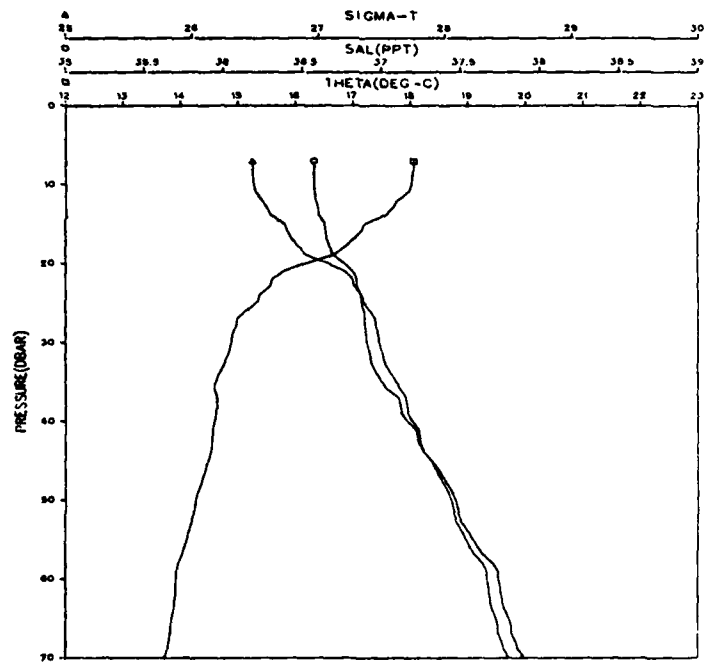


Figures 48a and 48b

CRUISE 131182
STATION 221155
ALBORAN SEA CTD DATA

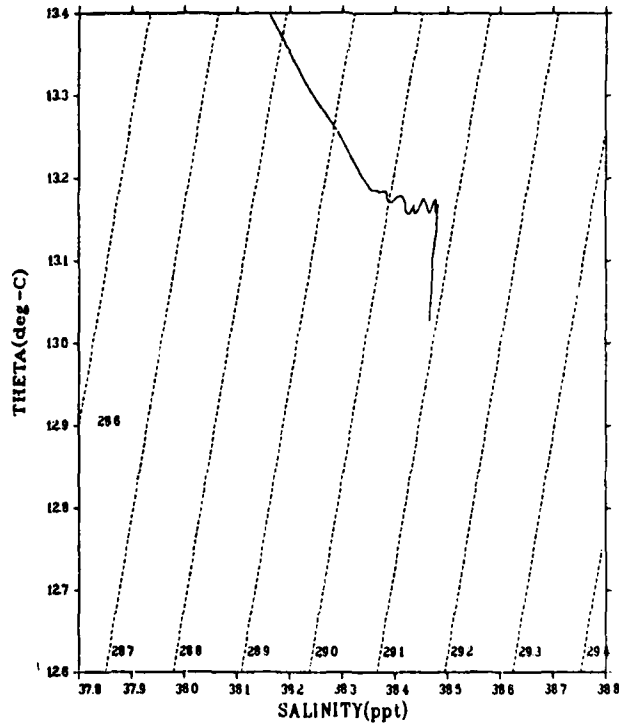
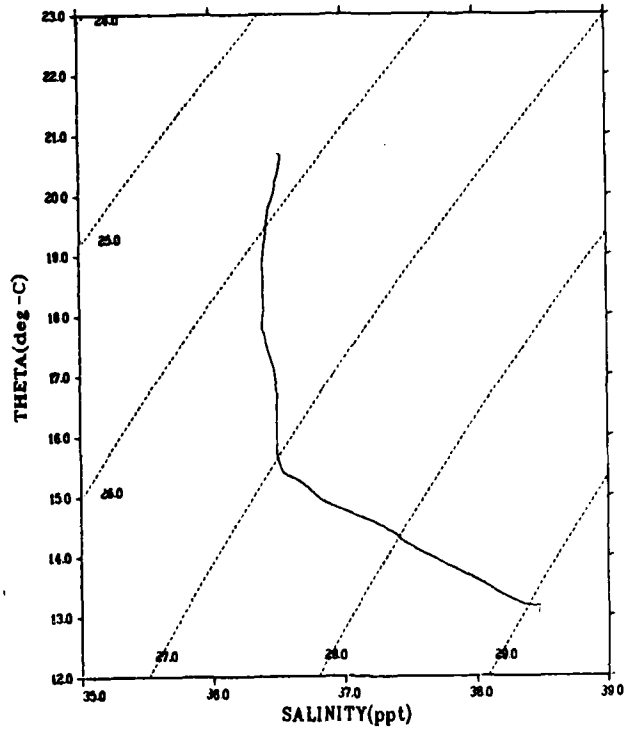


CRUISE 131182
STATION 221155
ALBORAN SEA CTD DATA

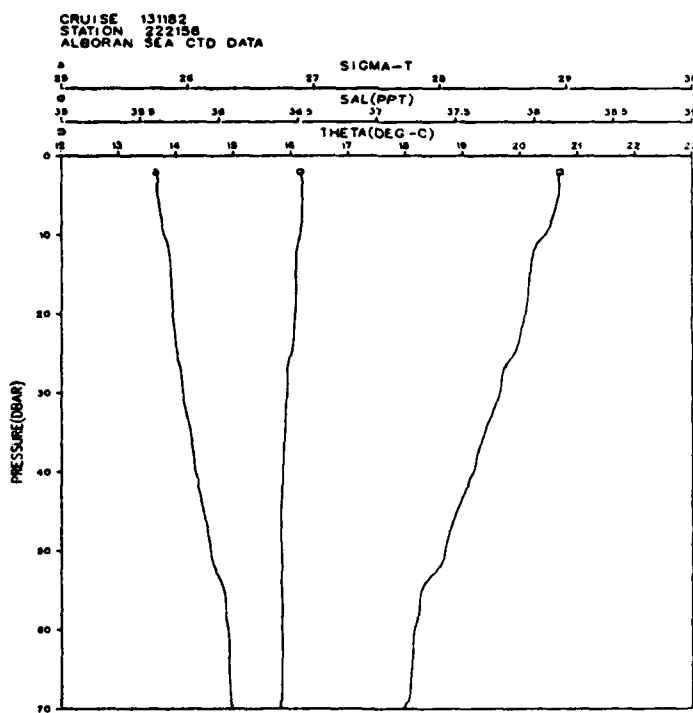
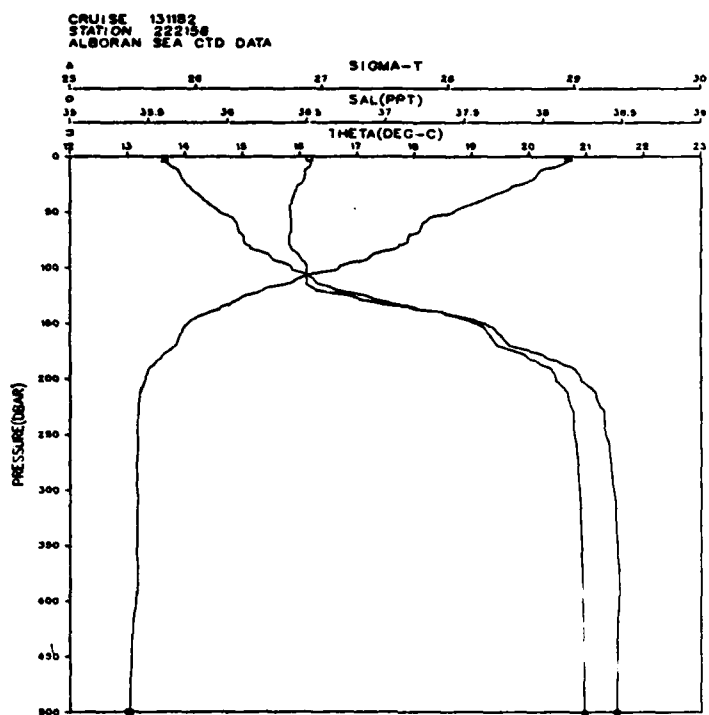


Figures 48c and 48d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 222156

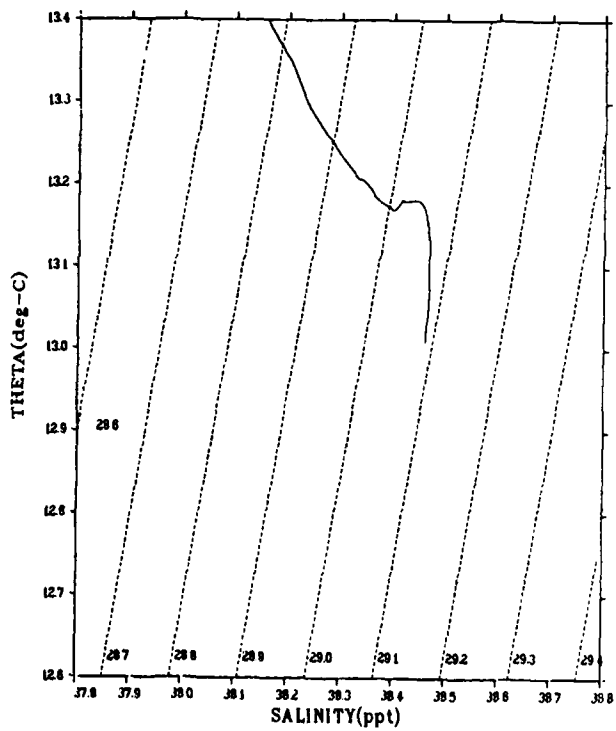
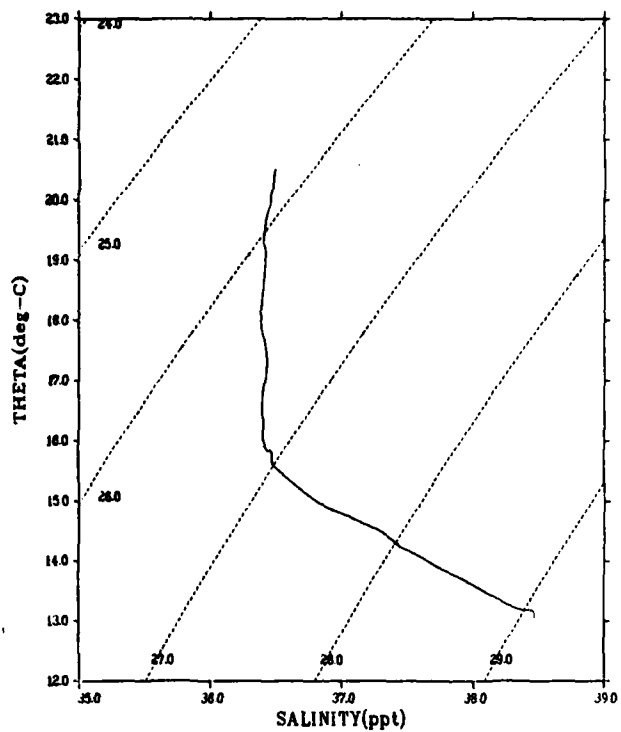


Figures 49a and 49b



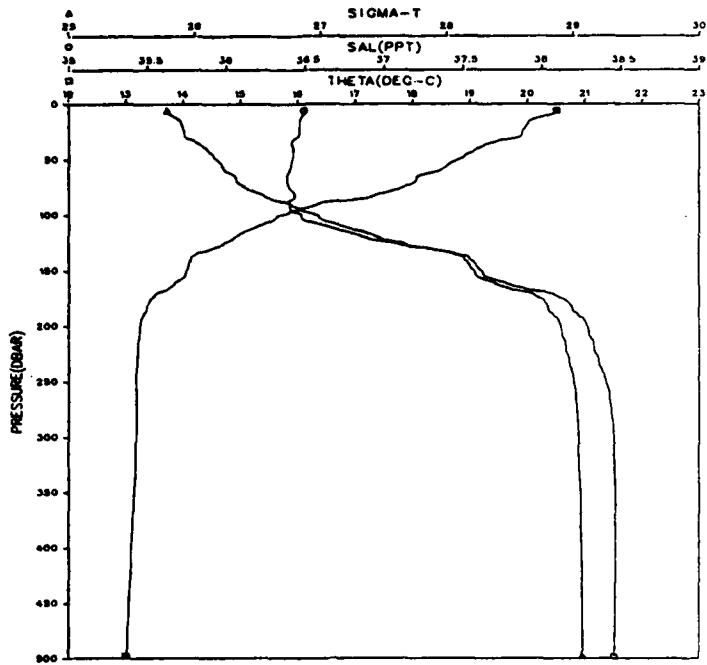
Figures 49c and 49d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 224158

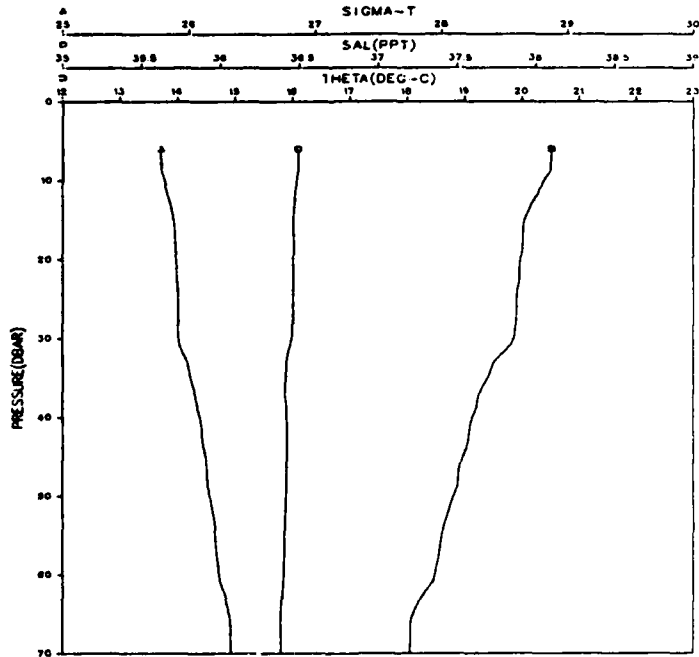


Figures 50a and 50b

CRUISE 13182
STATION 224158
ALBORAN SEA CTD DATA

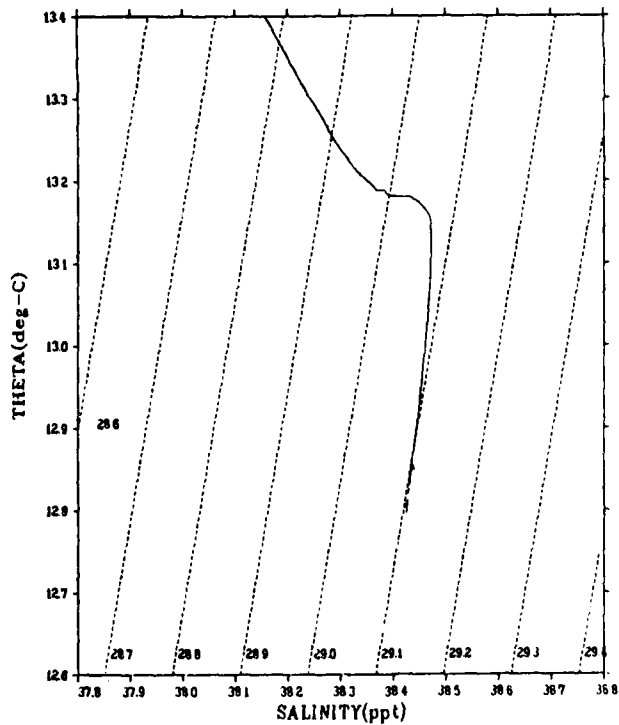
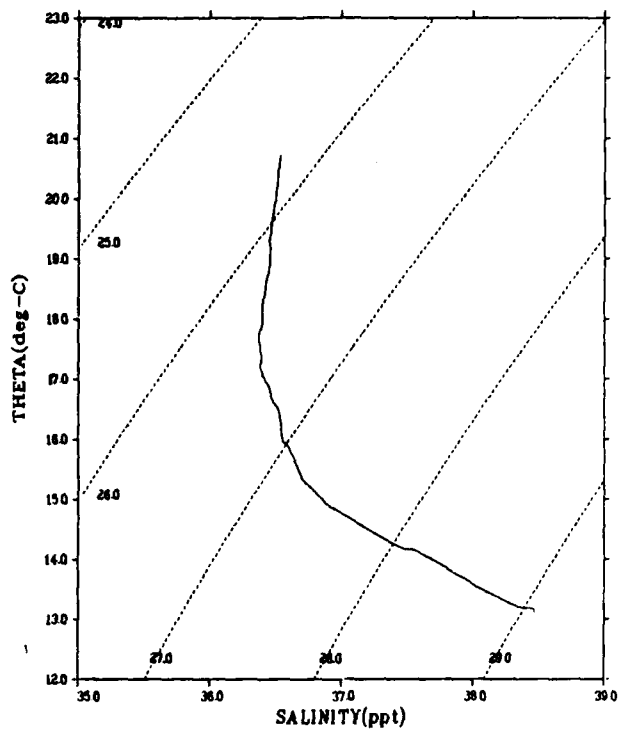


CRUISE 13182
STATION 224158
ALBORAN SEA CTD DATA

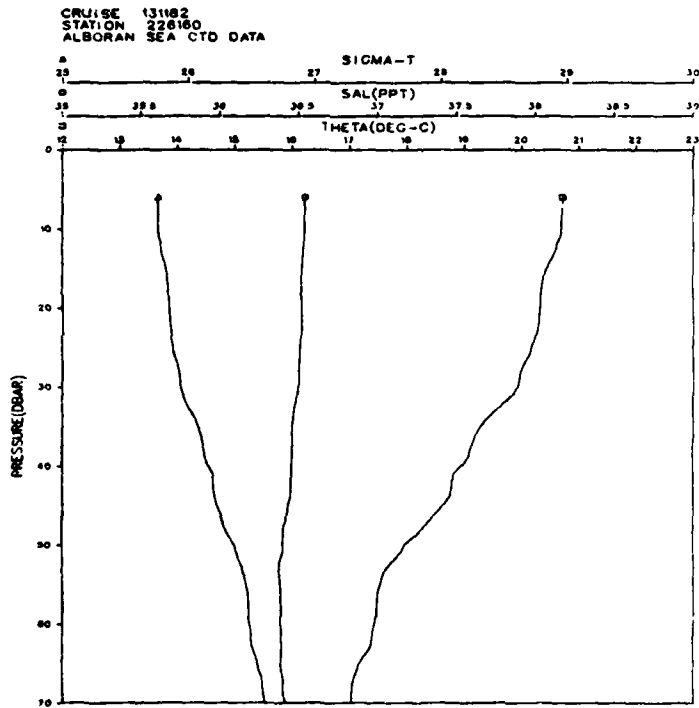
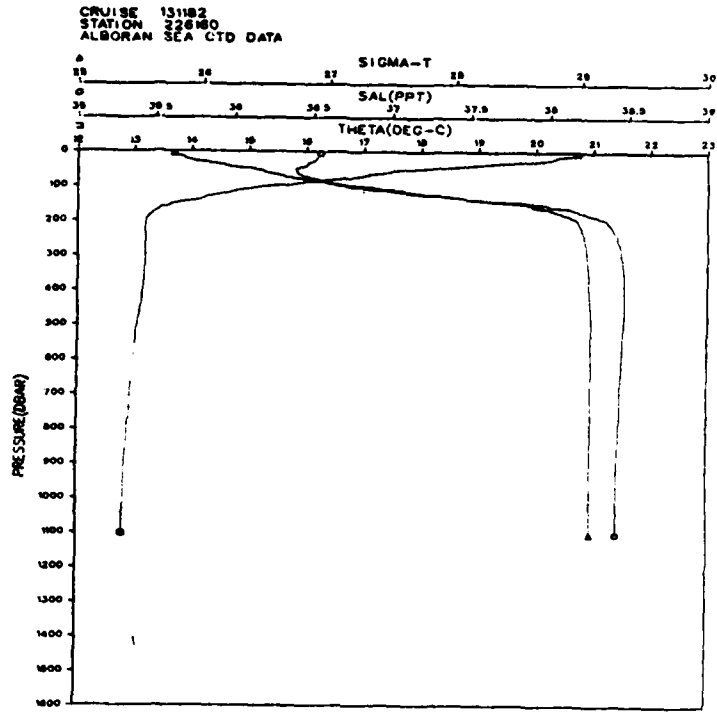


Figures 50c and 50d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 226160

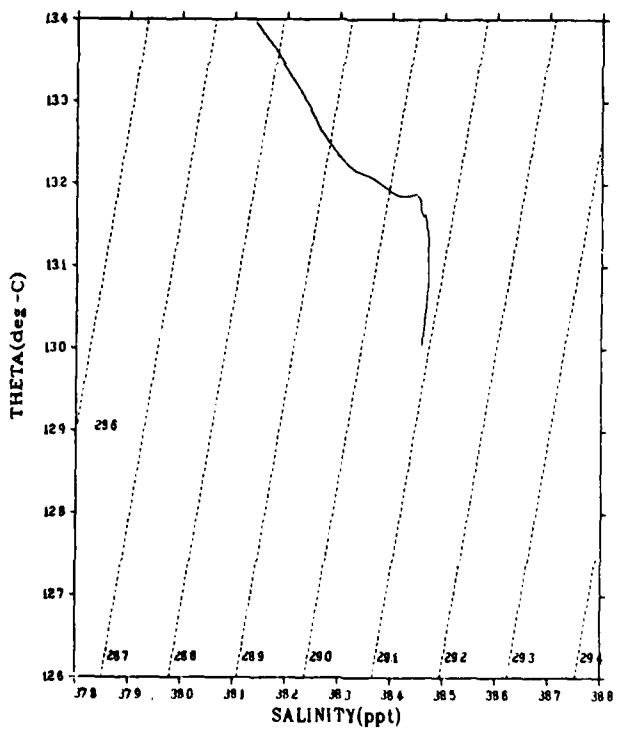
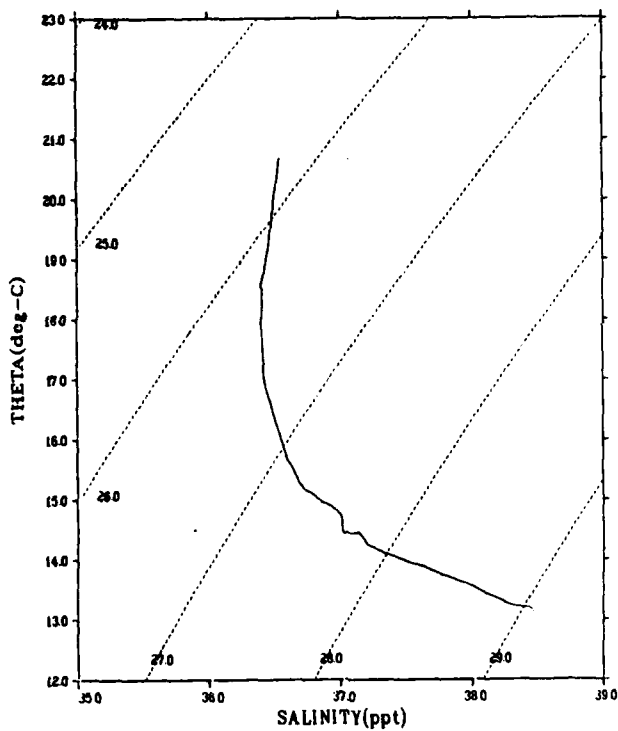


Figures 51a and 51b



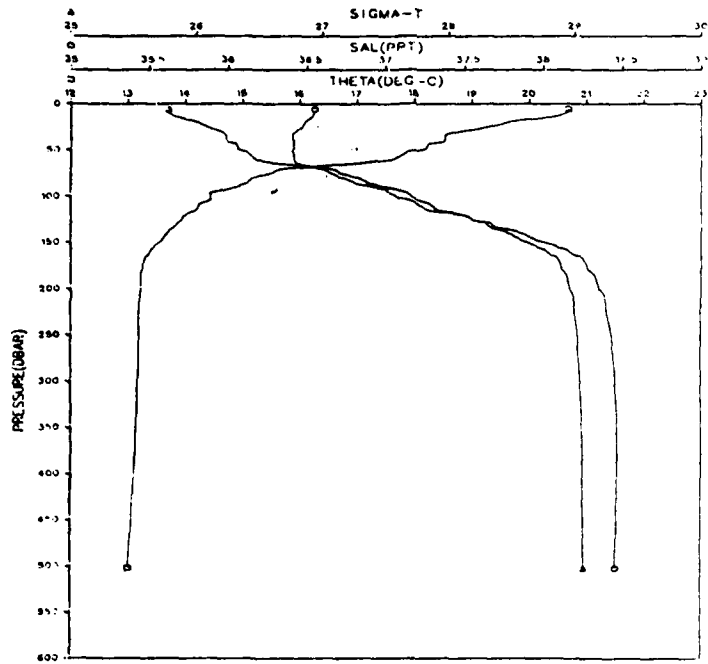
Figures 51c and 51d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 230164

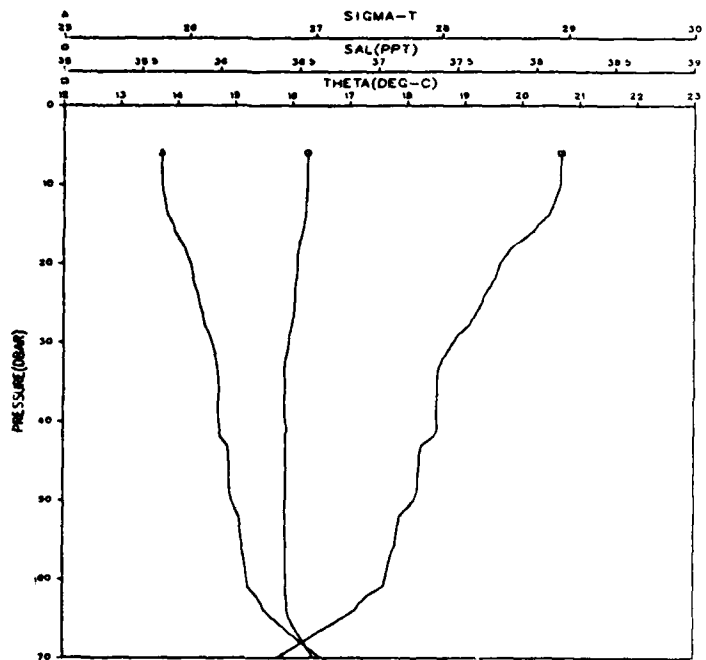


Figures 52a and 52b

CRUISE 131182
STATION 230184
ALBORAN SEA CTD DATA

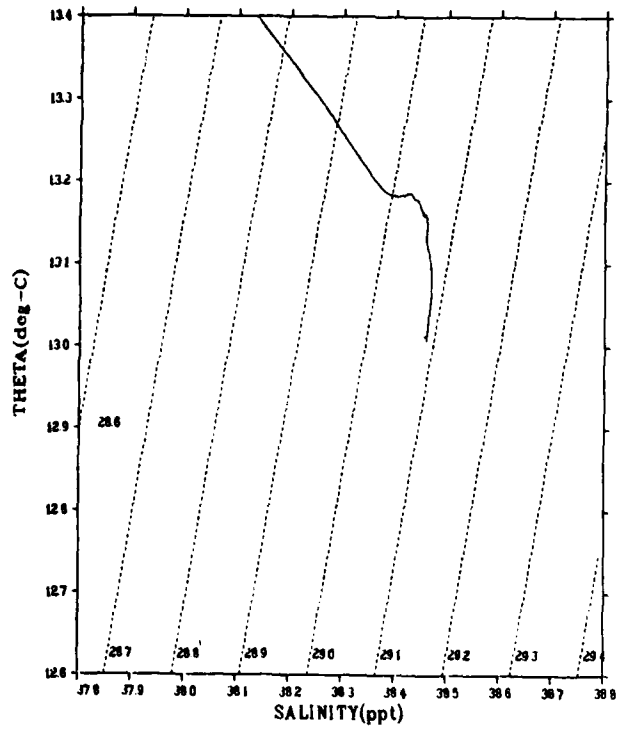
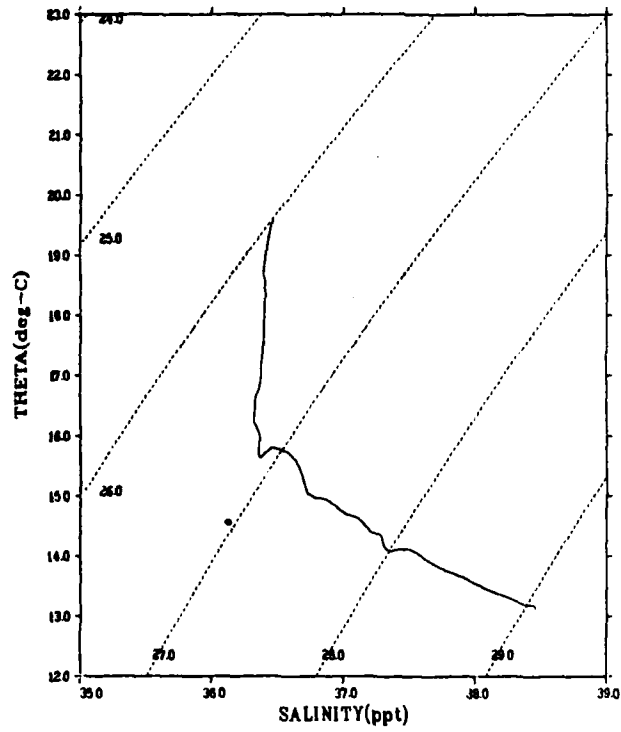


CRUISE 131182
STATION 230184
ALBORAN SEA CTD DATA

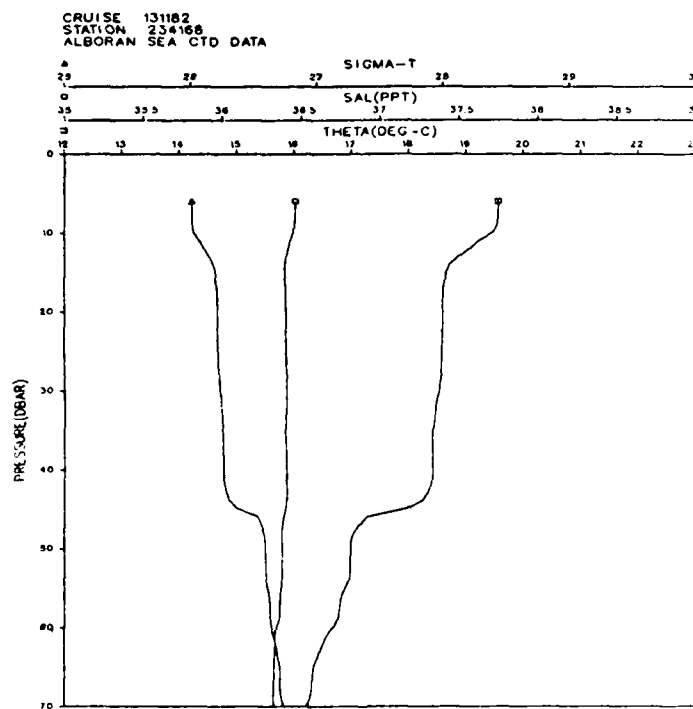
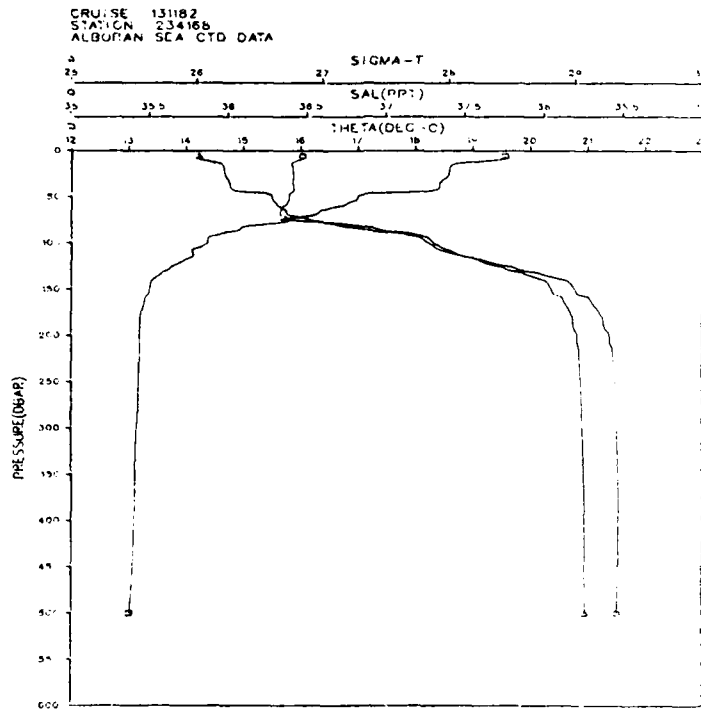


Figures 52c and 52d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 234168

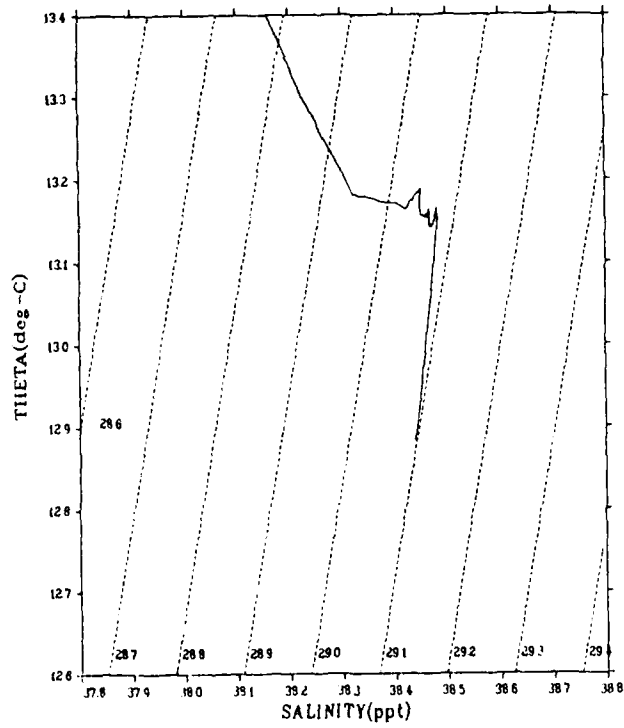
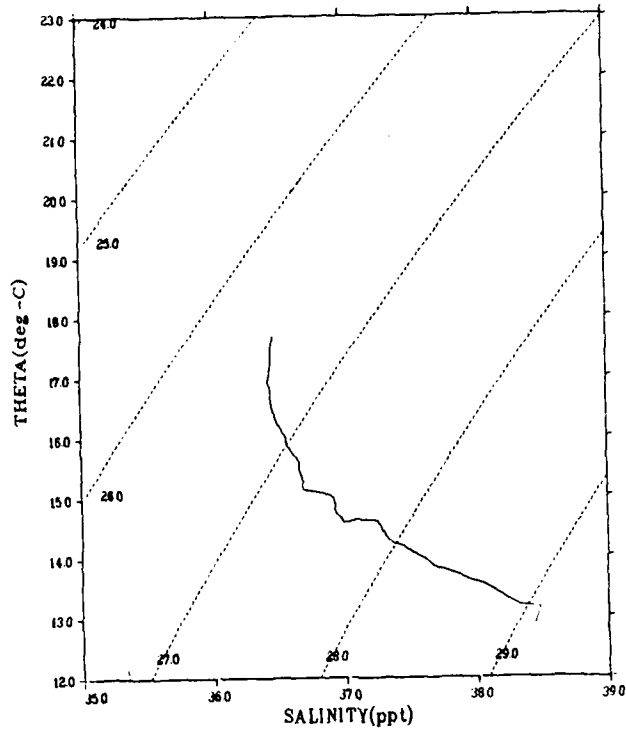


Figures 53a and 53b



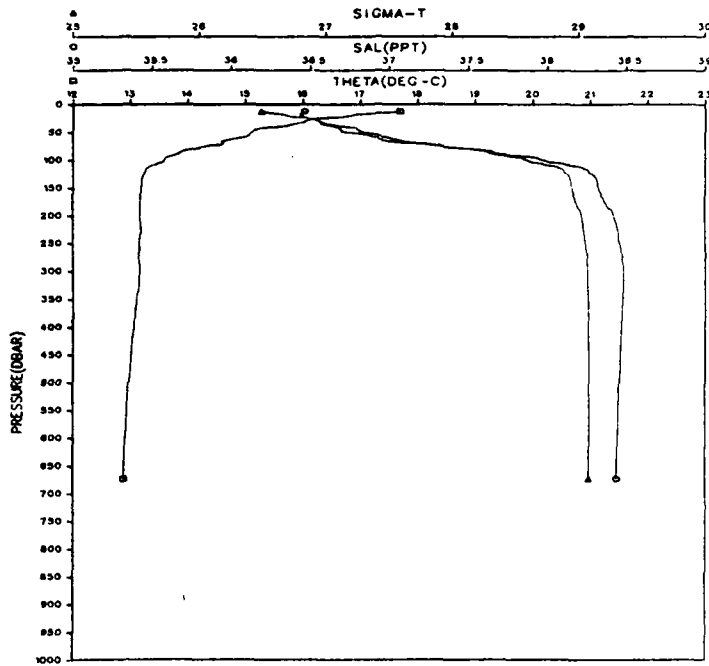
Figures 53c and 53d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 238173

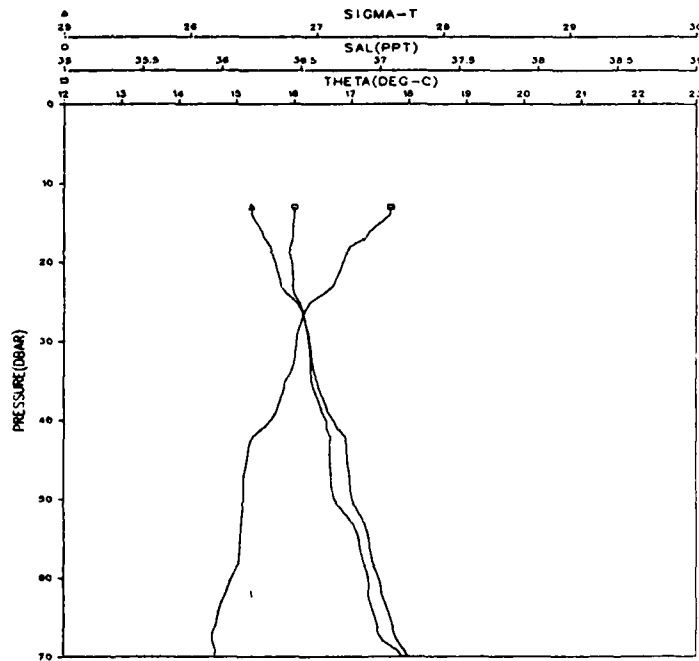


Figures 54a and 54b

CRUISE 131182
 STATION 238173
 ALBORAN SEA CTD DATA

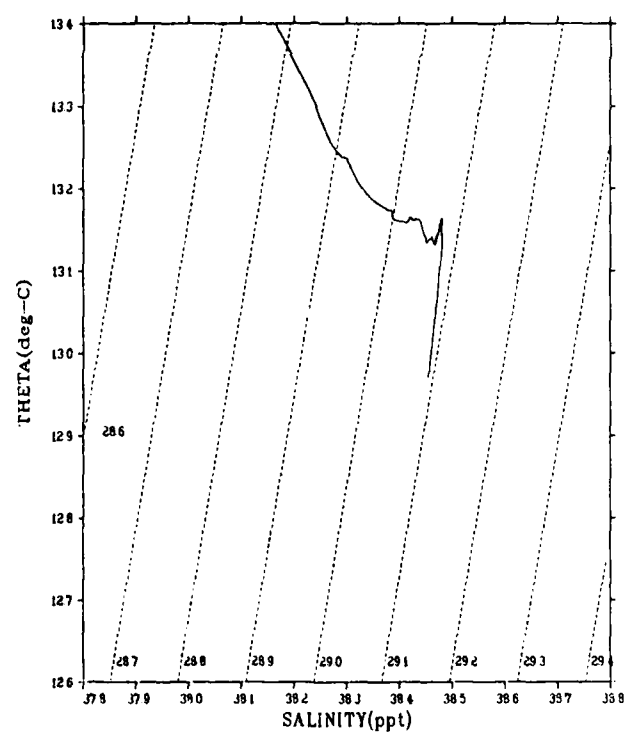
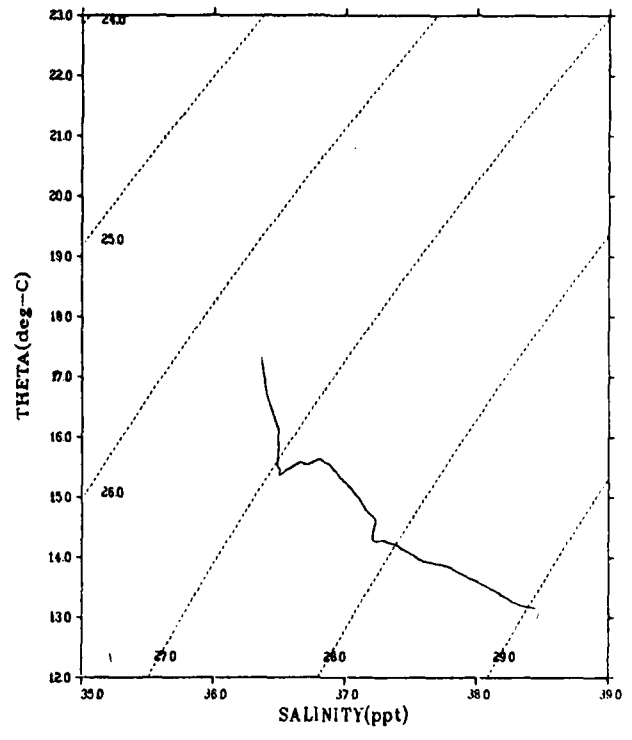


CRUISE 131182
 STATION 238173
 ALBORAN SEA CTD DATA



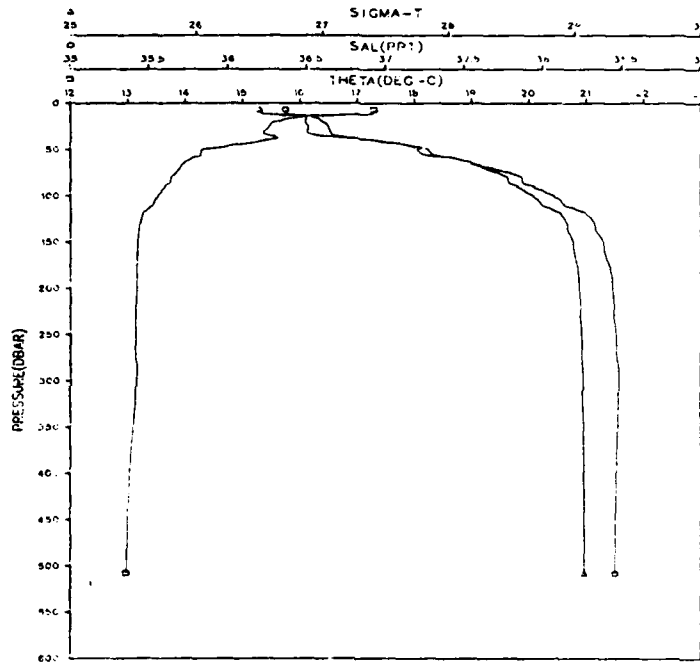
Figures 54c and 54d

ALBORAN SEA CTD DATA
CRUISE 131162 STATION 24277

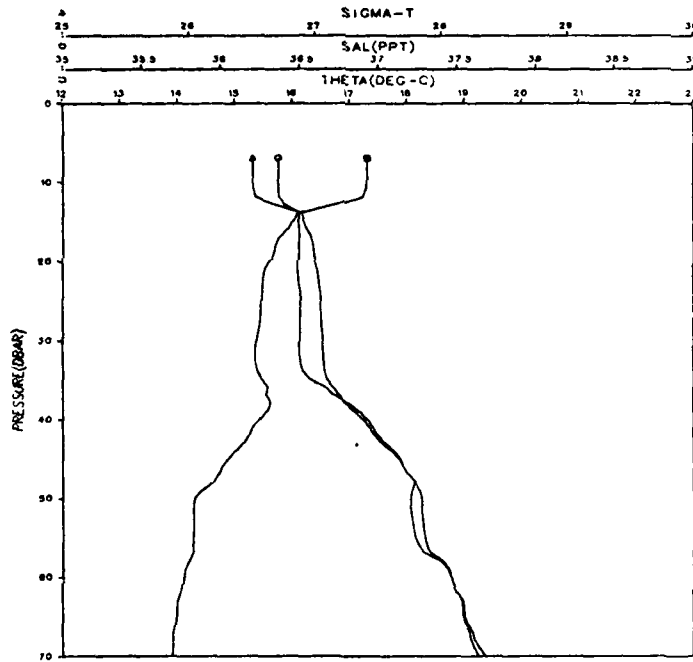


Figures 55a and 55b

CRUISE 131182
 STATION 242177
 ALBORAN SEA CTD DATA

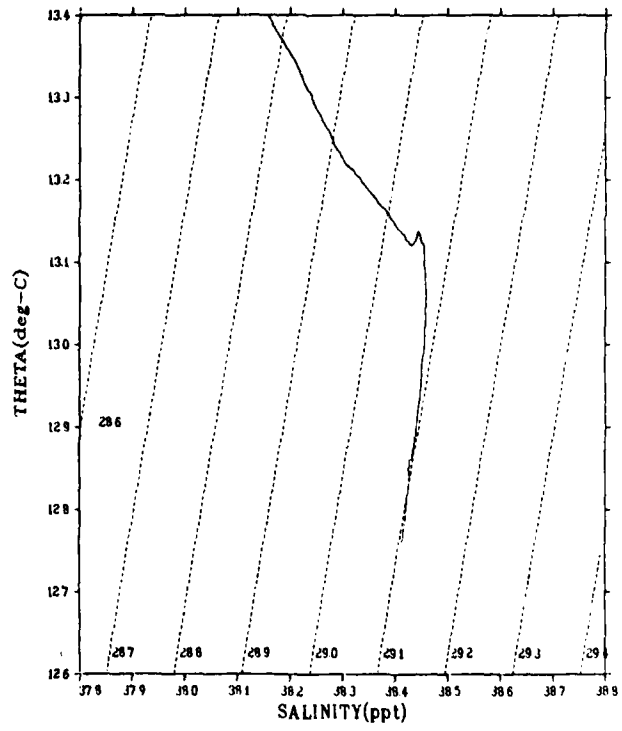
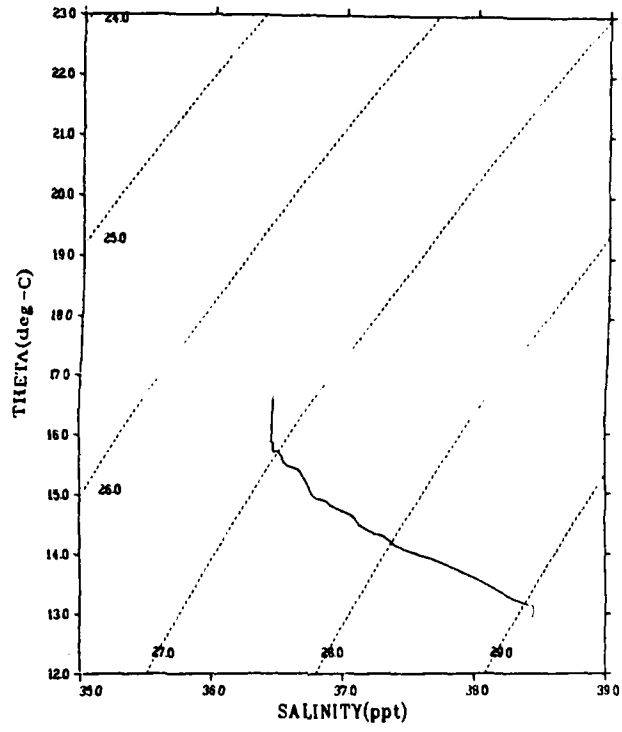


CRUISE 131182
 STATION 242177
 ALBORAN SEA CTD DATA

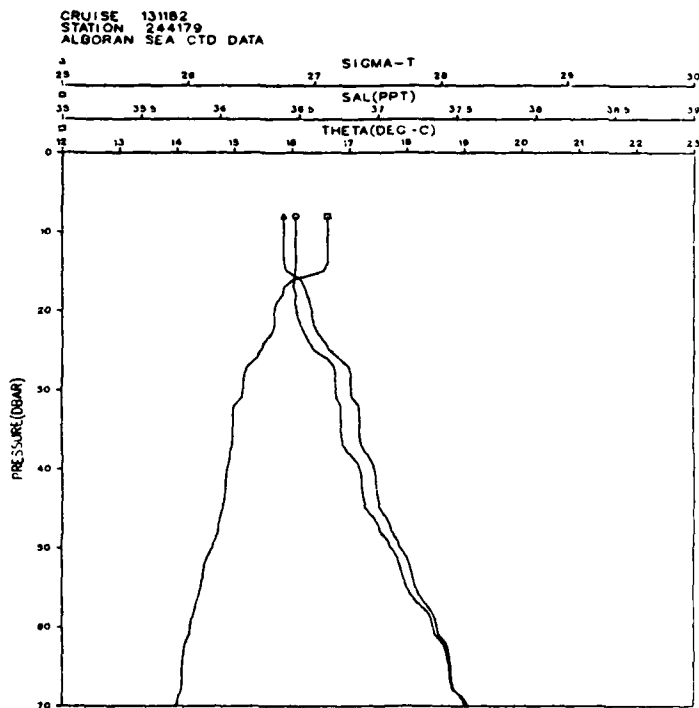
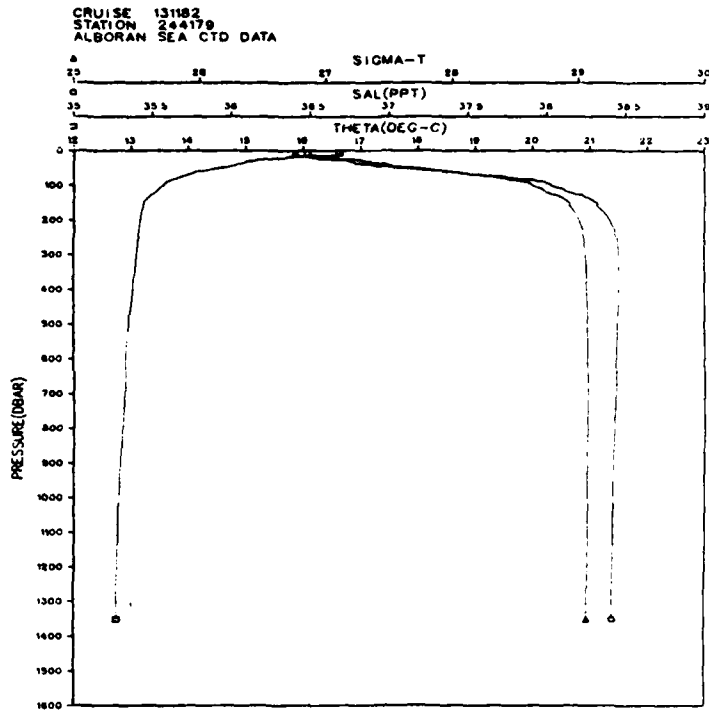


Figures 55c and 55d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 244179

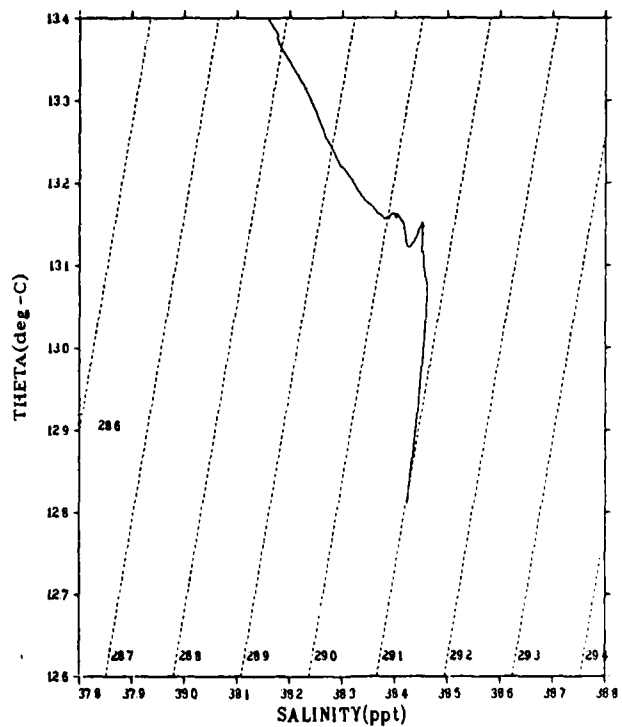
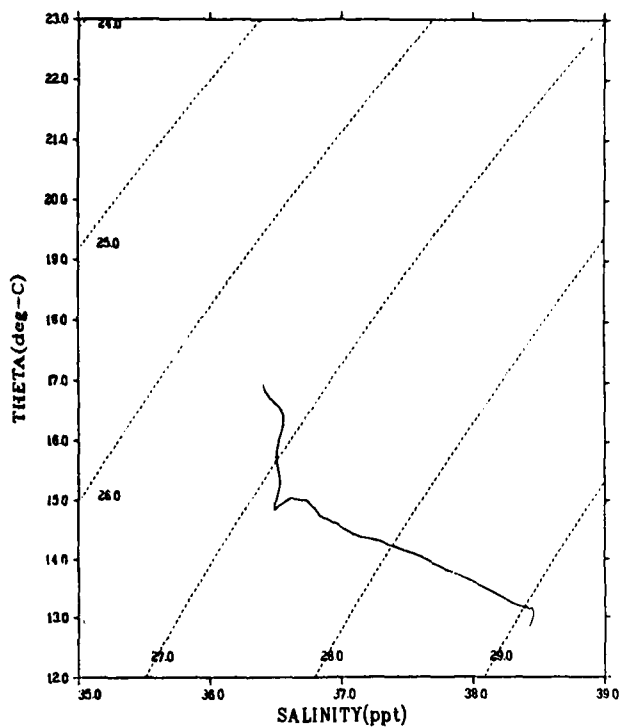


Figures 56a and 56b



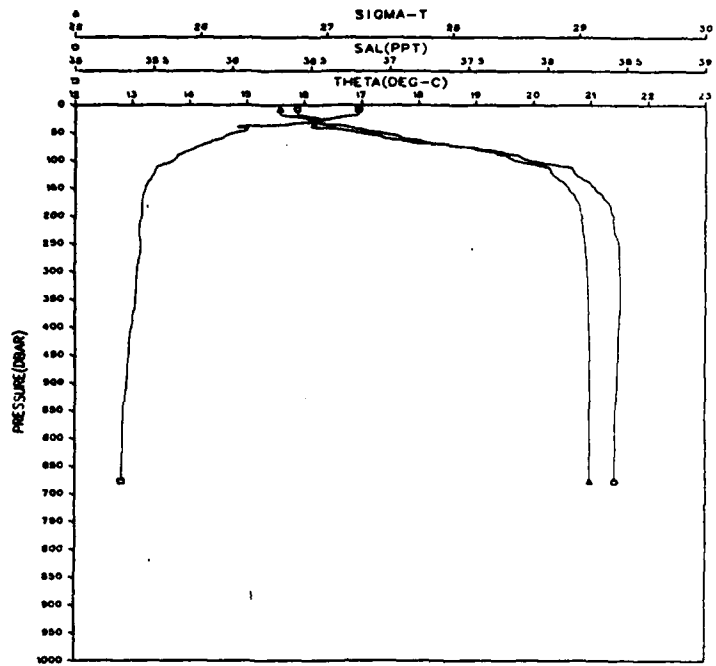
Figures 56c and 56d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 245180

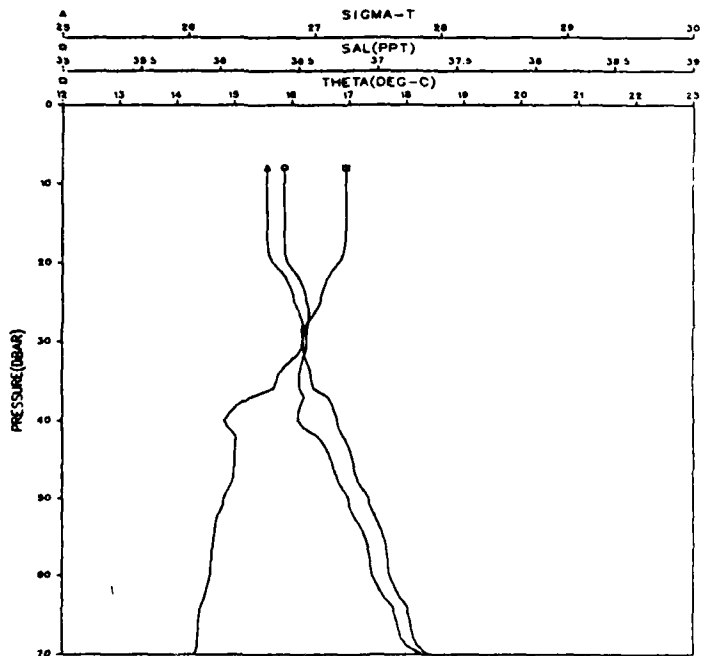


Figures 57a and 57b

CRUISE 131182
STATION 245180
ALBORAN SEA CTD DATA

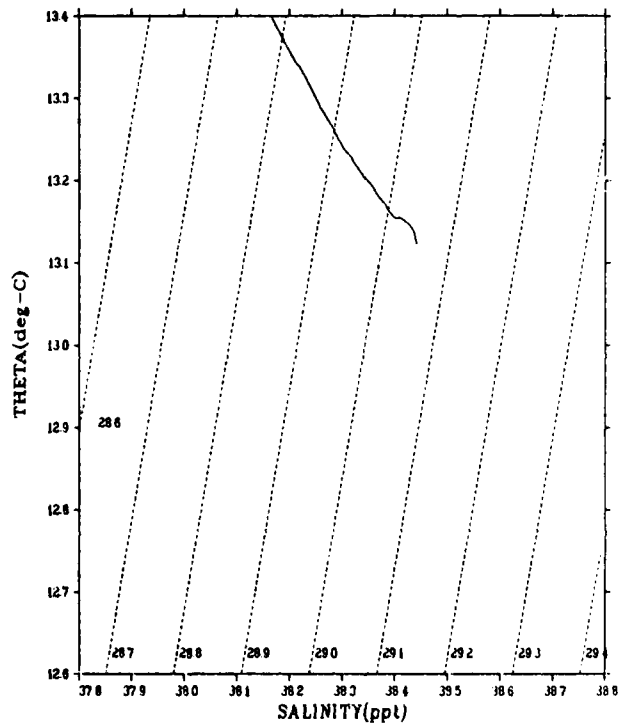
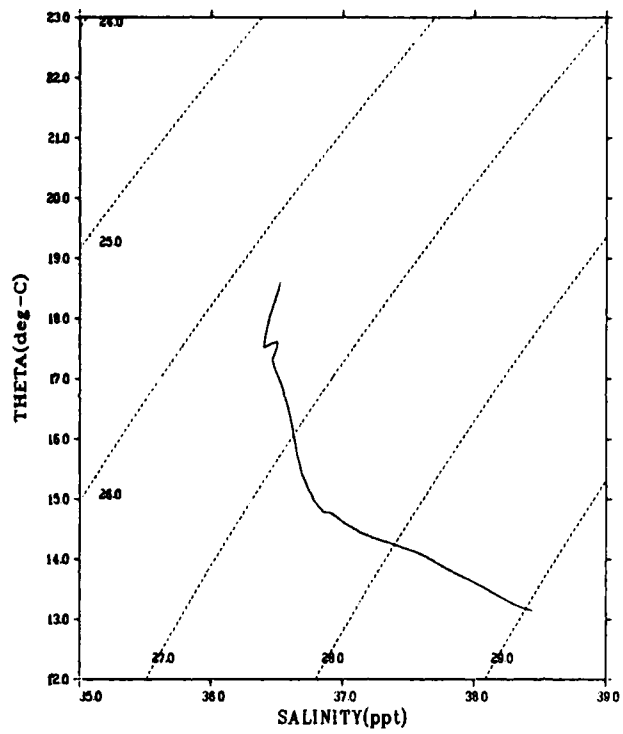


CRUISE 131182
STATION 245180
ALBORAN SEA CTD DATA

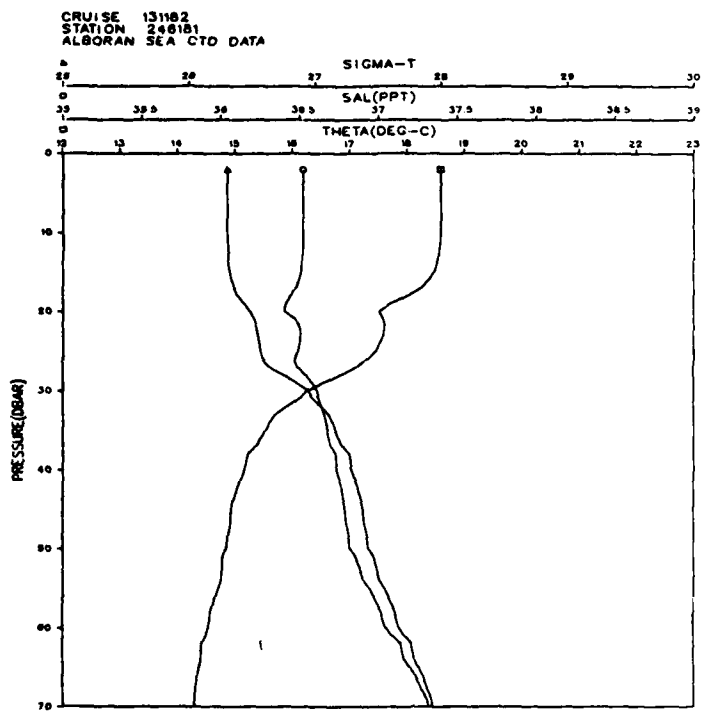
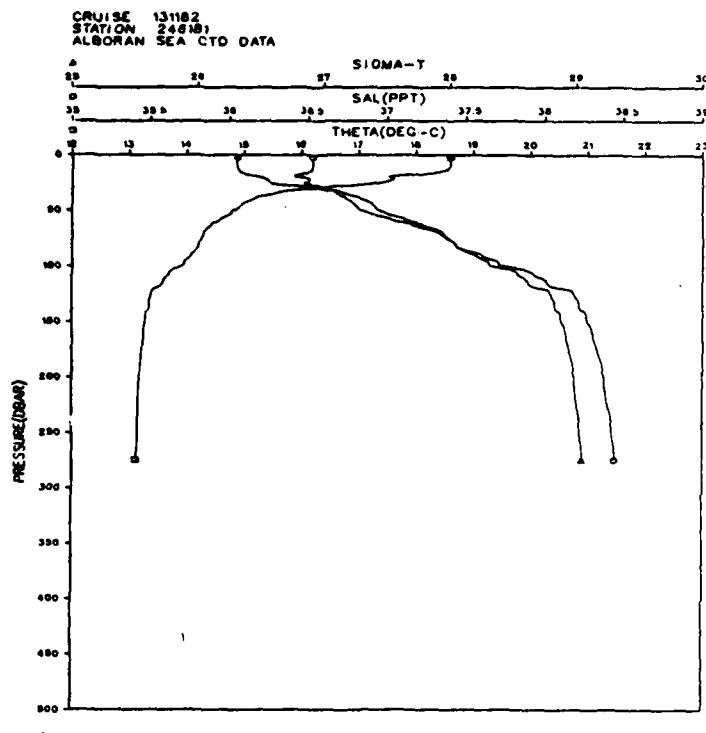


Figures 57c and 57d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 246181

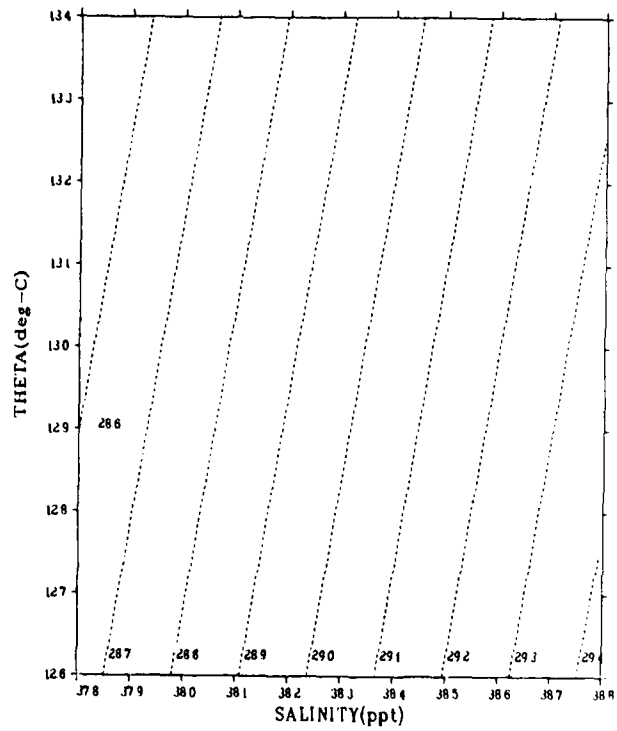
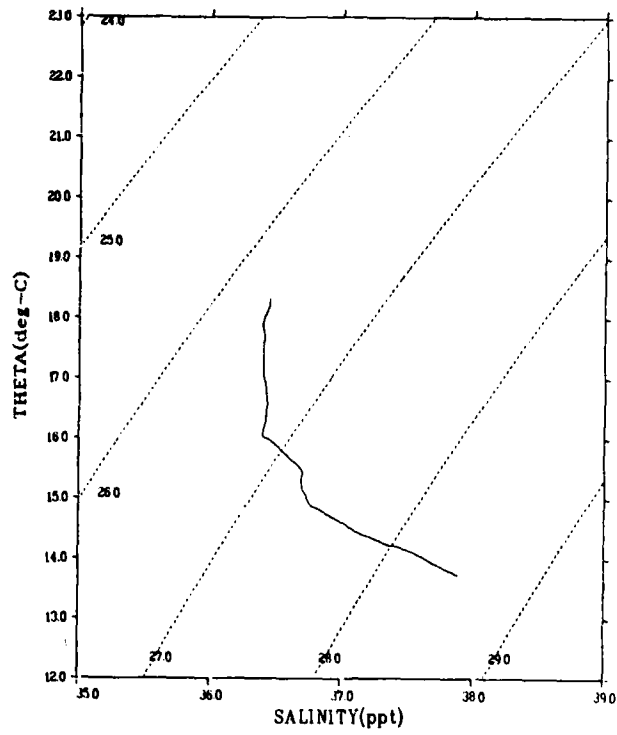


Figures 58a and 58b

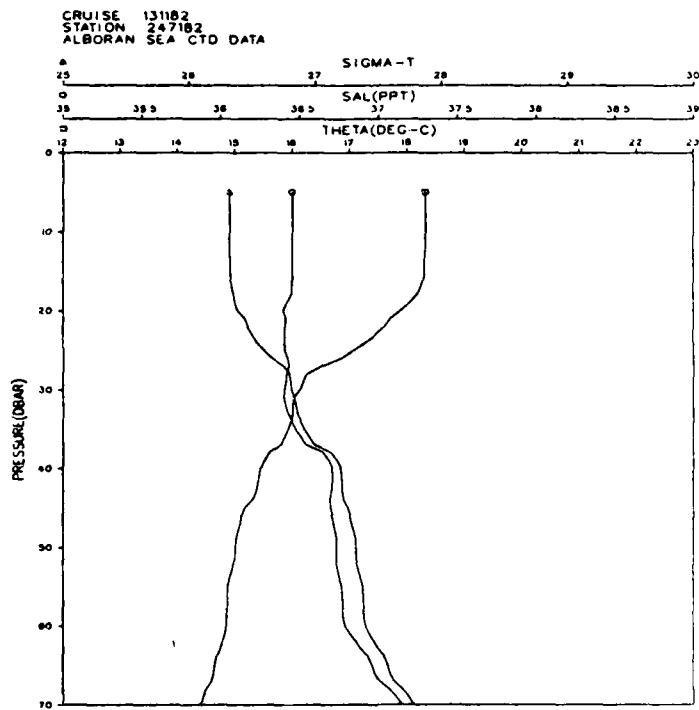
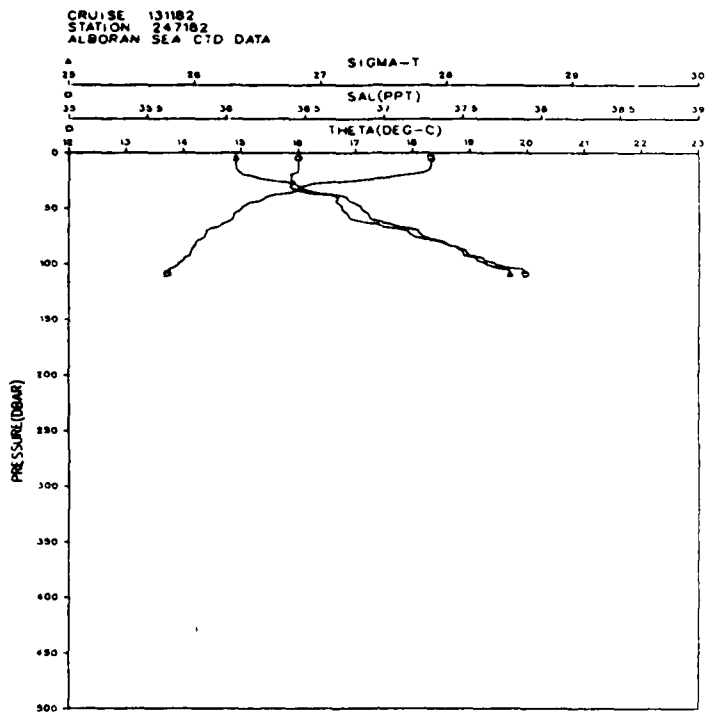


Figures 58c and 58d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 247182

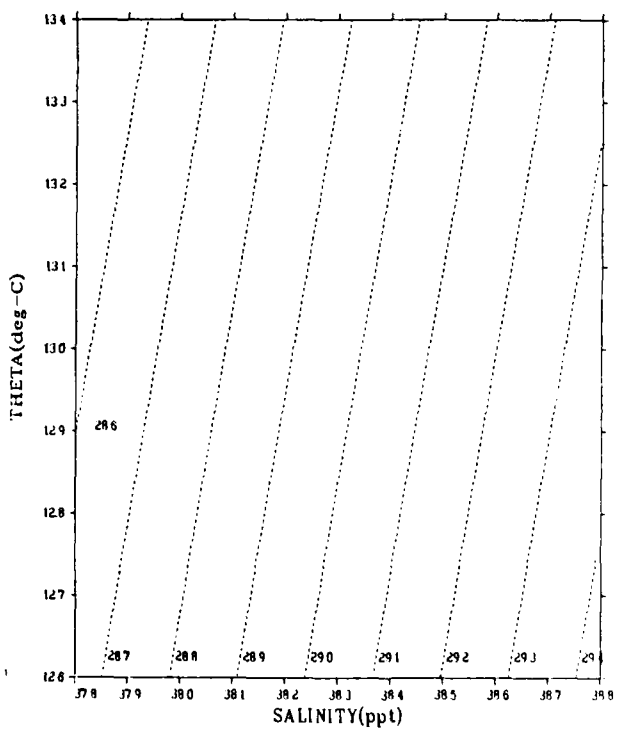
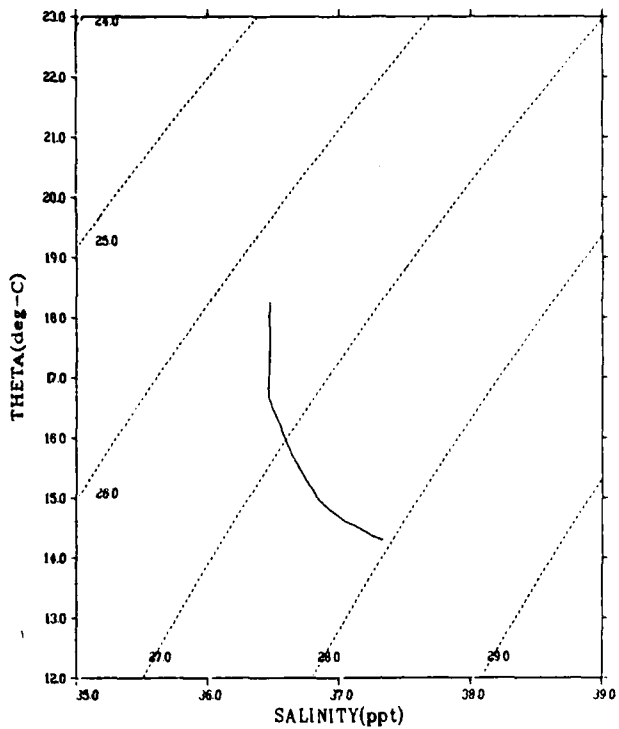


Figures 59a and 59b

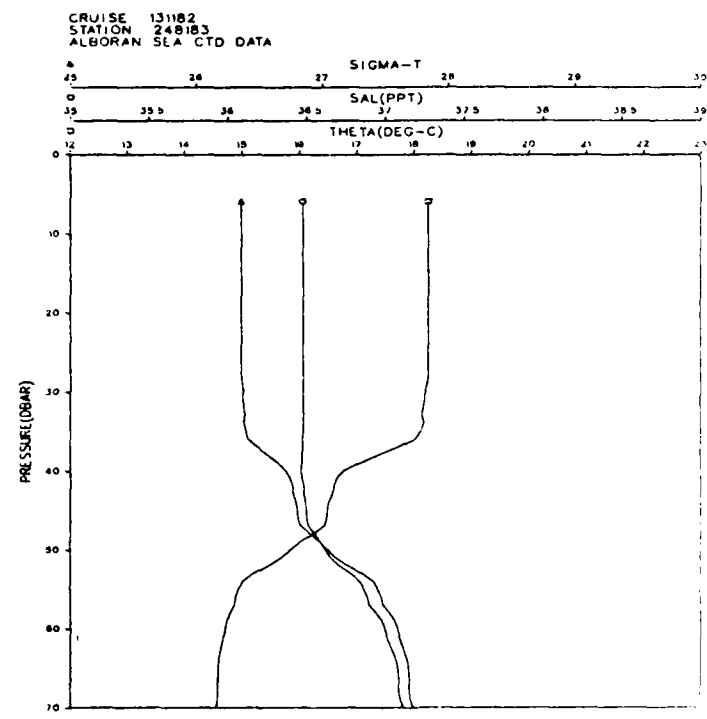
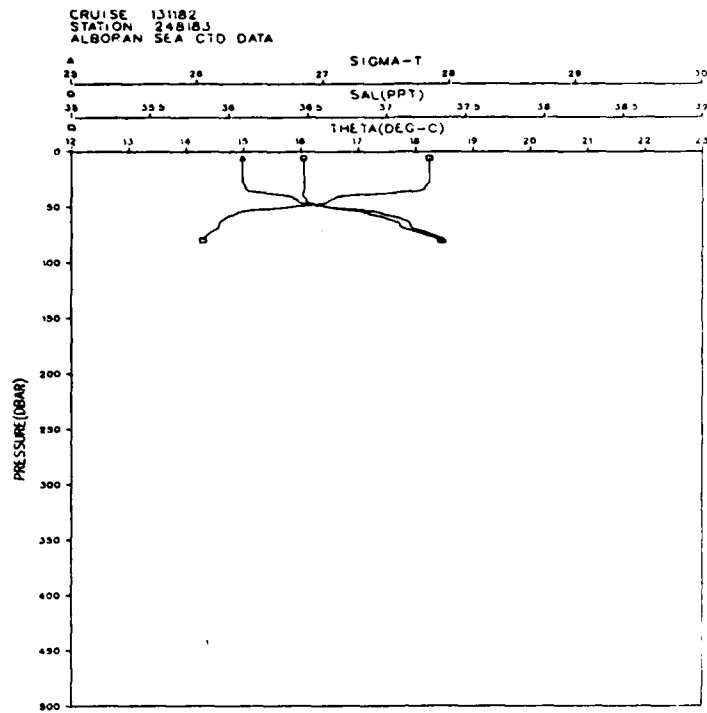


Figures 59c and 59d

ALBORAN SEA CTD DATA
 CRUISE 131182 STATION 248183

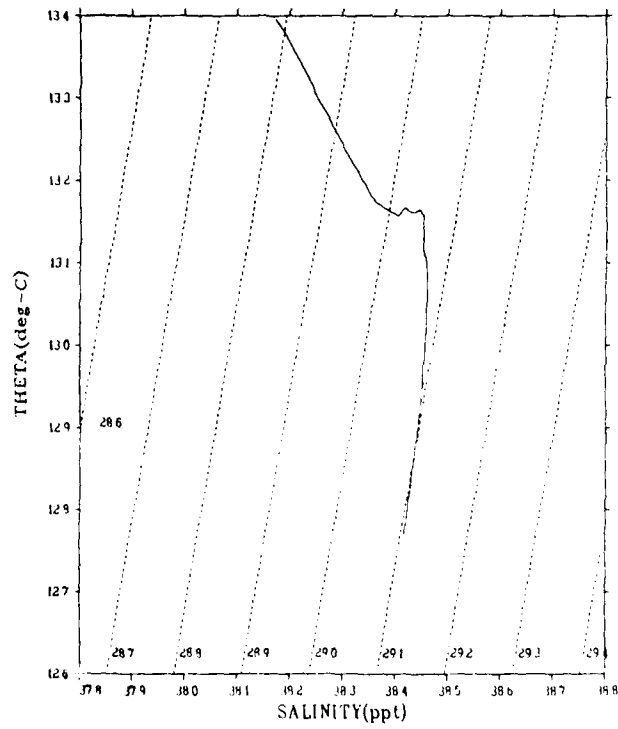
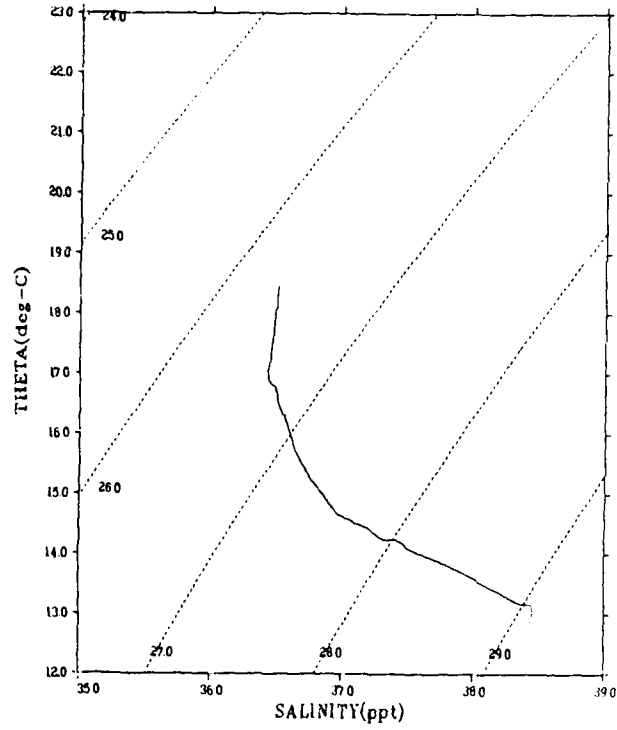


Figures 60a and 60b



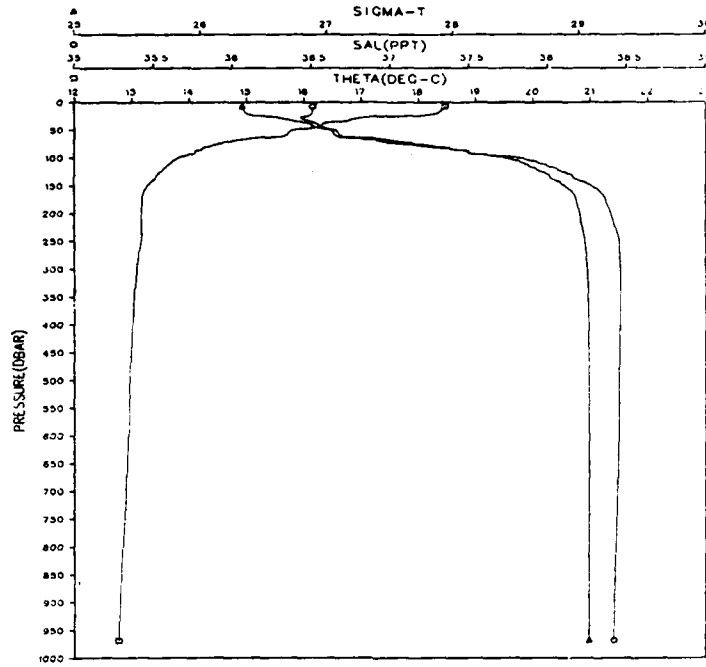
Figures 60c and 60d

ALBORAN SEA CTD DATA
CRUISE 131182 STATION 249184

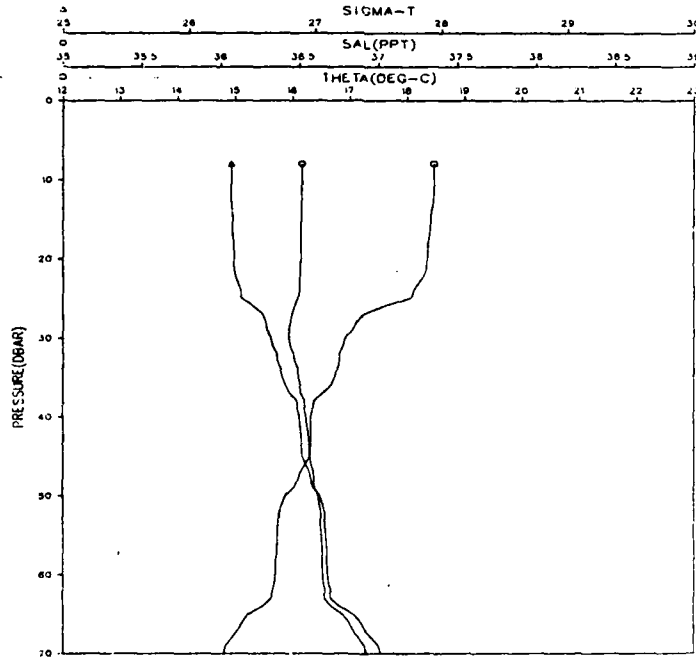


Figures 61a and 61b

CRUISE 131182
STATION 249184
ALBORAN SEA CTD DATA

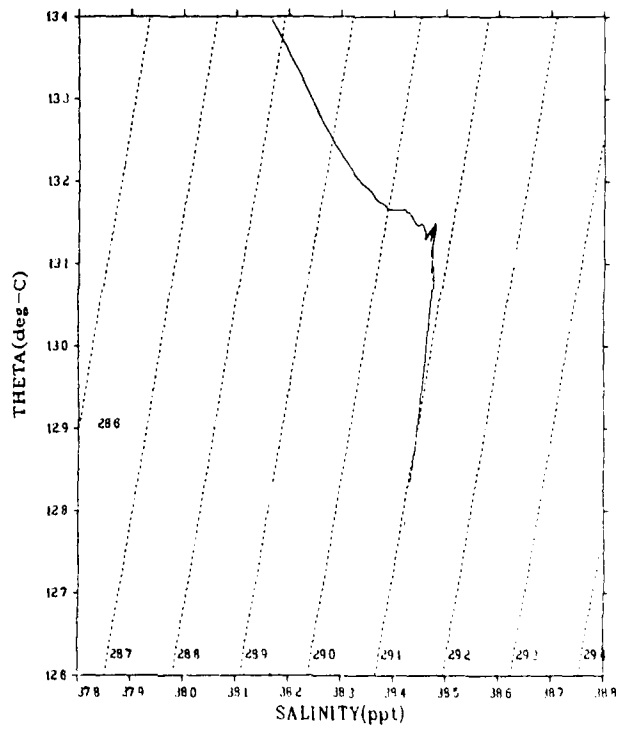
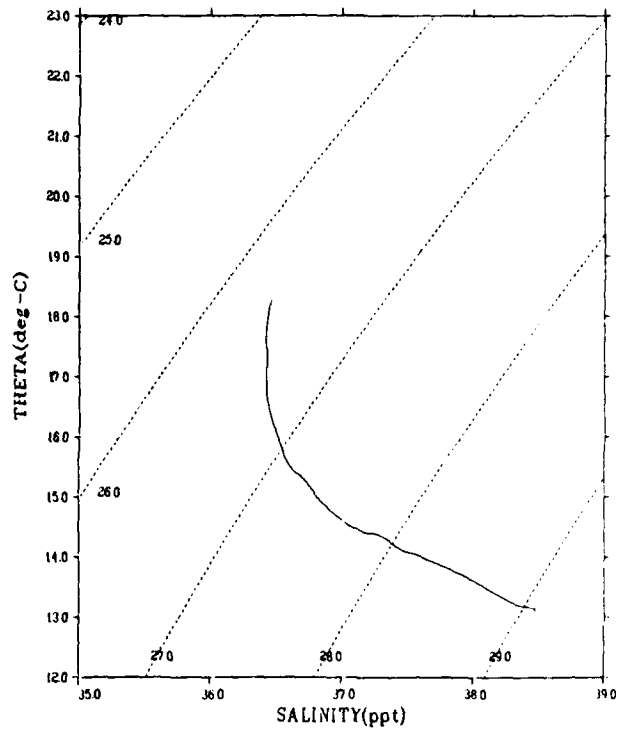


CRUISE 131182
STATION 249184
ALBORAN SEA CTD DATA

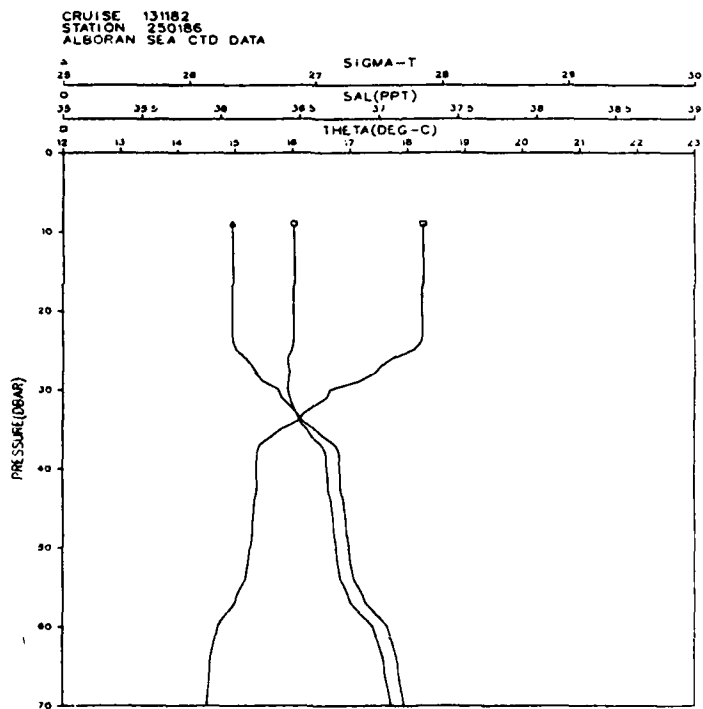
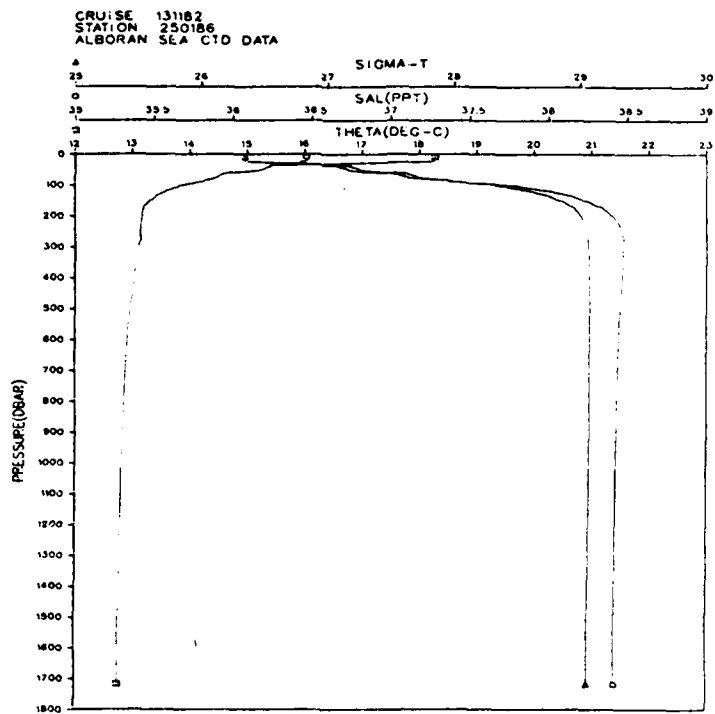


Figures 61c and 61d

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 CRUISE 131182 STATION 250186

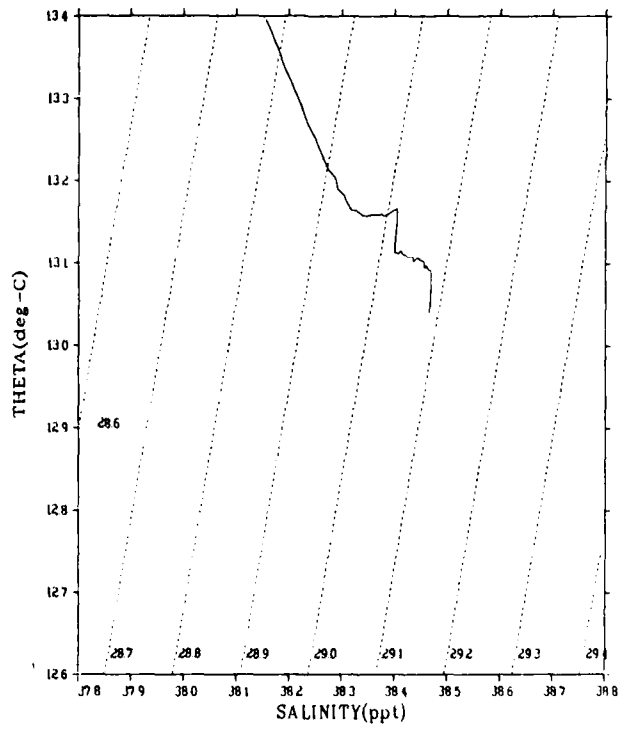
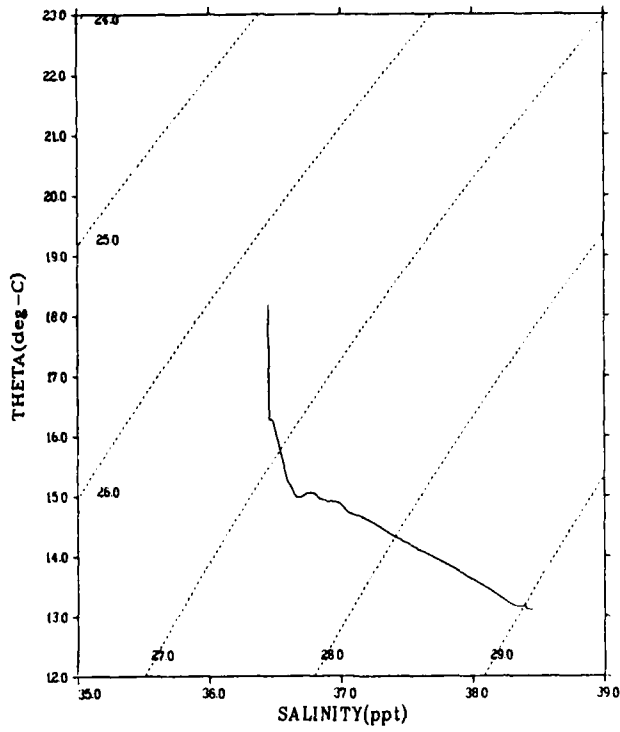


Figures 62a and 62b



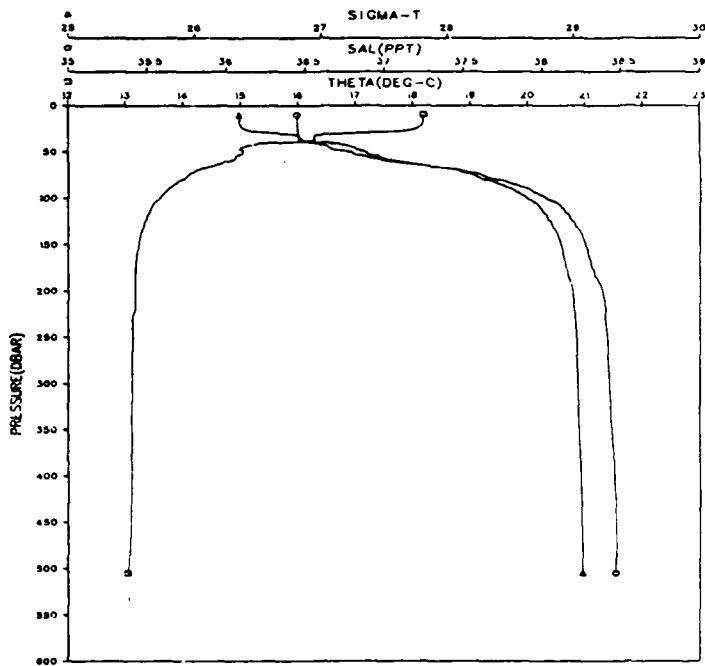
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CRUISE 131182 STATION 255191

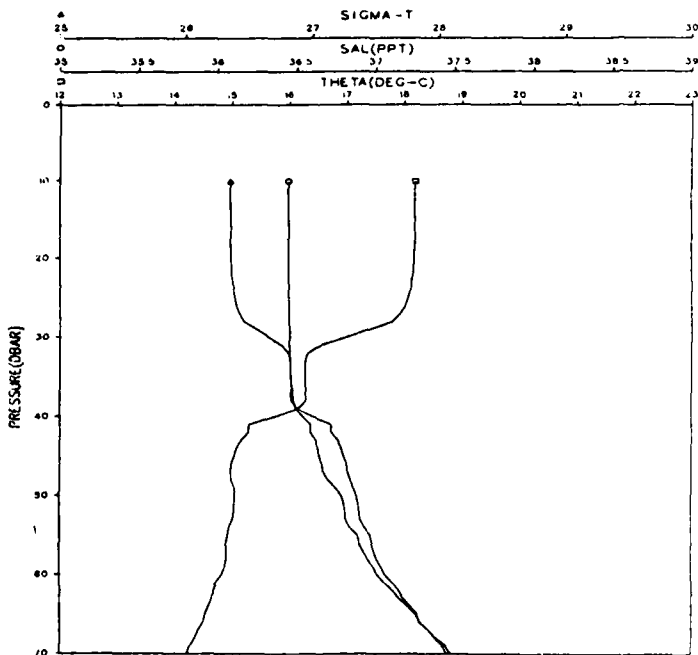


Figures 63a and 63b

CRUISE 131182
STATION 255191
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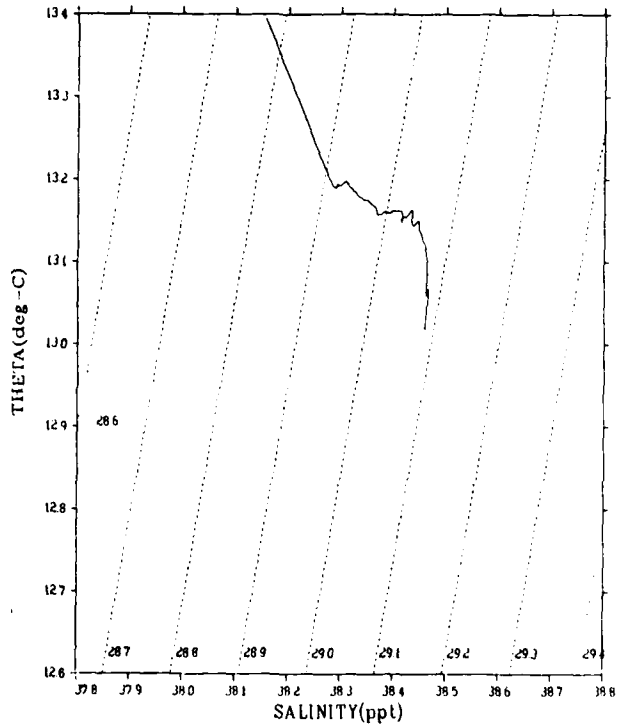
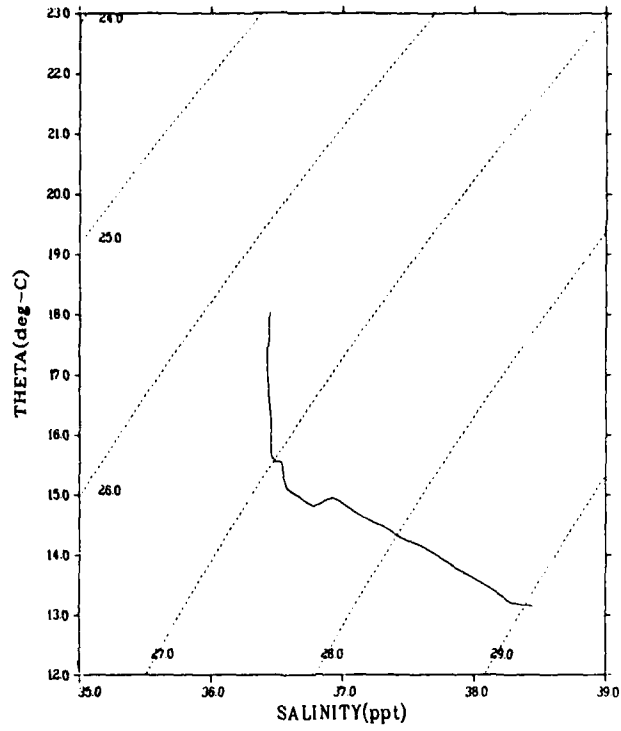


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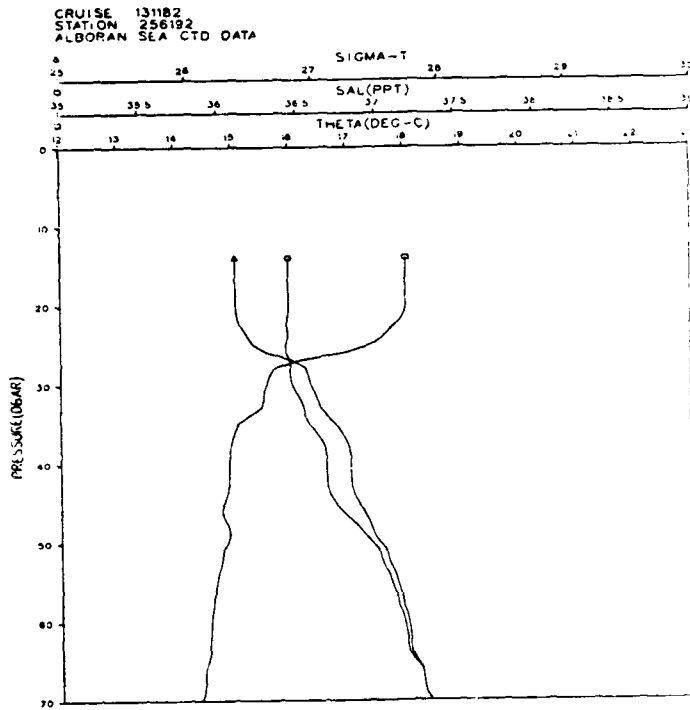
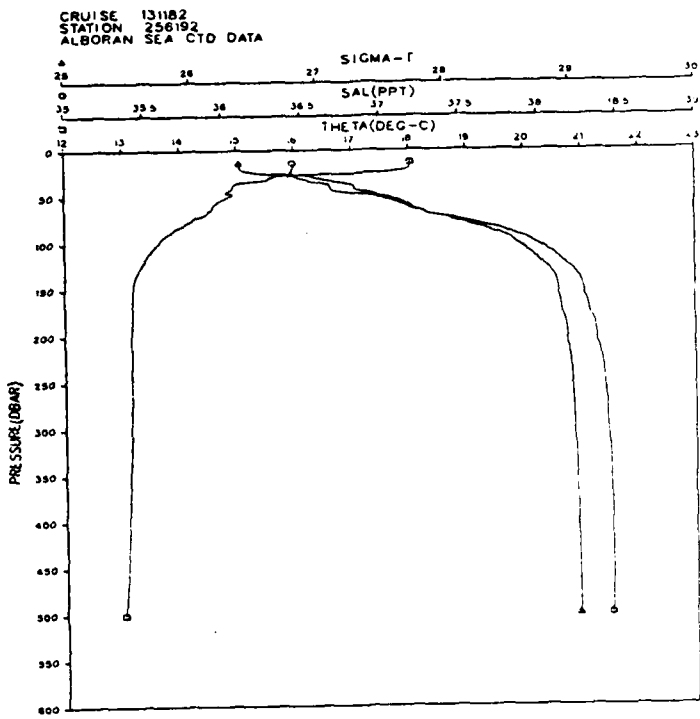


Figures 63c and 63d

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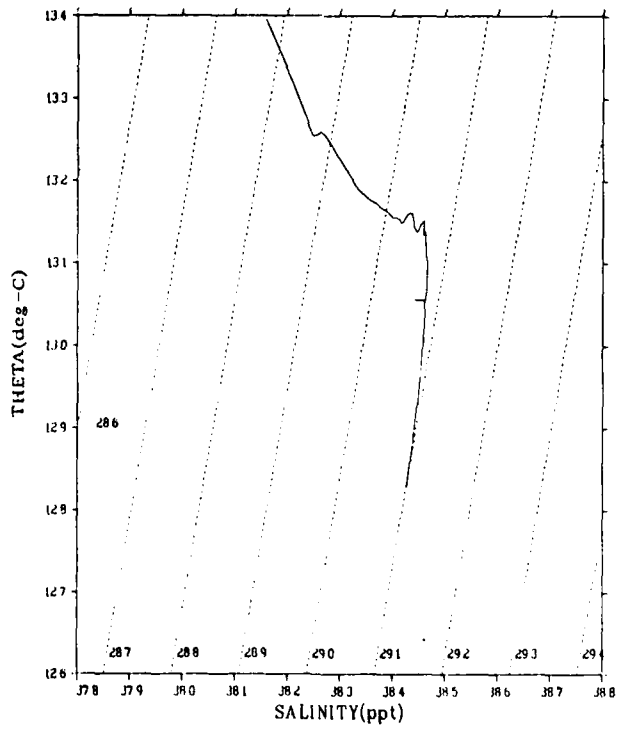
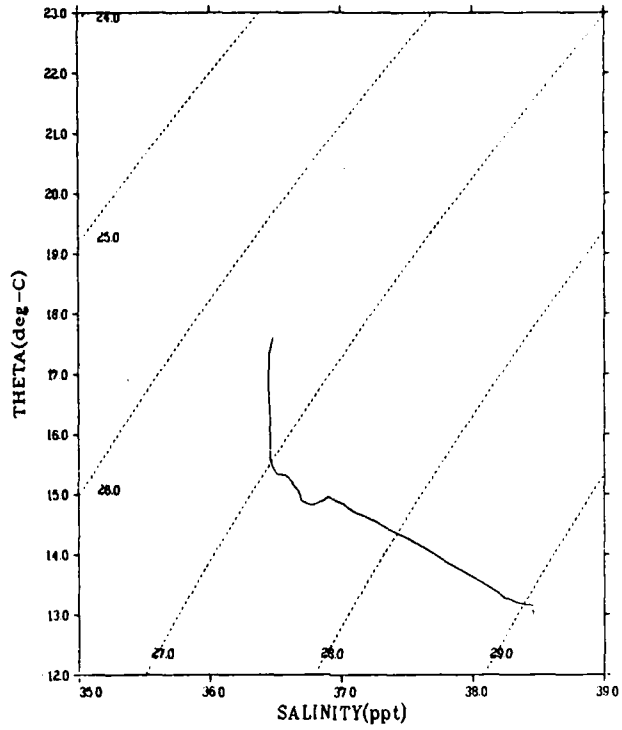


Figures 64a and 64b

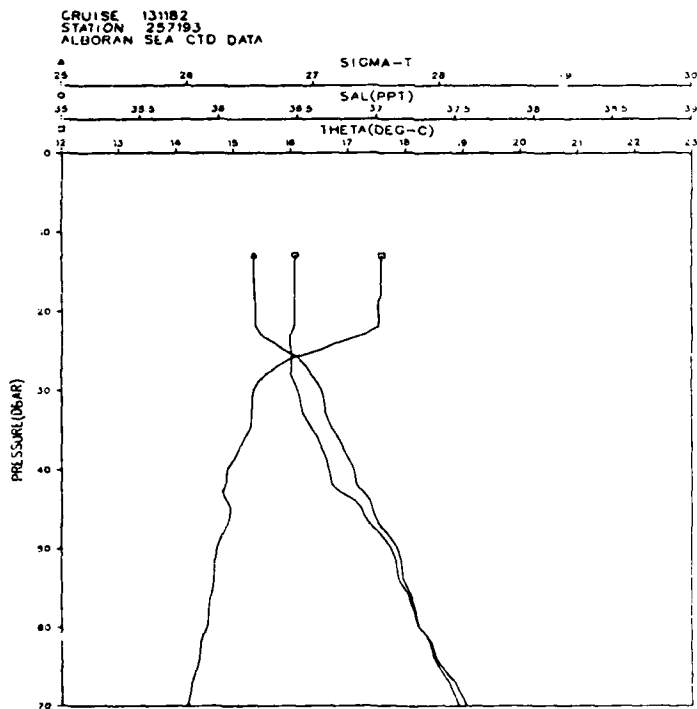
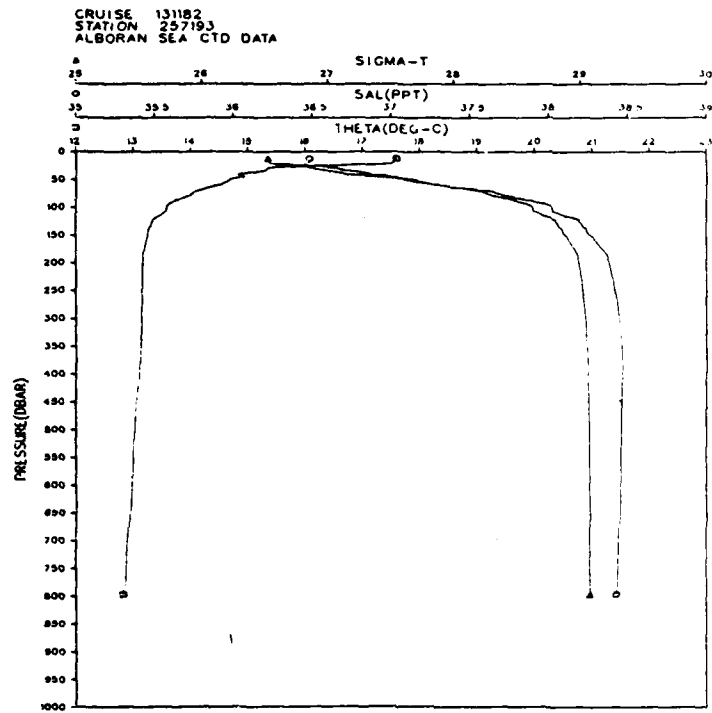


Figures 64c and 64d

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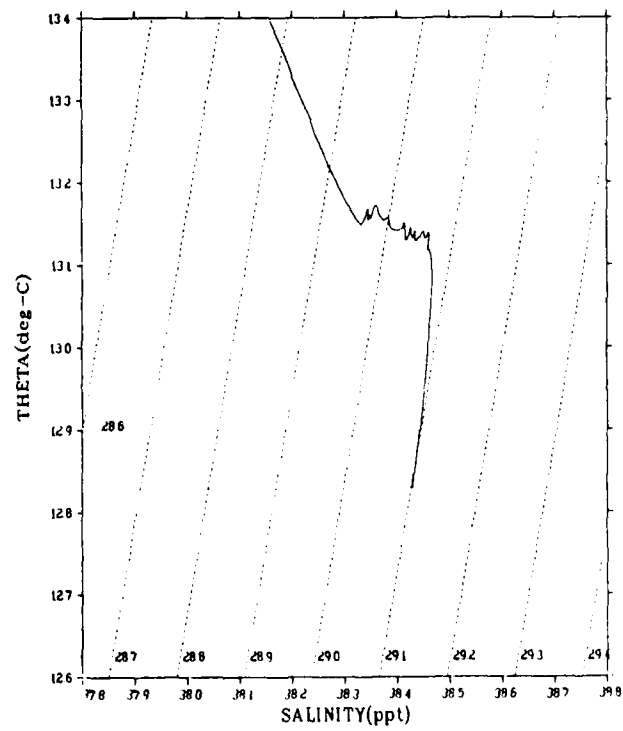
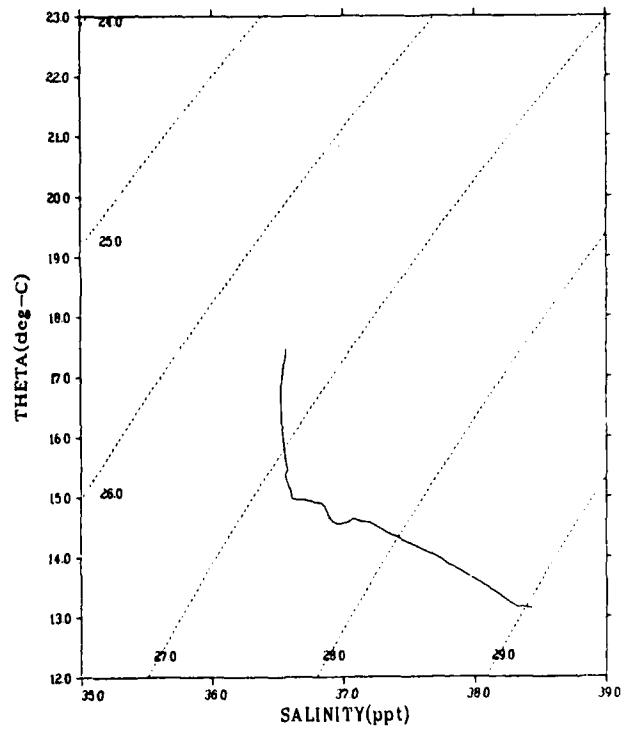


Figures 65a and 65b

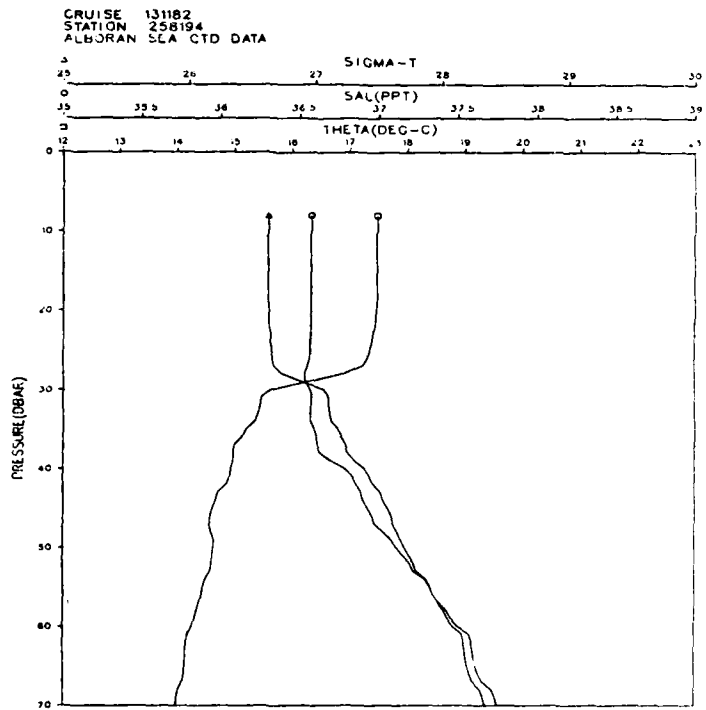
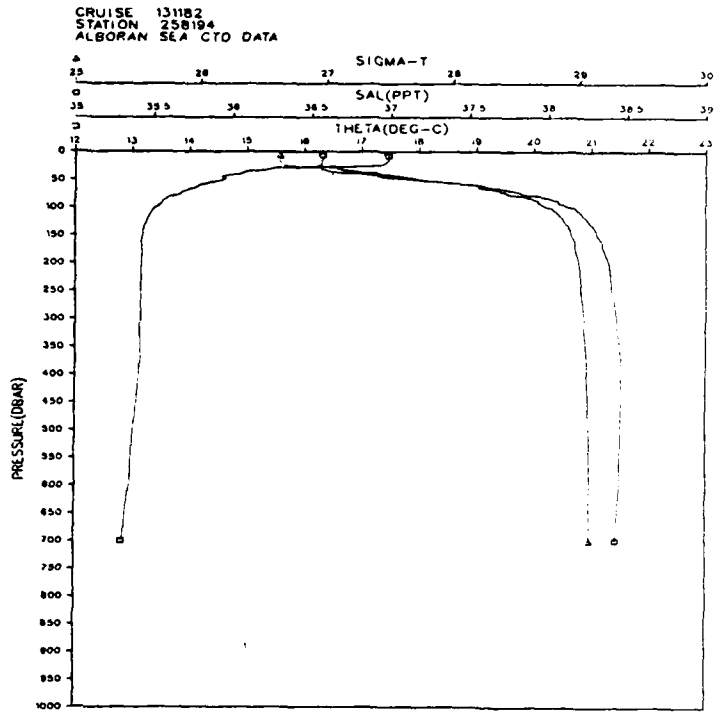


Figures 65c and 65d

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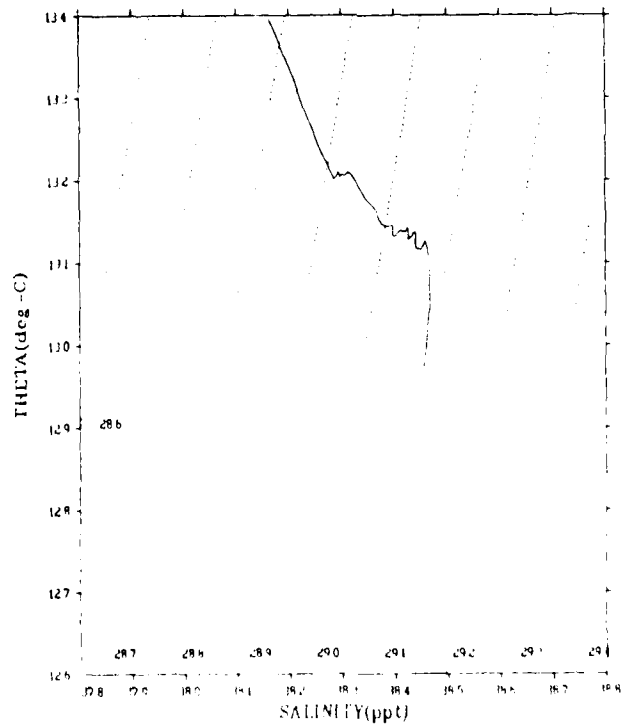
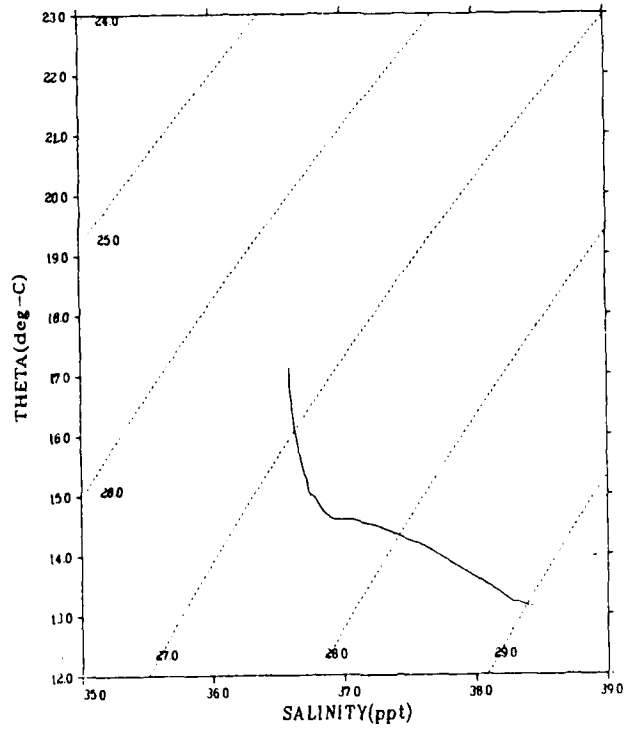


Figures 66a and 66b



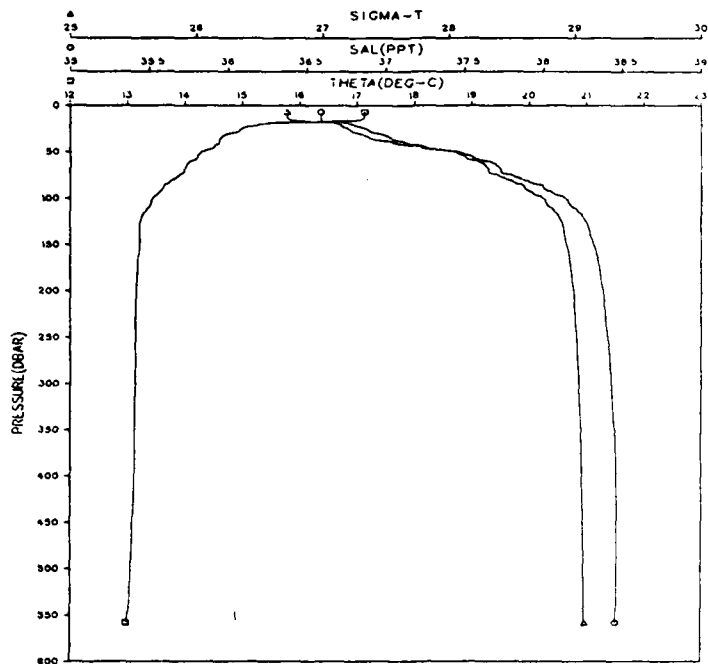
Figures 66c and 66d

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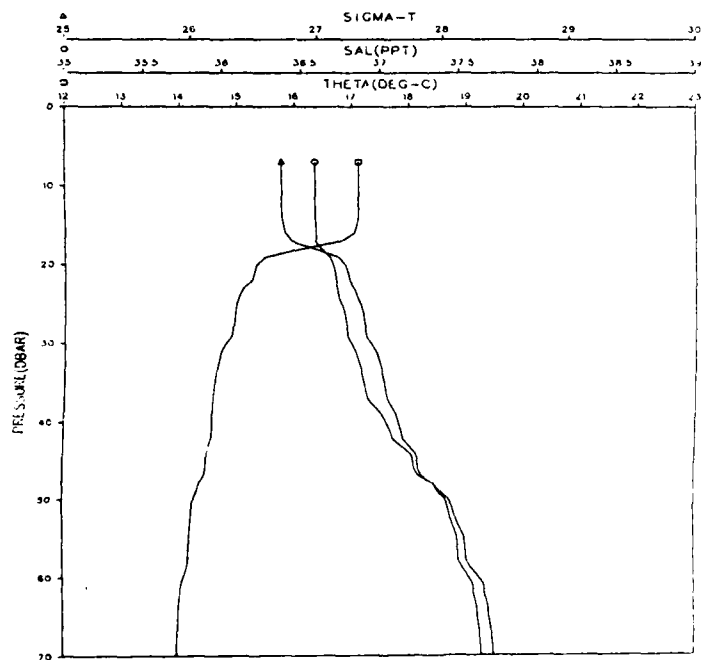


Figures 67a and 67b

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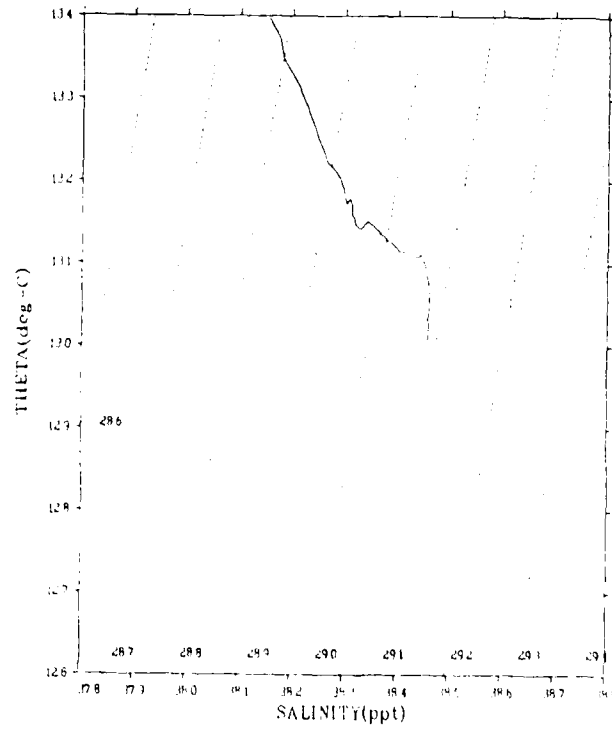
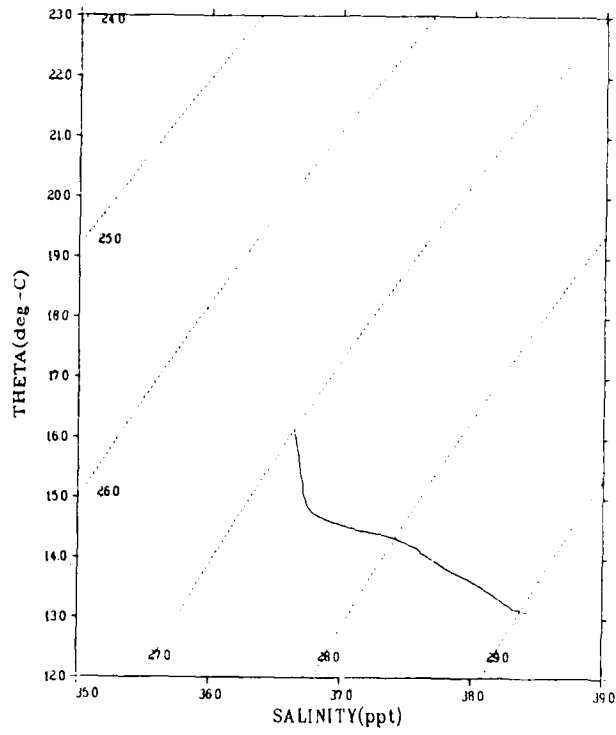


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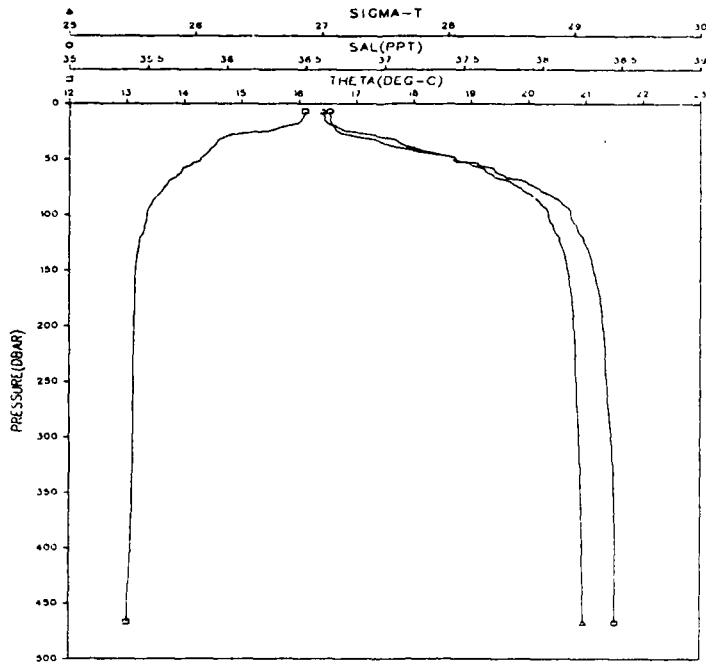
Figures 67c and 67d

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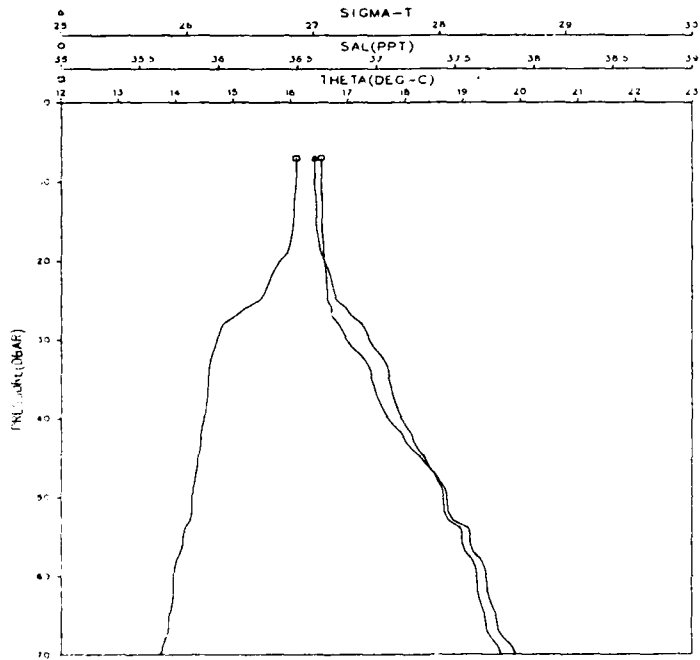


Figures 68a and 68b

CRUISE 131182
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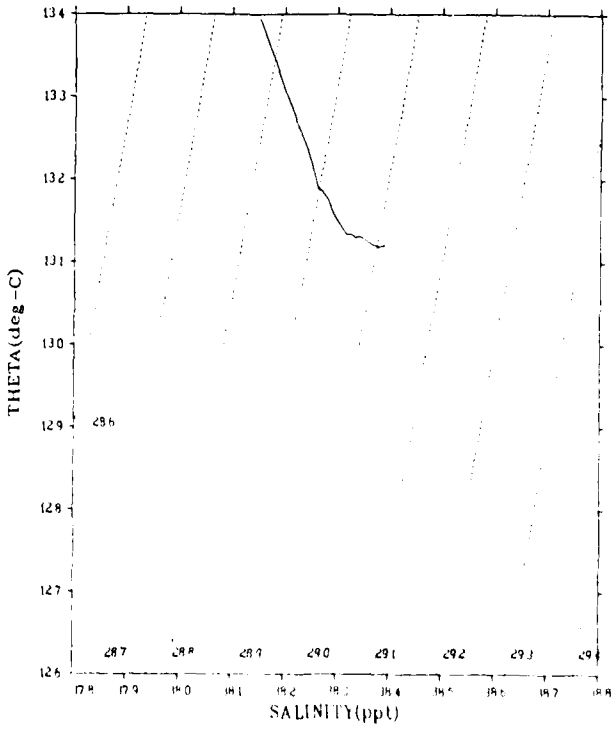
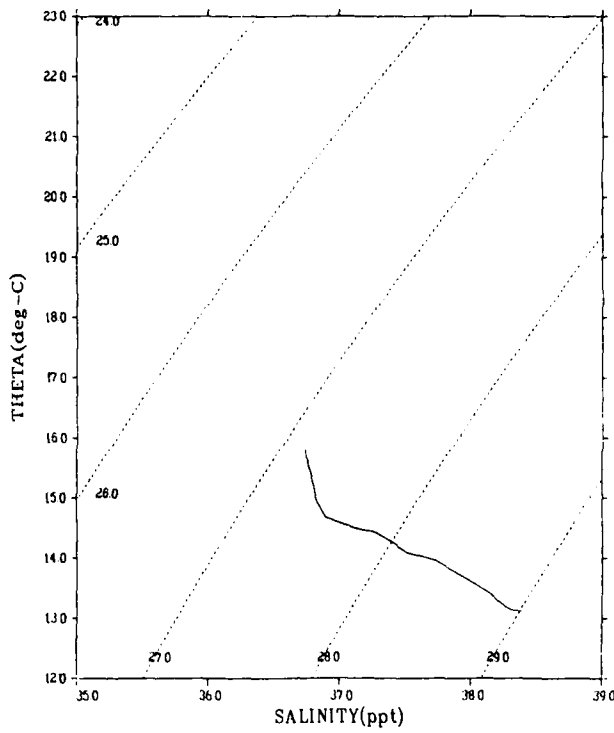


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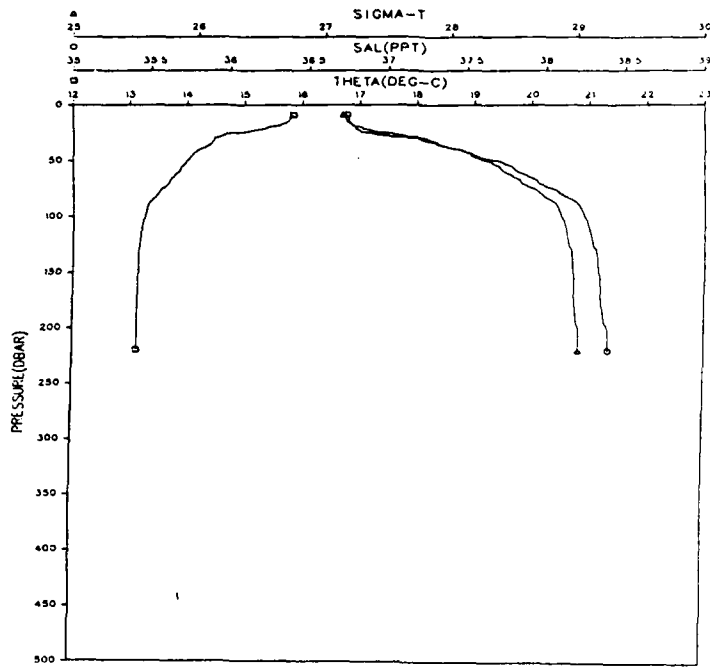
Figures 68c and 68d

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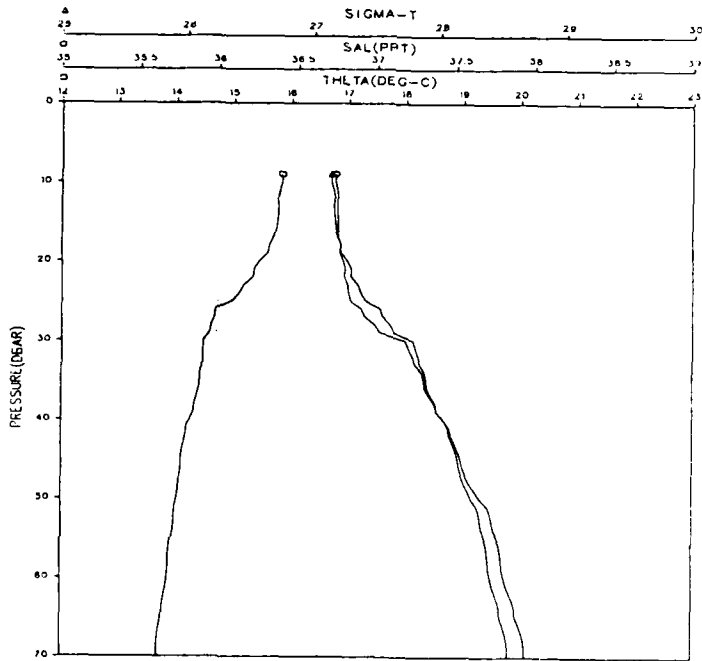


Figures 69a and 69b

CRUISE 131182
 STATION 261197
 ALBORAN SEA CTD DATA



CRUISE 131182
 STATION 261197
 ALBORAN SEA CTD DATA



Figures 69c and 69d

CRUISE 131182
CASTS 262501-262542

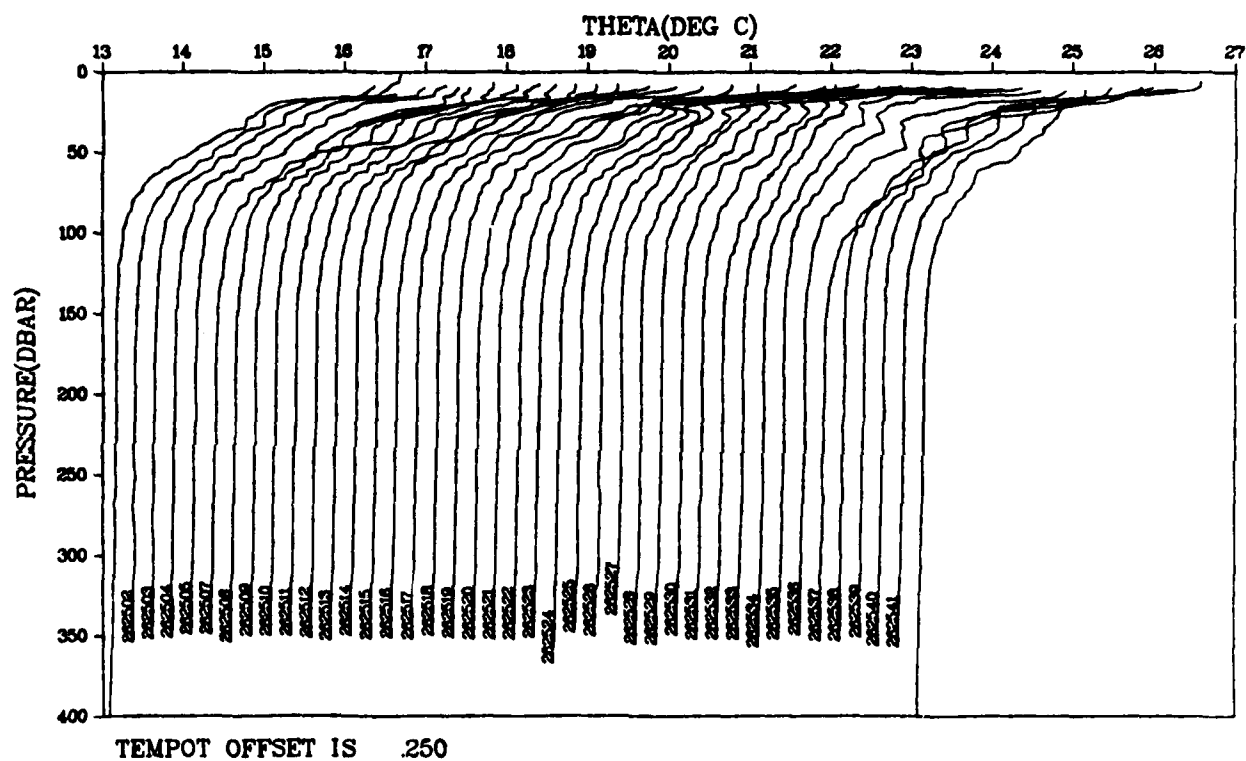


Figure 70a. Vertical temperature profiles

CRUISE 131182
CASTS 262501-262542

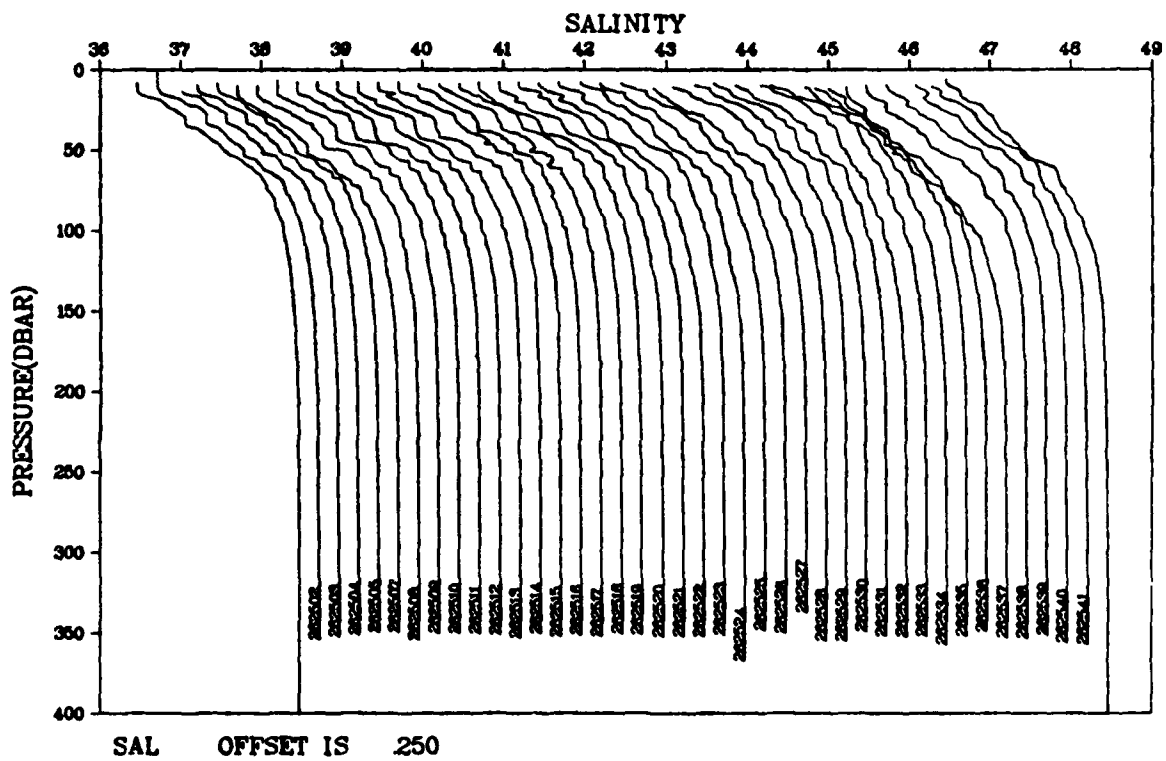


Figure 70b. Vertical salinity profiles

CRUISE 131182
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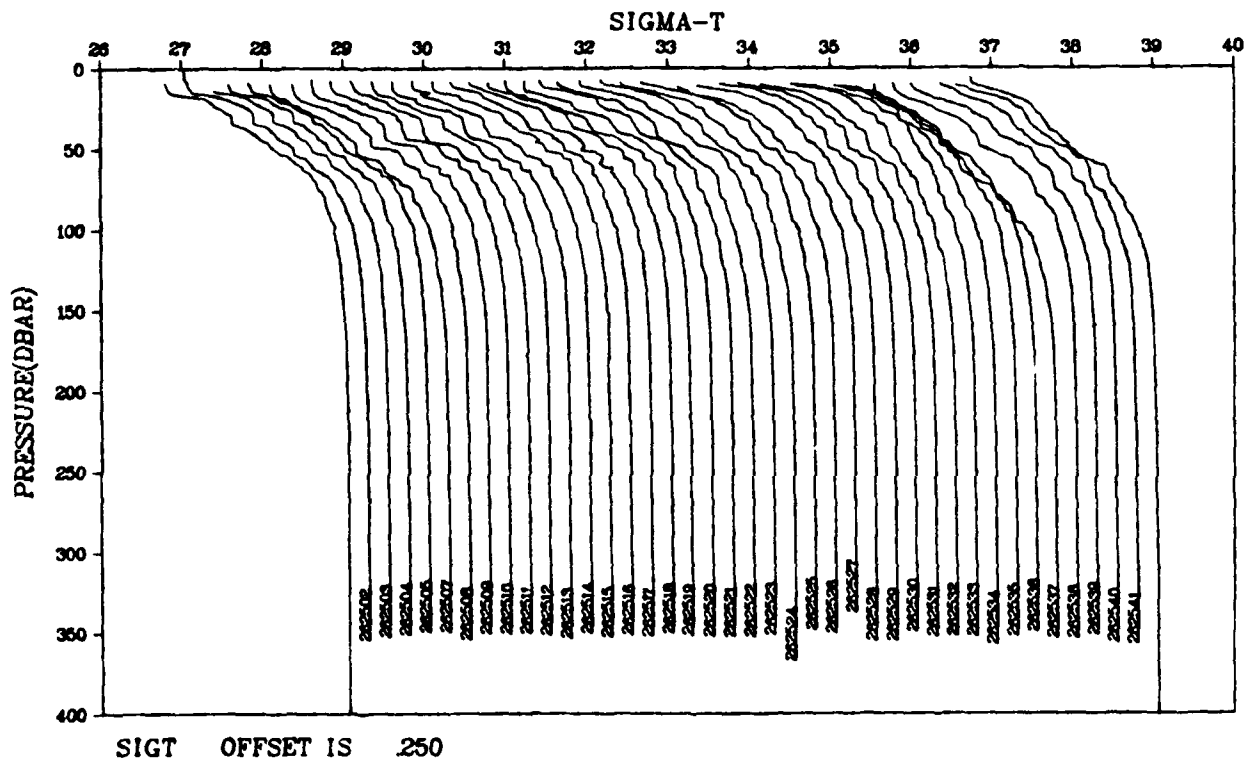


Figure 70c. Vertical density (sigma-theta) profiles

CRUISE 131182
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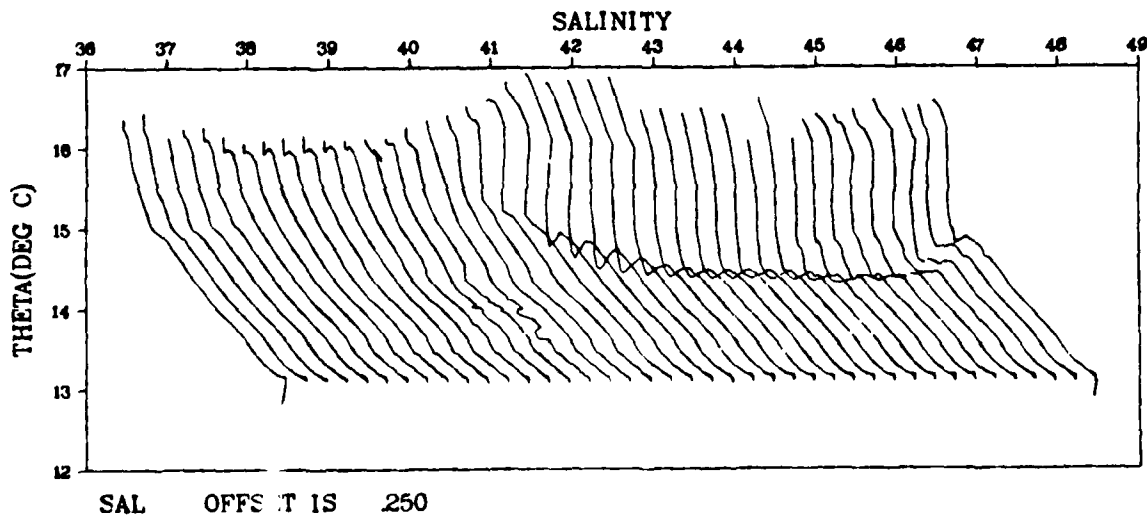


Figure 70d. Potential temperature-salinity diagrams

CRUISE 131182
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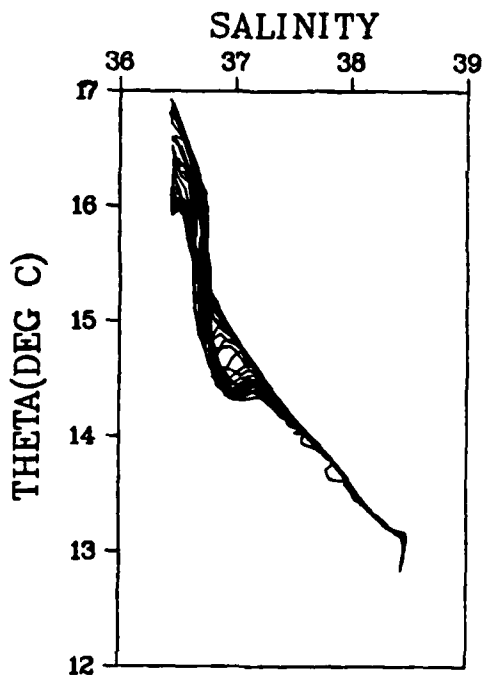


Figure 70e. Composite temperature-salinity diagram

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) During October 1982, 78 CTD stations were taken in the Western Alboran Sea (Western Mediterranean). Vertical profiles of potential temperature, salinity, and density are presented along with potential temperature versus salinity correlation diagrams. A comparison of CTD and water sample data is presented, and the rationale for a salinity correction is given.		

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