



## **CRUISE REPORT ON RESEARCH ACTIVITY**

**M.V.SEAFDEC Cruise No.64-2/2001, 9-30 October 2001**

**M.V.SEAFDEC Cruise No.65-3/2001, 27 October-17 November 2001**

**M.V.SEAFDEC Cruise No.66-4/2001, 28 November- 11 December 2001**

**M.V.SEAFDEC Cruise No. 67-5/2001, 14 December2001-30 January 2002**

### **Indian Ocean**

**TD/RP/53**

This report is base on preliminary data

For readers who may need data in the report, please contact to:

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## Cruise report on research activities

### 1. Cruise Summary

<b>Vessel:</b>	<b>MV. SEAFDEC</b>
<b>Cruise No.:</b>	64-2/2001
<b>Duration:</b>	9 -30 October 2001
<b>Objective:</b>	To carry out the shipboard training for universities student, prepare FADs for cruise No. 65-3/2001, fishing demonstration (Tuna longline, Squid jigging and Bottom vertical longline) and fishing ground information collection.
<b>Area of Operation:</b>	Indian Ocean
<b>Port of call:</b>	Phuket (Thailand),Singapore
<b>Researcher:</b>	1. Dr. Somboon Siriraksophon 2. Mr. Isara Chanrajkit 3. Mr. Pratakphon Prajakjit
<b>Assistant Researcher:</b>	1. Ms. Pattarajit Kaewnuratchadasorn 2. Mr. Sukchai Arnuphapboon

### 2. Observation Summary

#### **Oceanographic data**

Oceanographic data was collected by Sea Bird Electric CTD (SBE CTD) model 19-03 (Conductivity, Temperature, Depth Recorder) and XBT (Expendable bathythermograph). There were 26 stations. Nine stations of sea condition observation were carried out in the Gulf of Thailand, ten station in Andaman sea and seven stations in Indian ocean. Working area were between latitude 6° N – 6° S and longitude 82° – 95°E. Position of observation were shown at Fig.1 and Table 1. Profiles of all oceanographic data were shown in Annex II.

#### **Zooplankton samples**

Zooplankton samples were collected in the Andaman Sea (Table2) by bongo net, which attached the 0.33 and 0.50 mm mesh size plankton nets. There were 10 sampling stations. The bongo net was oblique tow by ship speed 3 knots for 30 minutes. The maximum depth of the haul was 60-100 meter below the surface which depend on the bottom depth. Samples were preserved in 10 % buffered formalin-seawater immediately. The samples will be sort at TD for further study.

#### **Chlorophyll-a at surface water**

There were 67 samples along the route track. The surface water were pumped every 6 hours (0600 hr, 1200 hr, 1800 hr and 2400 hr) then were filtered through the Whatman GFC filter paper. The filter papers were stored in the freezer. In Laboratory, the chlorophyll on filter paper were extracted in 90% acetone and measured the extinction at 750, 664, 647, 630, 510, 480 nm by spectrophotometer.

## ANNEX I

**Catch data collection**

Catch data were collected from one tuna longline, two automatic squid jigging and one bottom vertical longline fishing demonstration for university students.

Tuna longline with 600 hooks was demonstrated at latitude 2° 52.1 S, longitude 90° 08.0 E. The catch was black marlin, 103 kg weight and 270 cm total length. All catch of automatic squid jigging were purple back flying squid. Bottom vertical longline was demonstrated at latitude 6° 34.2 N, longitude 98° 04.8 E. The main species were armor sea robin, grouper, snapper, etc (Annex I).

Table1. The oceanographic station on M.V.SEAFFDEC cruise no.64-2/2001

St no.	Date	Time	Latitude	Longitude	Depth	Instrument	Activity	Area
	(Local)	(Local)			(m)			
1	9-Oct-01	1945	12_37.93 N	100_43.60 E	43	SBECTD	-	GOF
2	9-Oct-01	2155	12_10.61 N	100_54.08 E	30	SBECTD	-	GOF
3	10-Oct-01	0150	11_22.84 N	101_08.95 E	-	SBECTD	-	GOF
4	10-Oct-01	0510	10_44.98 N	101_21.39 E	69	SBECTD	-	GOF
5	10-Oct-01	0845	10_08.16 N	101_33.40 E	70	SBECTD	-	GOF
6	10-Oct-01	1225	9_29.73 N	101_45.50 E	77	SBECTD	-	GOF
7	10-Oct-01	1540	8_51.51 N	101_58.10 E	76	SBECTD	-	GOF
8	10-Oct-01	1900	8_14.59 N	102_10.06 E	76	SBECTD	-	GOF
9	10-Oct-01	2205	7_38.82 N	102_25.49 E	71	SBECTD	-	GOF
10	15-Oct-01	1215	7_29.42 N	98_00.43 E	145	SBECTD	Bongo st no. 12	Andaman sea
11	15-Oct-01	1616	7_30.44 N	97_30.84 E	474	SBECTD	Bongo st no. 11	Andaman sea
12	15-Oct-01	2027	6_58.85 N	96_59.36 E	1017	SBECTD	Bongo st no. 17	Andaman sea
13	16-Oct-01	1225	4_36.65 N	93_46.10 E	-	XBT	-	Indian ocean
14	17-Oct-01	1235	0_51.50 N	89_40.53 E	-	SBECTD	-	Indian ocean
15	18-Oct-01	0830	1_49.26 S	86_46.62 E	-	XBT	-	Indian ocean
16	18-Oct-01	20.45	3_44.23 S	85_31.09 E	~4896	SBECTD	-	Indian ocean
17	20-Oct-01	18.15	4_58.26 S	86_38.88 E	-	SBECTD	ASJ	Indian ocean
18	21-Oct-01	18.35	3_41.58 S	88_12.86 E	-	SBECTD	ASJ	Indian ocean
19	22-Oct-01	15.50	2_53.93 S	89_54.24 E	-	SBECTD	TLL	Indian ocean
20	26-Oct-01	06.30	6_31.94 N	98_03.53 E	165	SBECTD	Bongo st. no.18/BVL	Andaman sea
21	26-Oct-01	12.55	7_00.39 N	98_01.34 E	306	SBECTD	Bongo st no.16	Andaman sea
22	26-Oct-01	15.45	6_59.38 N	98_30.03 E	80	SBECTD	Bongo st no.15	Andaman sea
23	26-Oct-01	18.38	6_30.19 N	98_30.15 E	110	SBECTD	Bongo st no.19	Andaman sea
24	26-Oct-01	21.30	6_30.60 N	98_59.43 E	73	SBECTD	Bongo st no.20	Andaman sea
25	27-Oct-01	00.20	6_58.89 N	98_00.53 E	62	SBECTD	Bongo st no.14	Andaman sea
26	27-Oct-01	04.10	7_30.78 N	98_30.67 E	62	SBECTD	Bongo st no.13	Andaman sea
Remark:	ASJ-Automatic Squid Jigging							
	TLL-Tuna Longline							
	BVL-Bottom Vertical Longline							

Table2. Partial details of zooplankton survey station.

Date	Station no.	Time		Position start:		Position finish:		Sea Depth (m)	Sampling depth (m)	Net		Flow meter no.	Flow re
		Start	Finish	Lat.	Long.	Lat.	Long.			Fish larvae	Zoopl.		
15-Oct-01	12	11.47	12.17	7_29.87 N	98_00.5 E	7_29.42 N	98_00.43 E	145	100	x		2120	
											x	2081	
15-Oct-01	11	15.46	16.16	7_29.99 N	98_30.50 E	7_30.44 N	97_30.84 E	474	100	x		2120	
											x	2081	
15-Oct-01	17	19.57	20.27	7_00.03 N	97_00.12 E	6_58.85 N	96_59.36 E	1017	100	x		2120	
											x	2081	
26-Oct-01	18	06.30	07.00	6_32.18 N	98_04.31 E	6_31.76 N	98_02.86 E	164	100	x		2120	
											x	2081	
26-Oct-01	16	12.20	12.50	6_59.41 N	98_00.21 E	7_00.33 N	98_01.24 E	307	100	x		2120	
											x	2081	
26-Oct-01	15	15.15	15.45	7_00.12 N	98_29.50 E	6_59.38 N	98_30.03 E	82	70	x		2120	
											x	2081	
26-Oct-01	19	18.08	18.38	6_30.19 N	98_30.15 E	6_28.70 N	98_28.19 E	100	90	x		2120	
											x	2081	
26-Oct-01	20	21.00	21.30	6_30.17 N	98_59.50 E	6_30.60 N	98_59.43 E	72	60	x		2120	
											x	2081	
26-Oct-01	14	23.50	0.20	6_59.29 N	99_00.04 E	6_58.89 N	99_00.53 E	63.8	55	x		2120	
											x	2081	
27-Oct-01	13	03.36	04.06	7_29.45 N	98_30.51 E	7_30.78 N	98_30.67 E	61	60	x		2120	
											x	2081	

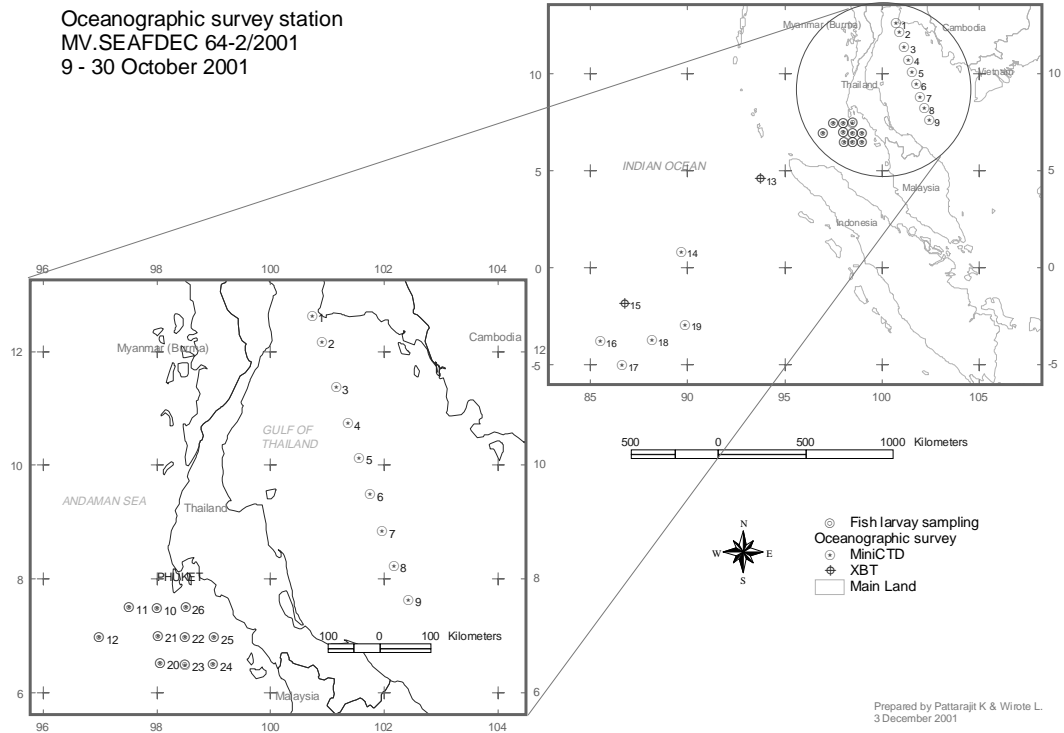


Figure 1. Survey station of cruise no. 64-2/2001

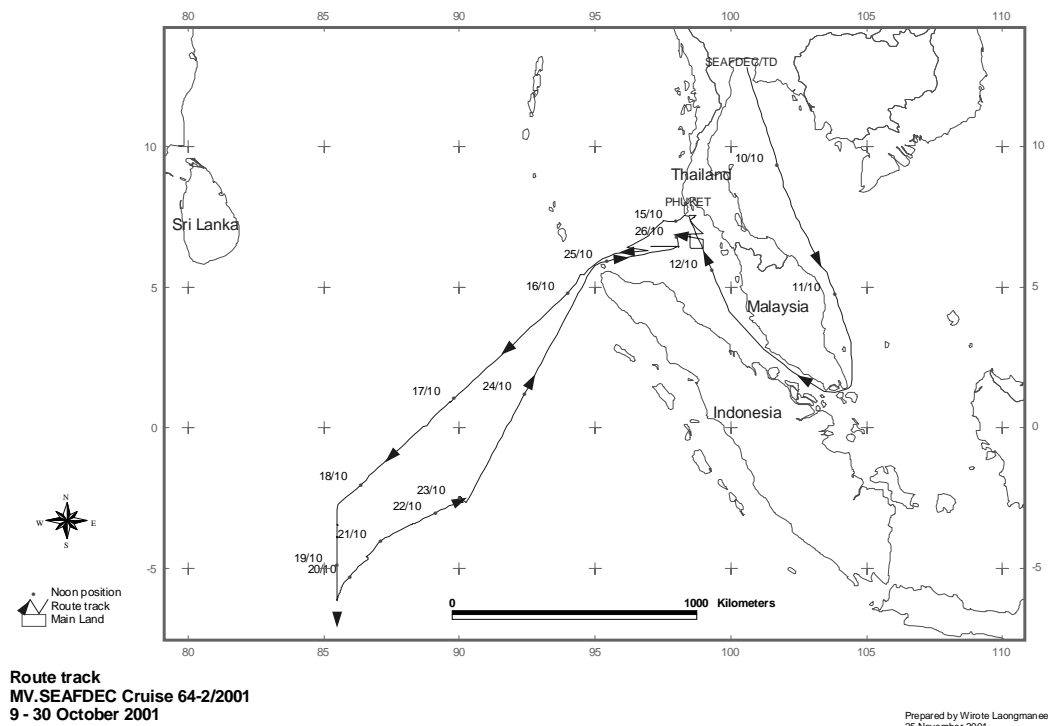


Figure 2. Route track of cruise no. 64-2/2001

# **ANNEX I**



SEAFDEC Fishing Logsheet

Recorder: Pattarajit

Operation Information										
Vessel Name MV.SEAFDEC			Gear	Type of Gear: Automatic Squid Jiggin			Number of Gear 2			
Cruise no. 64-2/2001				Operation no.: 01			Memo: Unit=machine			
Station no. 001				Operation distance : - NM						
Date (dd/mm/yyyy) 20-10-2001			Position	Start	Latitude: 04_57.4	N / S	Time (local)	Hauling/ Shooting	Start: 20:30	
Depth of Capture - m					Longitude: 086_38.5	E / W				Finish: 02:00
Vessel Speed 0 kt				Finish	Latitude:	N / S			Start:	
Engine Speed 000 rpm					Longitude:	E / W			Finish:	
Environmental Information										
Air	Temperature - °C		Water							
	Pressure: - mbar		Color (Forel or Ule scale) -			Current (ground / water / true track)	Surface	Speed : - kt		
	Humidity: - %		Transparency - m					Direction : - deg		
	Wind Speed :- kt		Surface Temp.- °C				50 m	Speed : - kt		
	Direction :- deg		Sea Depth - m					Direction : - deg		
Weather condition: -		Stage of sea -			100 m		Speed : - kt			
Bottom			Direction : - deg							
Bottom Temp. : - C			Oceanographic stations							
Type of bottom: -			Type of instrument : SBE CTD			Memo :				
			File no.: SE64m017							
Catch Information										
No.	Species	No. (ind)	No.	Species	Weight (kg)	Remarks				
1	Purpleback Flying Squid(Male)	5	14			The weighting Balance is out of order				
2	Purpleback Flying Squid(Female)	10	15							
3			16							
4			17							
5			18							
6			19							
7			20							
8			21							
9			22							
10			23							
11			24							
12			25							
13			<b>Total</b>							



SEAFDEC Fishing Logsheet

Recorder: Pattarajit

Operation Information									
Vessel Name MV.SEAFDEC			Gear	Type of Gear: Automatic Squid Jiggin			Number of Gear 2		
Cruise no. 64-2/2001				Operation no.: 02			Memo: Unit=machine		
Station no. 002				Operation distance : - NM					
Date (dd/mm/yyyy) 21-10-2001			Position	Start	Latitude: 03_41.5	N / S	Time (local)	Hauling/ Shooting	Start: 20:10
Depth of Capture - m					Longitude: 088_13.2	E / W			Finish: 23:30
Vessel Speed 0 kt				Finish	Latitude: 03_41.2	N / S	Hauling/ Shooting	Start:	
Engine Speed 000 rpm					Longitude: 088_15.2	E / W		Finish:	
Environmental Information									
Air	Temperature 27.7 °C		Water						
	Pressure: 1008.3 mbar		Color (Forel or Ule scale) -	Current (ground / water / true track)	Surface	Speed : 0.1 kt		Direction : 020 deg	
	Humidity: 92.7 %				Transparency - m	50 m	Speed : 0.2 kt		Direction : 013 deg
	Wind Speed : 7.3 kt		Surface Temp. 29.2 °C		100 m		Speed : 0.5 kt		Direction : 356 deg
	Direction : 150 deg		Sea Depth - m						
Weather condition: -		Stage of sea -							
Bottom									
Bottom Temp. : - C			Oceanographic stations						
Type of bottom: -			Type of instrument : SBE CTD			Memo :			
			File no.: SE64m018						
Catch Information									
No.	Species	Weight (kg)	No.	Species	Weight (kg)	Remarks			
1	Purpleback Flying Squid(7)	1.255	14						
2			15						
3			16						
4			17						
5			18						
6			19						
7			20						
8			21						
9			22						
10			23						
11			24						
12			25						
13			Total		1.255				



**Recorder:** Pattarajit

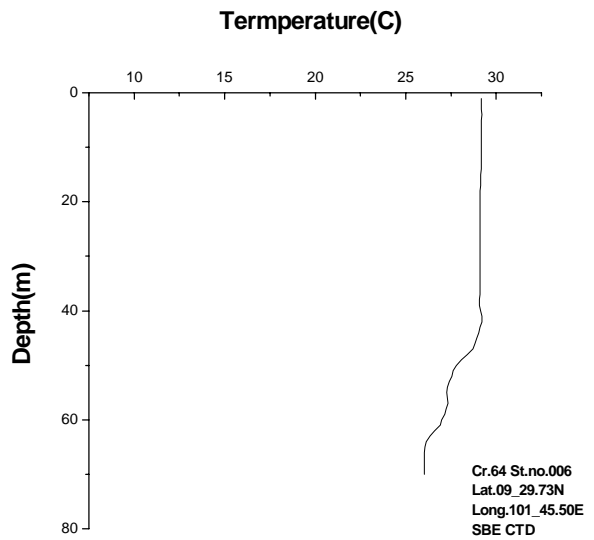
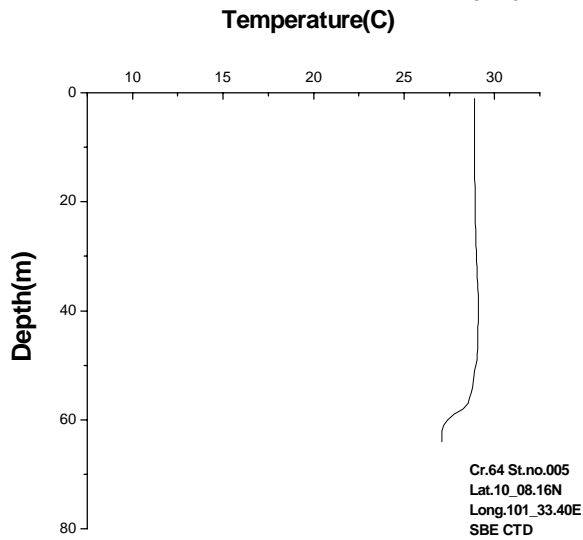
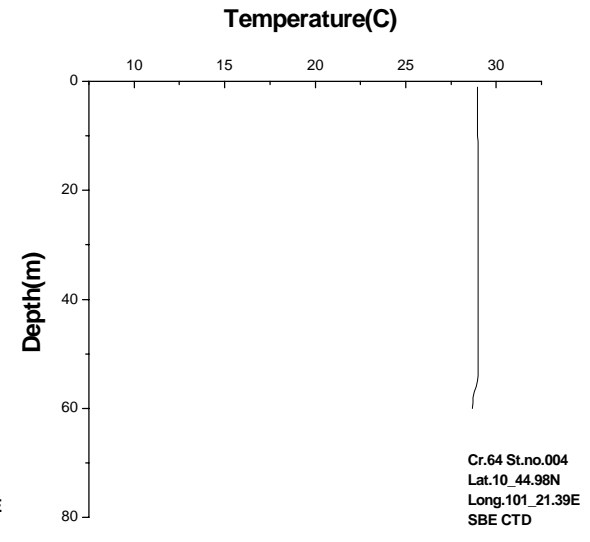
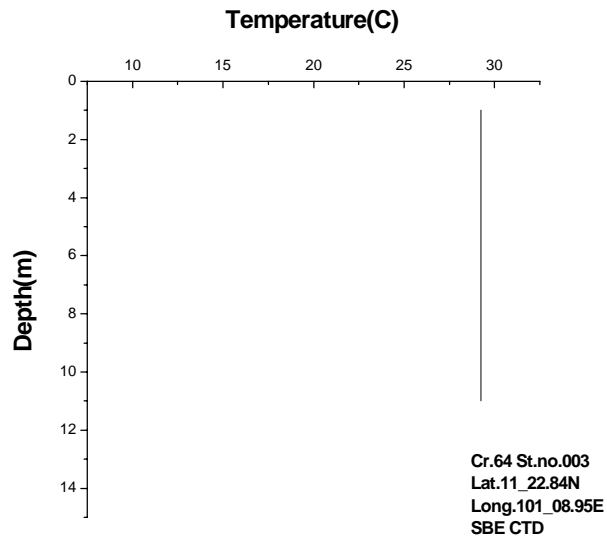
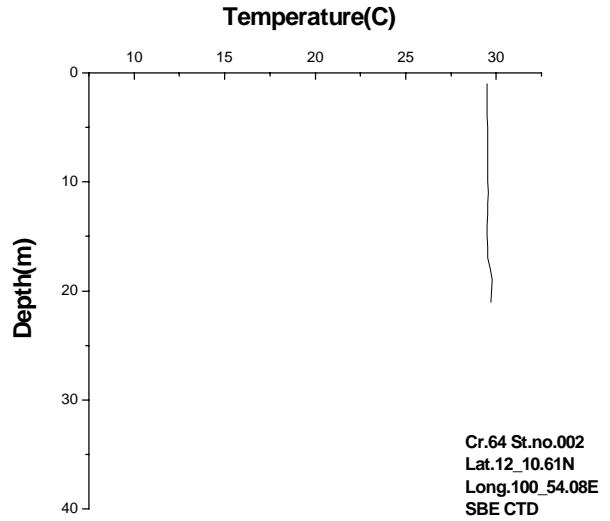
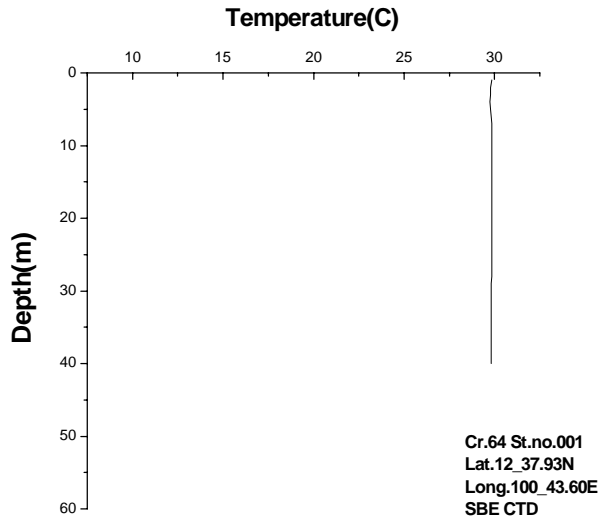
Operation Information										
Vessel Name		MV.SEAFDEC		Gear	Type of Gear: Tuna Longline			Number of Gear <sup>600</sup> hooklines		
Cruise no.		64-2/2001			Operation no.: 01			Memo:		
Station no.		003			Operation distance : - NM					
Date (dd/mm/yyyy)		23-10-2001		Position	Start	Latitude: 02_52.1	N / S	Time (local)	Shooting	Start: 04:05
Depth of Capture		-				Longitude: 090_08.0	E / W			Finish: 06:30
Vessel Speed		7 kt			Finish	Latitude: 02_37.9	N / S	Hauling	Start: 12:00	
Engine Speed		0400 rpm				Longitude: 089_58.6	E / W		Finish: 15:47	
Environmental Information										
Air	Temperature		27.7 °C		Water					
	Pressure:		1006.8 mbar		Current (ground / water / true track)	Surface	Color (Forel or Ule scale) -		Speed : 0.1 kt	
	Humidity:		86.5 %				Transparency - m		Direction : 352 deg	
	Wind Speed		:9.3 kt			50 m	Surface Temp. 28.8 °C		Speed : 0.1 kt	
Direction		:150 deg		Sea Depth - m			Direction : 225 deg			
Weather condition:		-		Stage of sea -		100 m	Speed : 0.5 kt			
Bottom						Direction : 267 deg				
Bottom Temp. :		- C		Oceanographic stations						
Type of bottom:		-		Type of instrument : SBE CTD		Memo : Thermocline~80 m.				
				File no.:		SE64m019				
Catch Information										
No.	Species	Weight (kg)	No.	Species	Weight (kg)	Remarks				
1	Black Marlin (1)	103	14			Black Marlin				
2	Lancet (4)	2.8	15			FL=256 cm				
3			16			TL=270 cm				
4			17			GL=85 cm				
5			18							
6			19							
7			20							
8			21							
9			22							
10			23							
11			24							
12			25							
13				<b>Total</b>	105.8					


**SEAFDEC Fishing Logsheet**
**Recorder:** Pattarajit

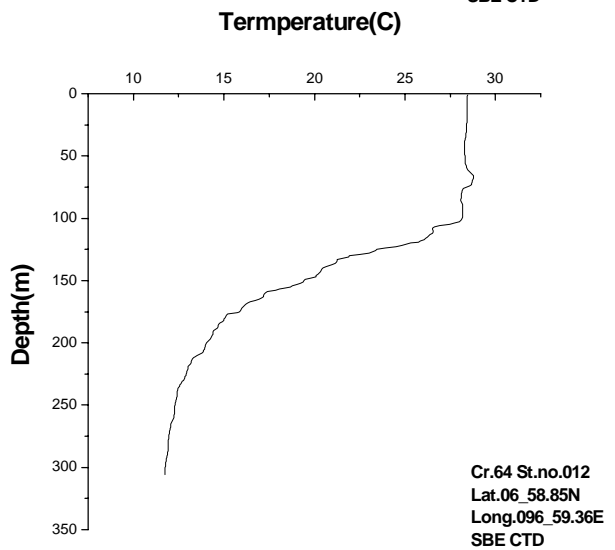
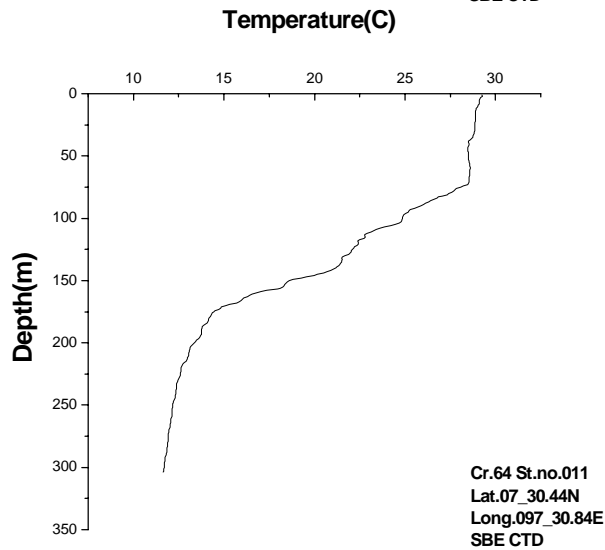
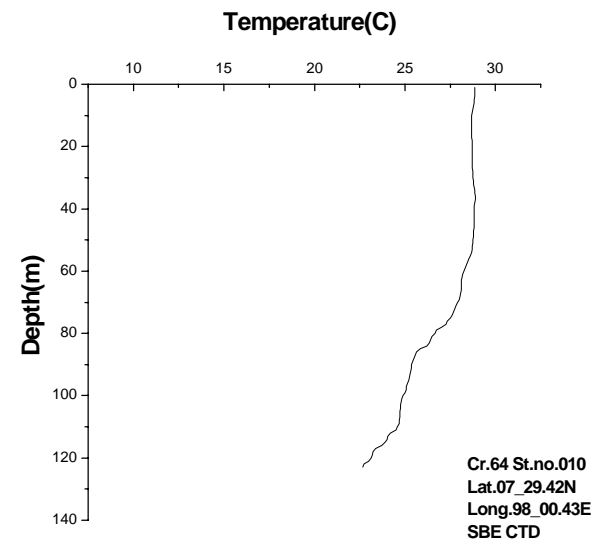
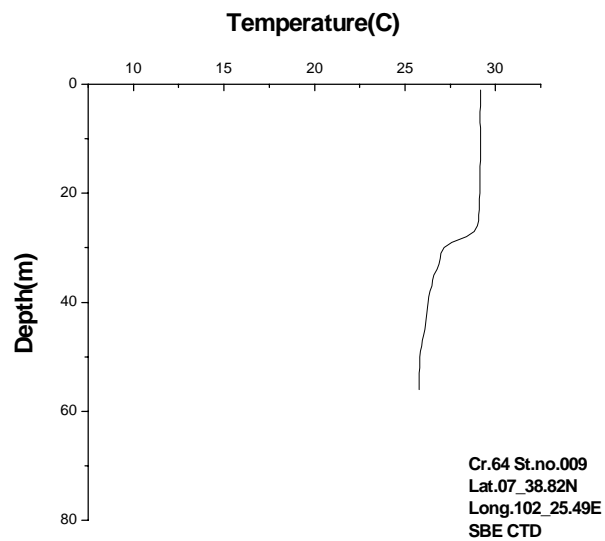
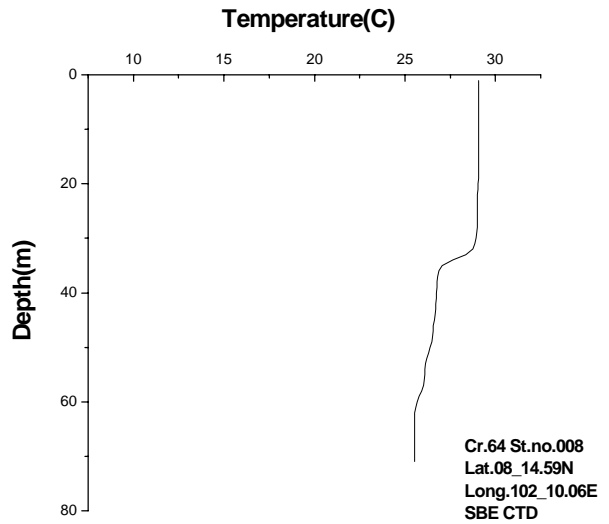
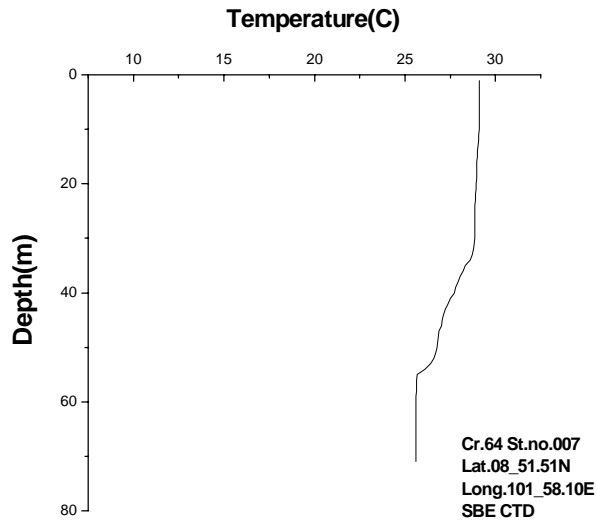
Operation Information										
<b>Vessel Name</b> MV.SEAFDEC		<b>Gear</b>	<b>Type of Gear:</b> Bottom Vertical Longline		<b>Number of Gear</b> 47 Baskets					
<b>Cruise no.</b> 66-4/2001			<b>Operation no.:</b> 01			<b>Memo:</b> 3 branchline/basket				
<b>Station no.</b> 003			<b>Operation distance :</b> 1.8 NM							
<b>Date (dd/mm/yyyy)</b> 10-12-2001		<b>Position</b>	<b>Start</b>	<b>Latitude:</b> 06_34.2	<b>N/ S</b>	<b>Time (local)</b>	<b>Shooting</b>	<b>Start:</b> 05:17		
<b>Depth of Capture</b> 140 - 160 m				<b>Longitude:</b> 098_04.8	<b>E/ W</b>			<b>Finish:</b> 05:53		
<b>Vessel Speed</b> 3 kt			<b>Finish</b>	<b>Latitude:</b> 06_32.4	<b>N/ S</b>	<b>Hauling</b>	<b>Start:</b> 09:00			
<b>Engine Speed</b> 0000 rpm				<b>Longitude:</b> 098_04.7	<b>E/ W</b>		<b>Finish:</b> 11:00			
Environmental Information										
<b>Air</b>	<b>Temperature</b> 27.3 °C		<b>Water</b>							
	<b>Pressure:</b> 1005.9 mbar		<b>Current</b> (ground / water / true track)	<b>Color (Forel or Ule scale)</b> -		<b>Surface</b>	<b>Speed :</b> 0.8 kt			
	<b>Humidity:</b> 86.9 %			<b>Transparency</b> - m			<b>Direction :</b> 022 deg			
	<b>Wind Speed :</b> 3.6 kt			<b>Surface Temp.</b> 29.2 °C		<b>50 m</b>	<b>Speed :</b> 0.4 kt			
<b>Directi</b> 3100 deg		<b>Sea Depth</b> 184 m		<b>Direction :</b> 336 deg						
<b>Weather condition</b> C		<b>Stage of sea</b> Slight		<b>100 m</b>	<b>Speed :</b> 0.6 kt					
<b>Bottom</b>		<b>Direction :</b> 013 deg								
<b>Bottom Temp. :</b> C		<b>Oceanographic stations</b>								
<b>Type of bottom:</b> -		<b>Type of instrument :</b> SBE CTD			<b>Memo :</b>					
		<b>File no.:</b> SE64m020								
Catch Information										
No.	Species	Weight (kg)	No.	Species	Weight (kg)	Remarks				
1	Armour searobin (42)	32	14	Lizardfish (1)	0.1					
2	Grouper (11)	25	15	Moray eel (10)	0.3					
3	Golden snapper (12)	22	16	Carpet shark (3)	1.4					
4	Red snapper (5)	9.5	17							
5	Sweetlip(19)	7	18							
6	<i>Portinus macrocephalus</i> (8)	1.6	19							
7	Dogshark(44)	43	20							
8	Cat shark(75)	25	21							
9	Soldier ( <i>Ostichthys</i> sp) (2)	1.5	22							
10	<i>Beryx splendens</i> (3)	0.8	23							
11	<i>Octopus</i> sp. (1)	0.6	24							
12	Eel (5)	1.0	25							
13	Flounder (9)	1.3	<b>Total</b>		172.1					

## **ANNEX II**

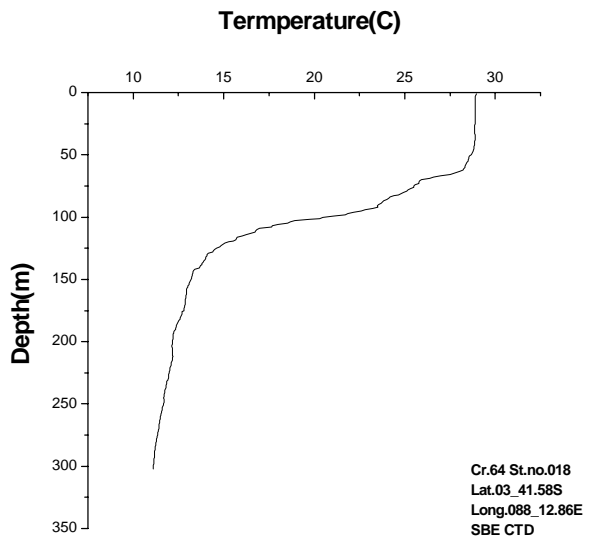
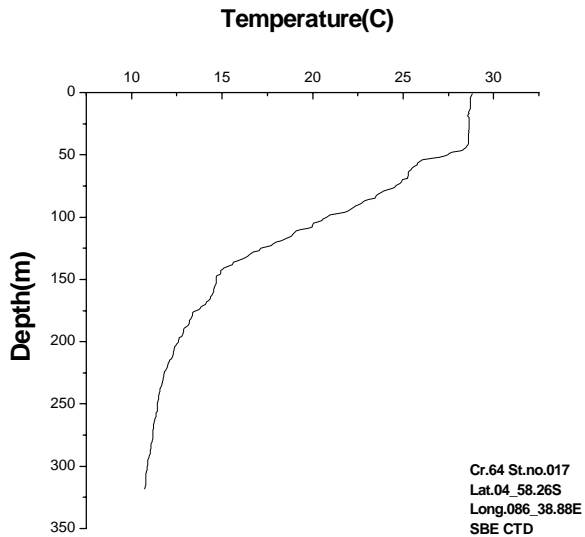
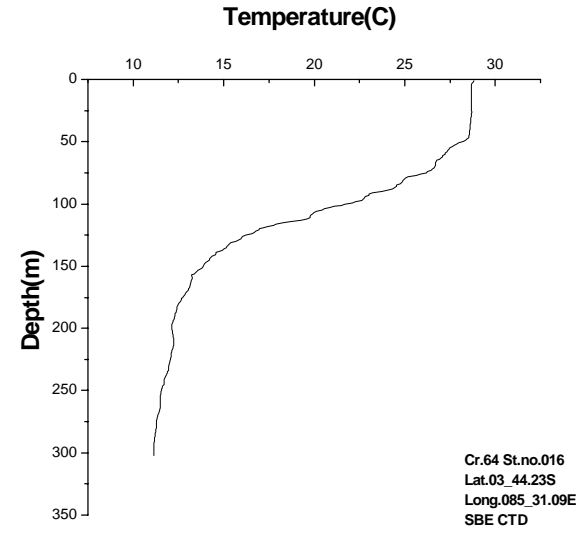
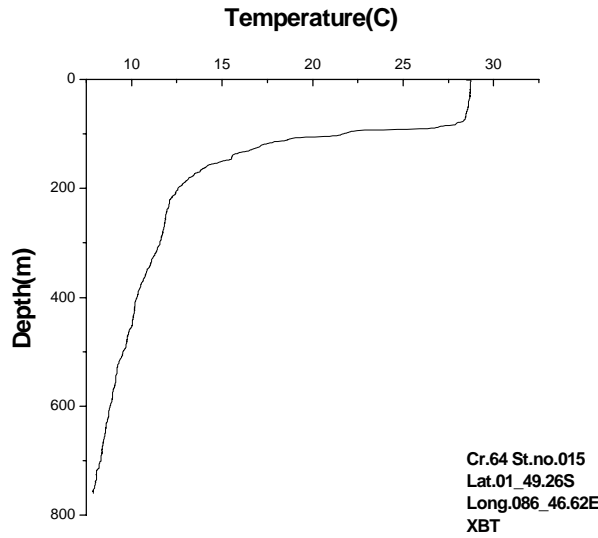
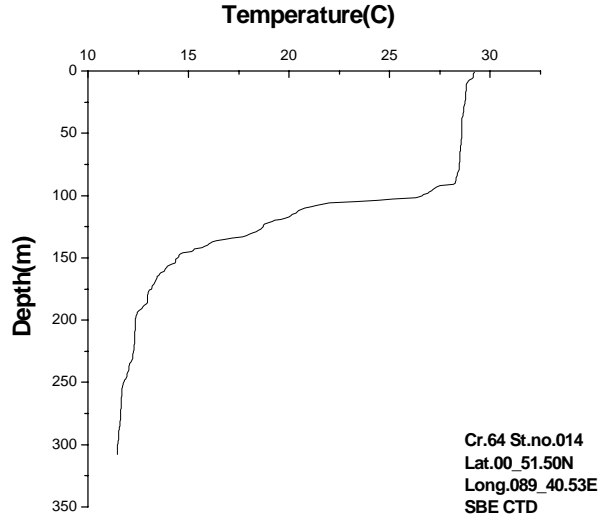
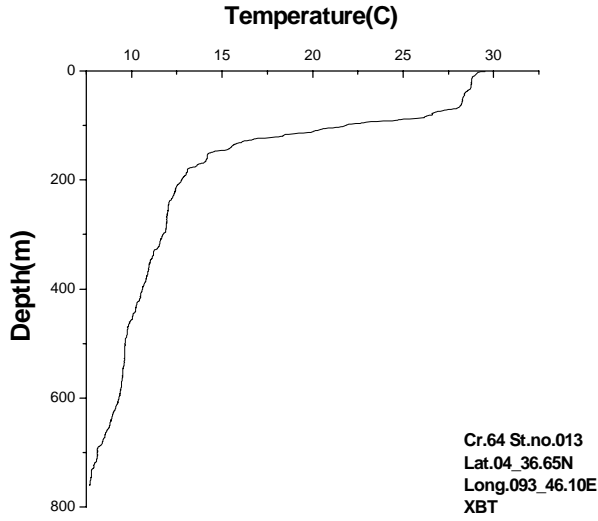
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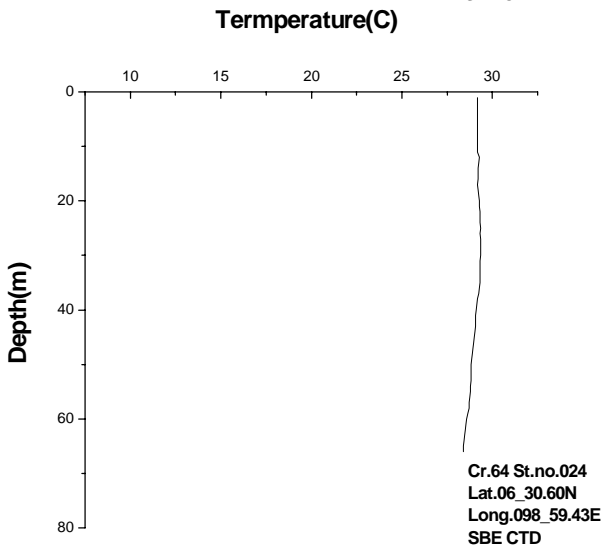
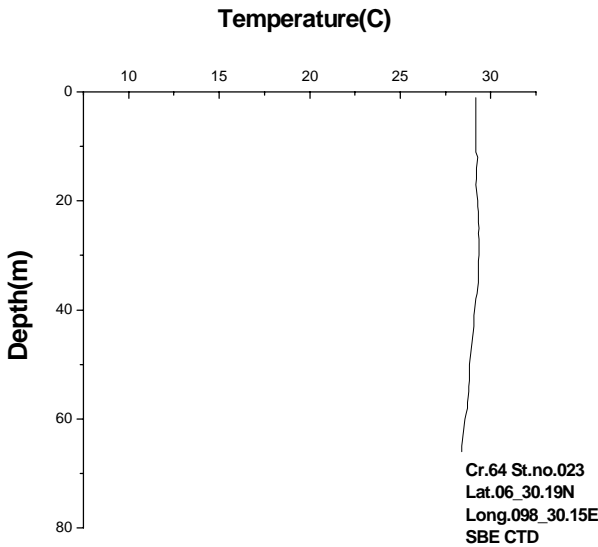
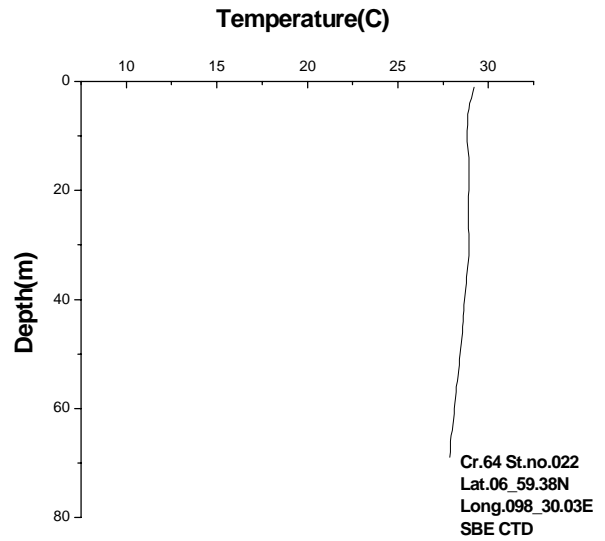
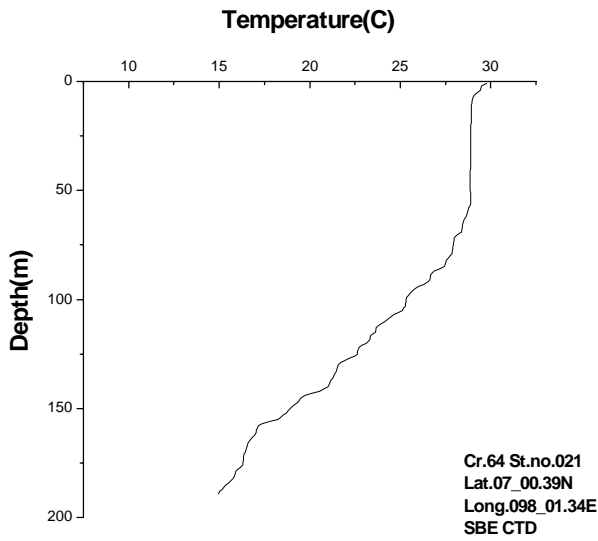
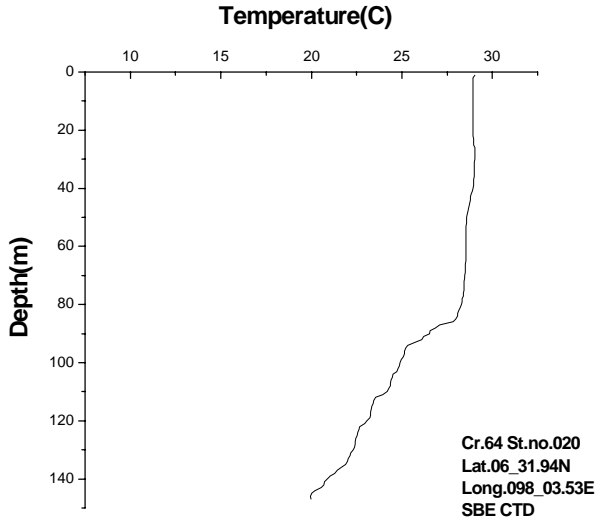
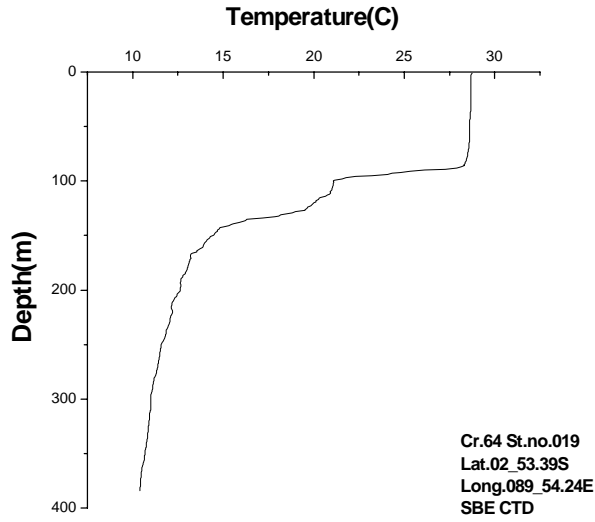
# Profile of Temperature



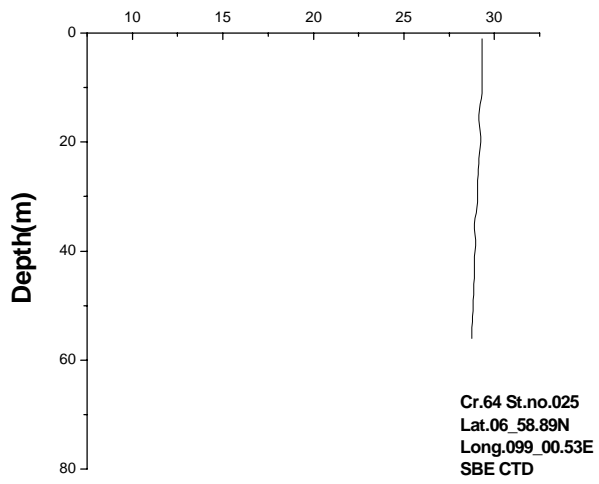
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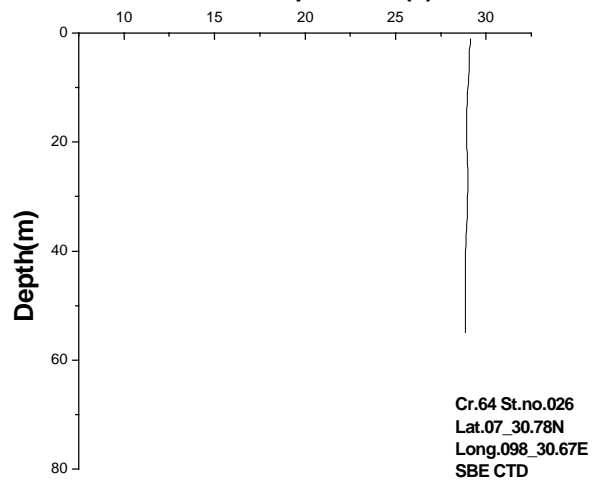
# Profile of Temperature



### Profile of Temperature Temperature (c)

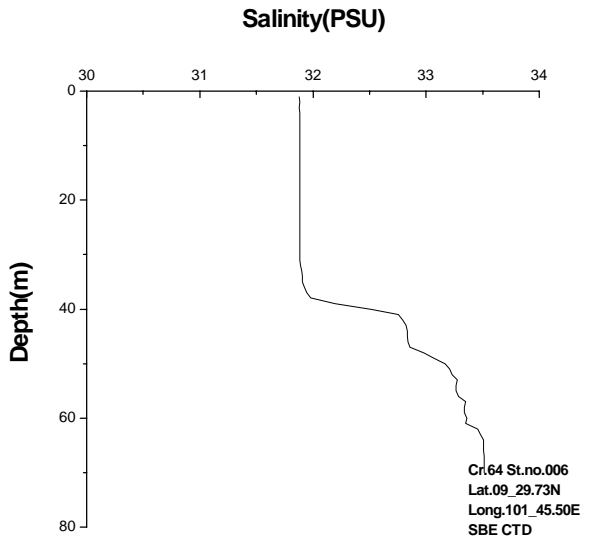
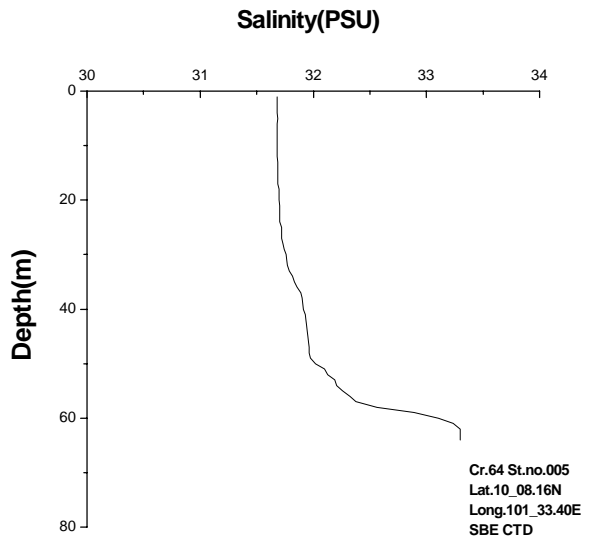
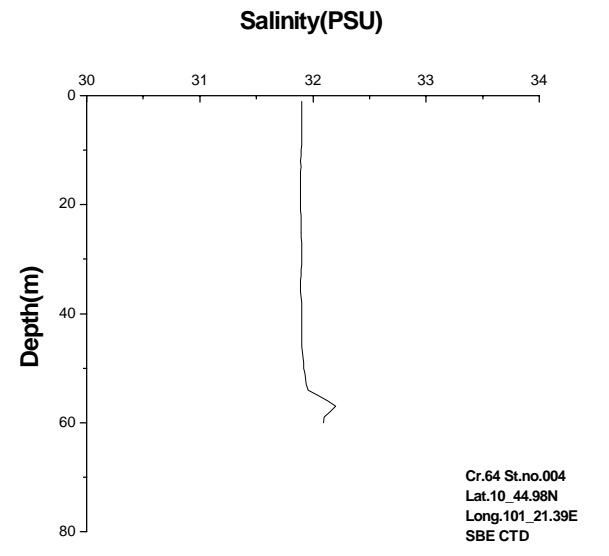
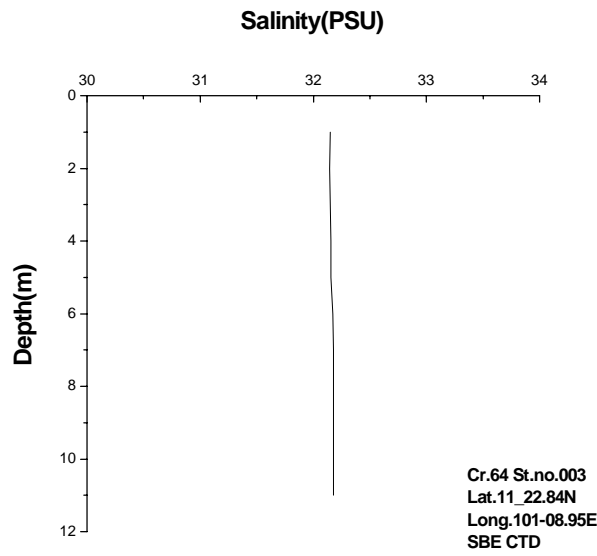
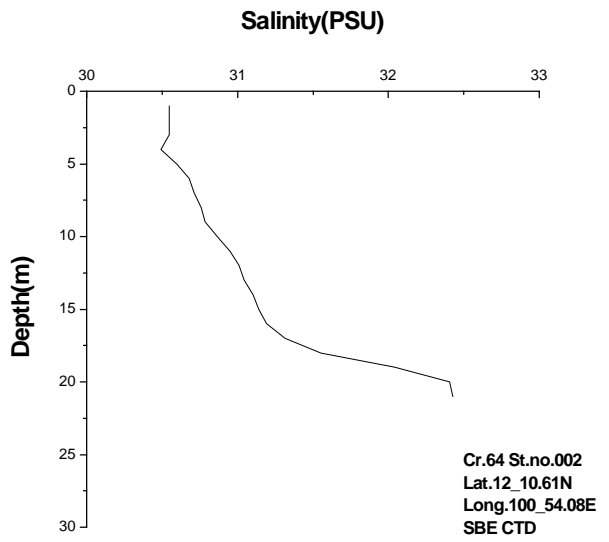
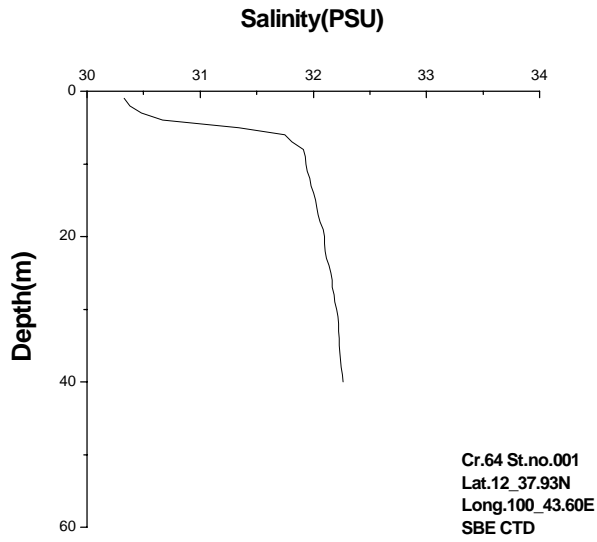


### Temperature (c)

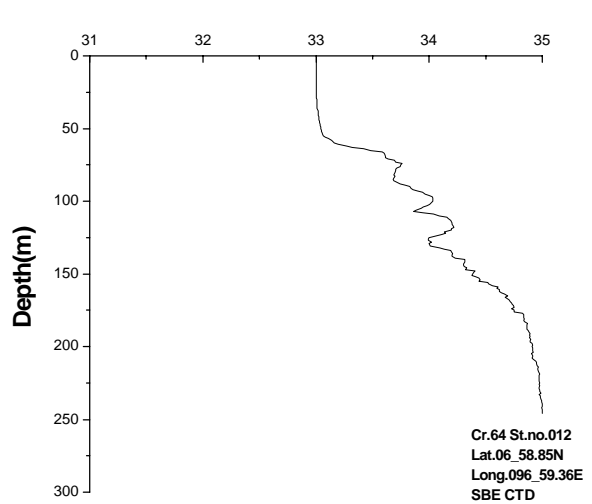
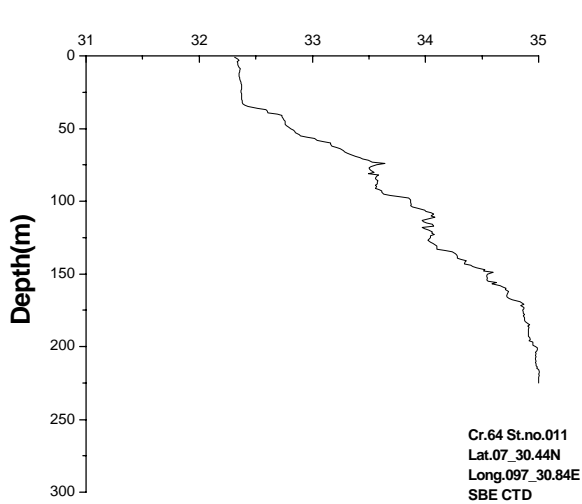
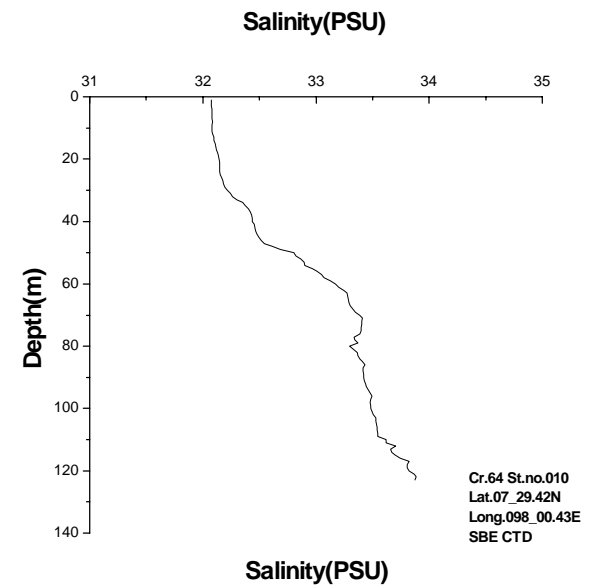
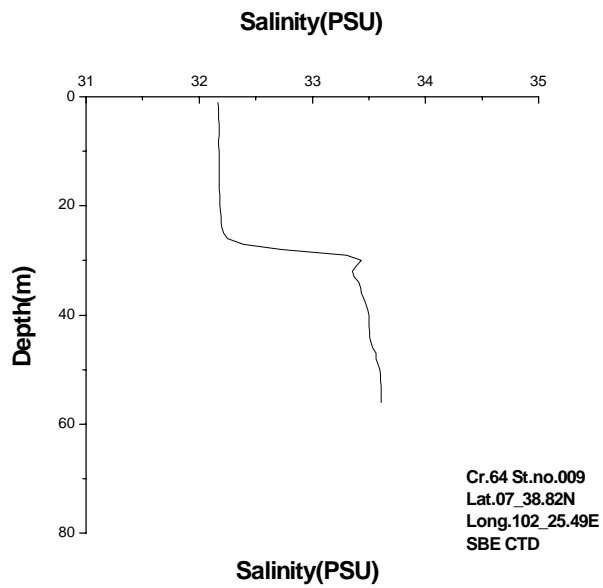
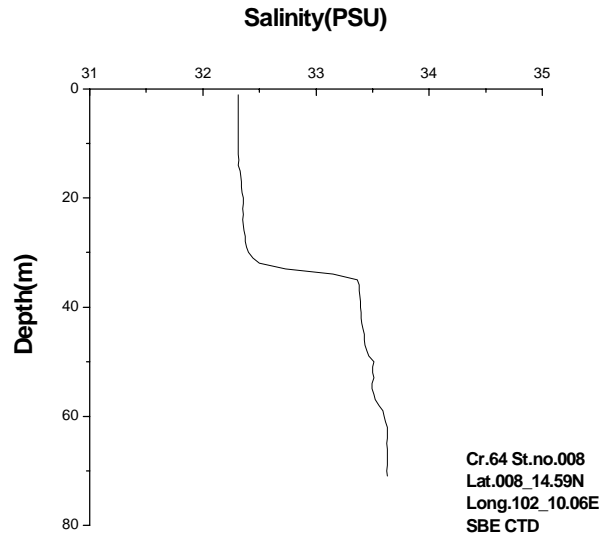
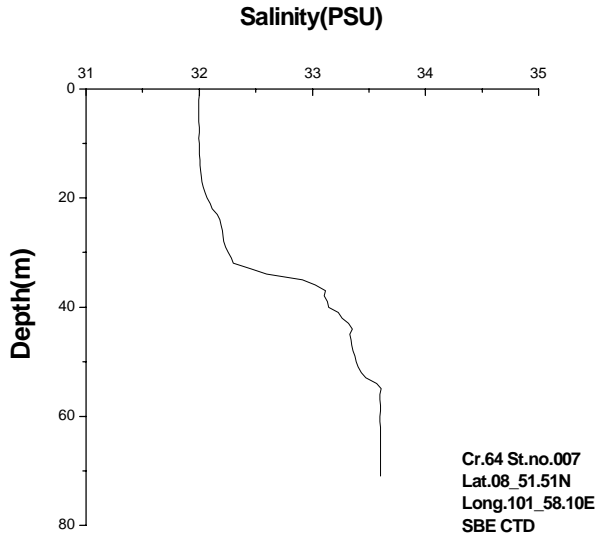




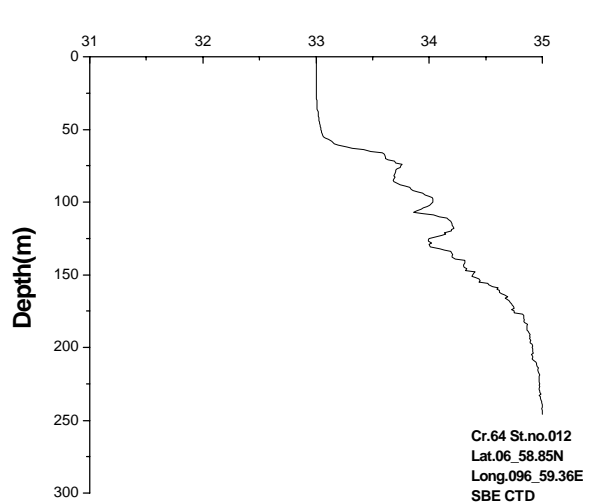
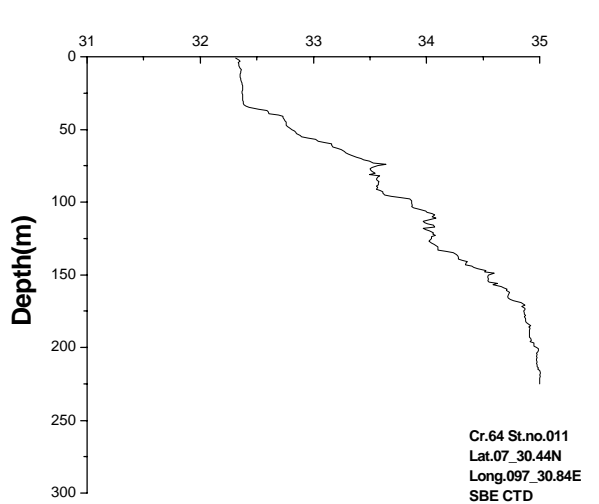
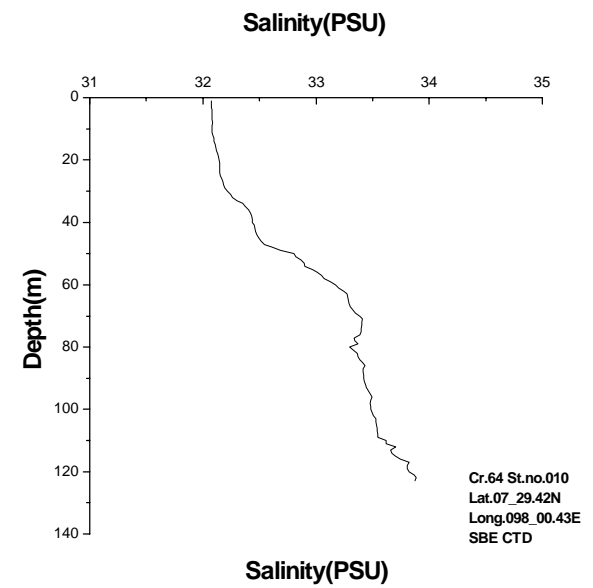
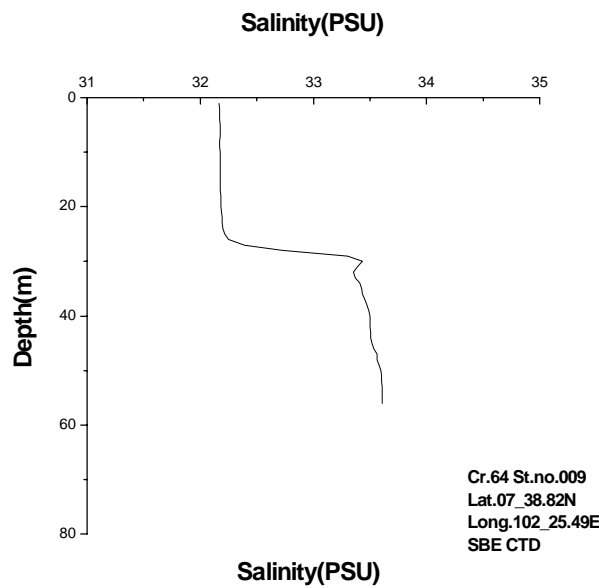
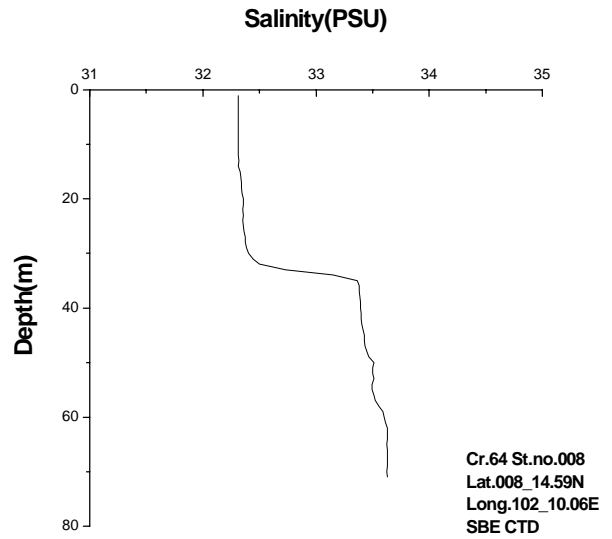
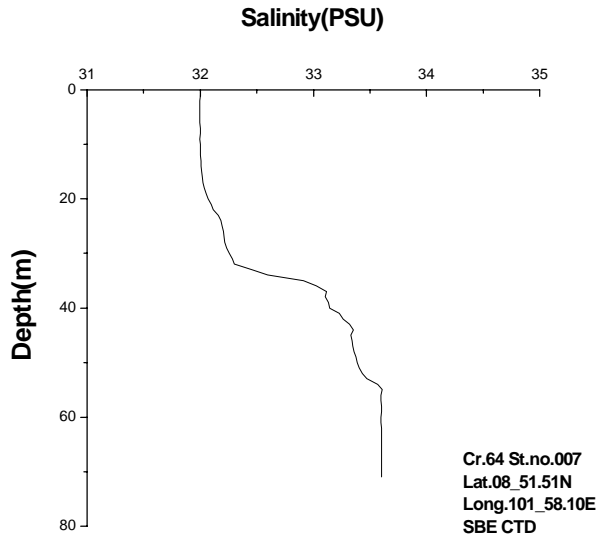
# Profile of Salinity



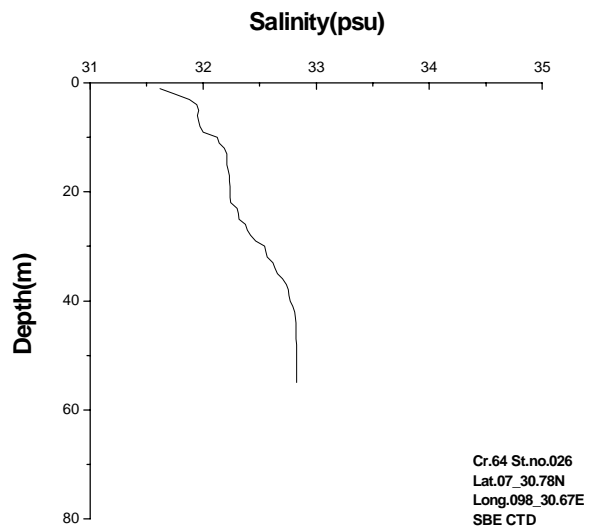
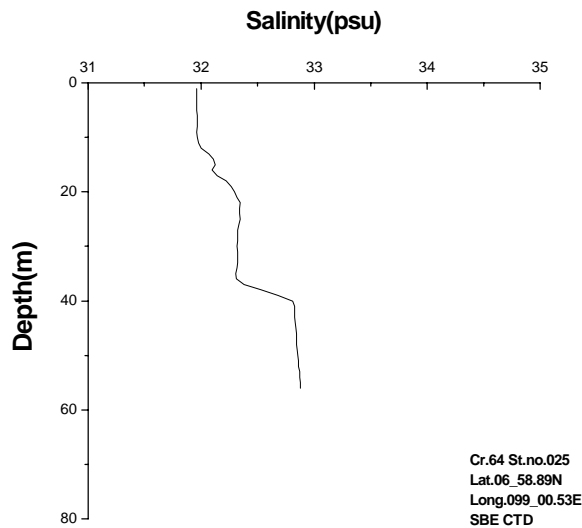
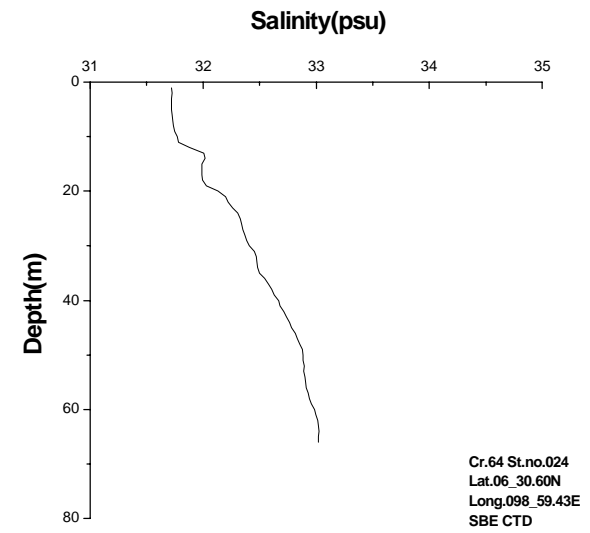
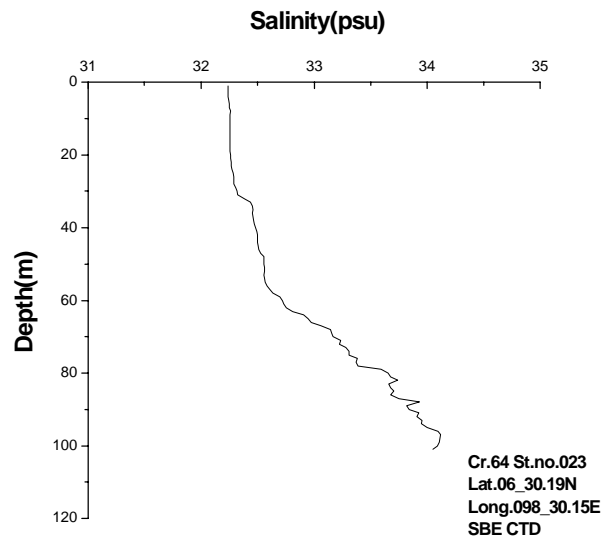
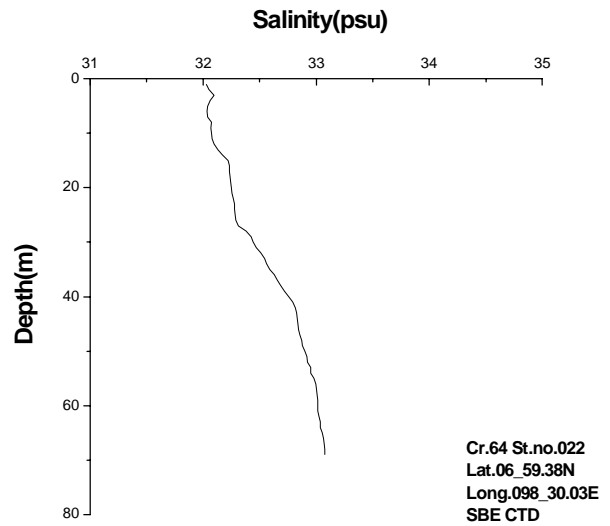
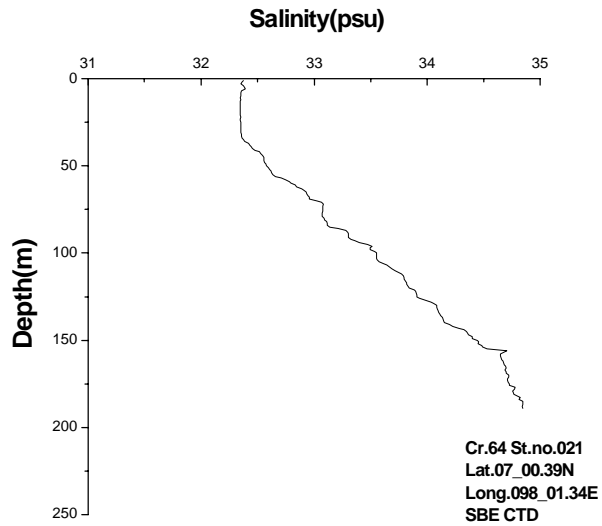
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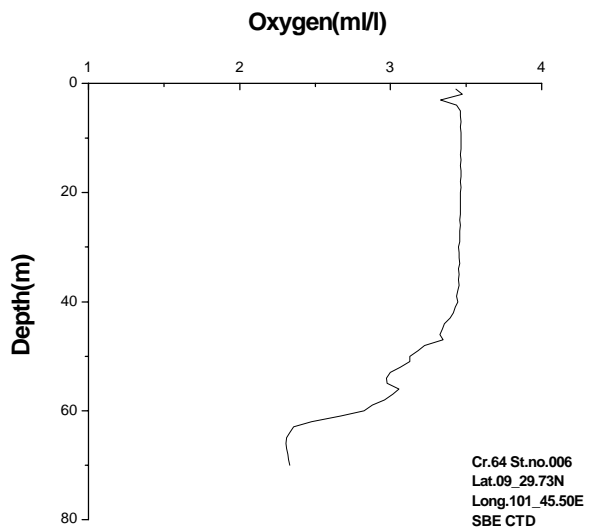
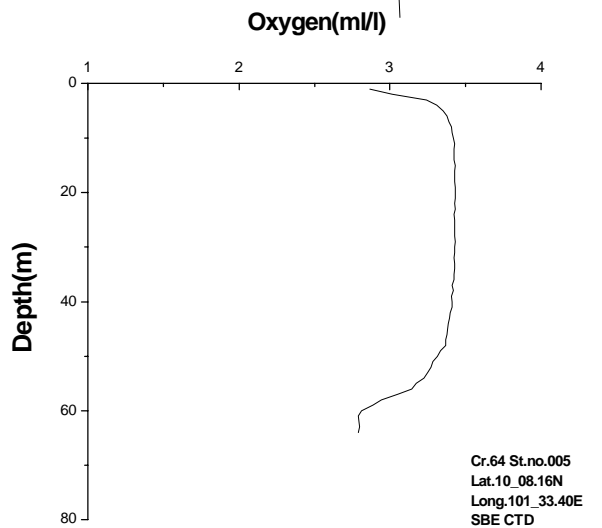
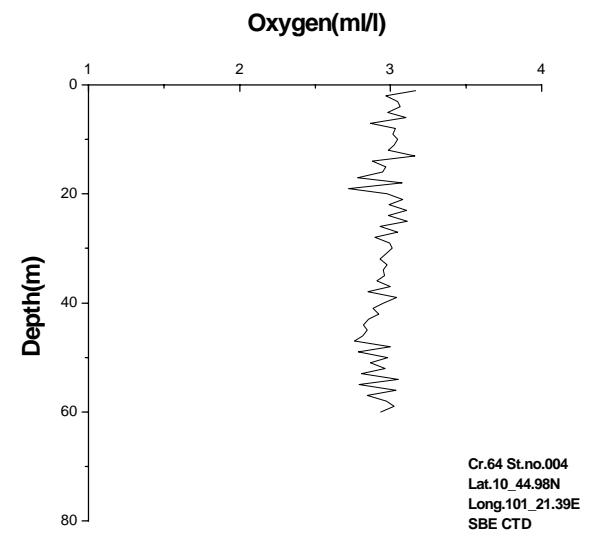
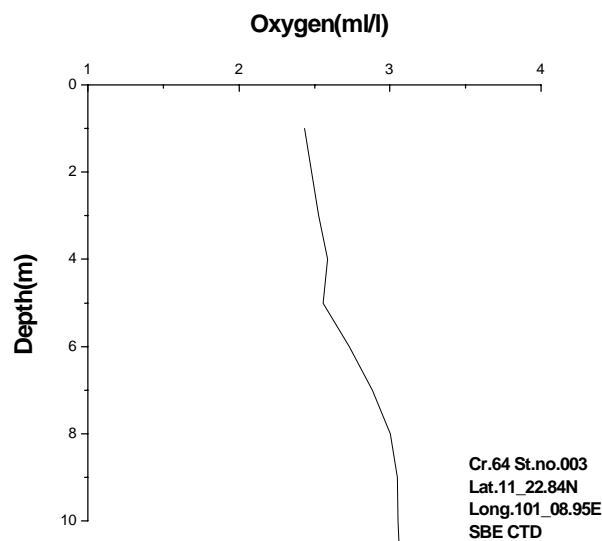
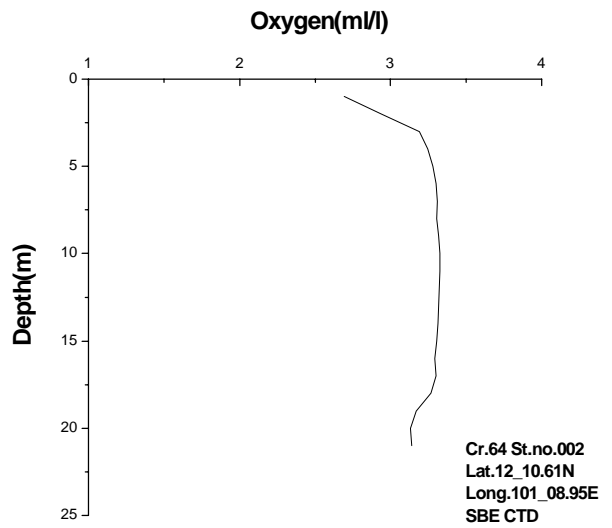
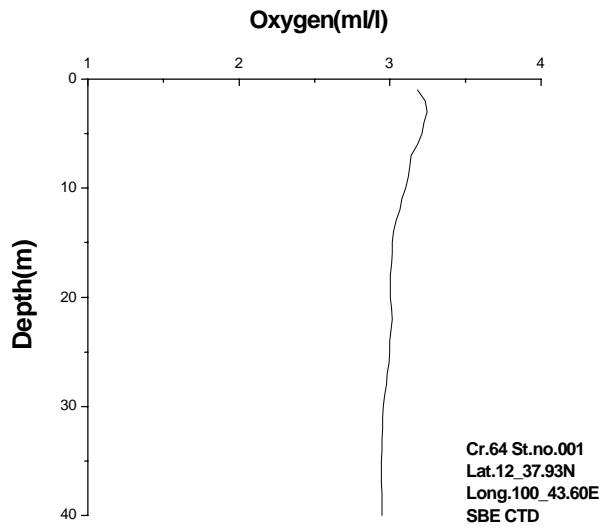
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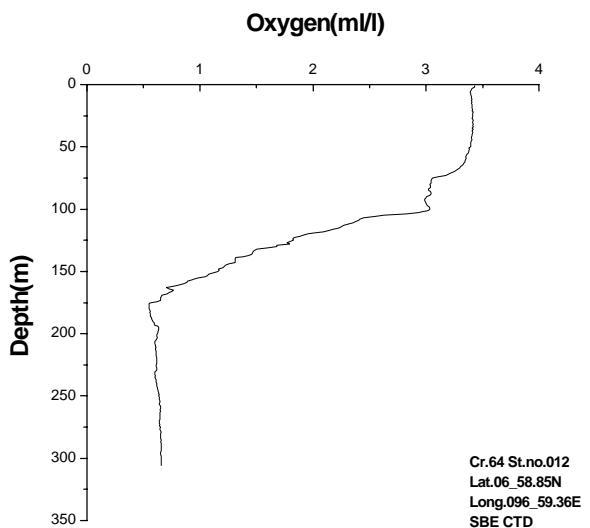
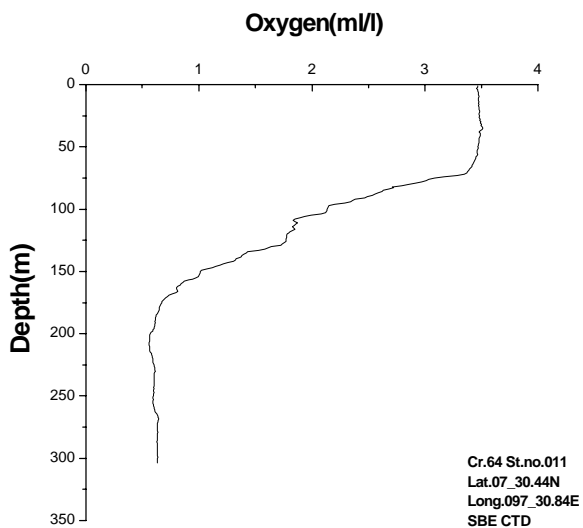
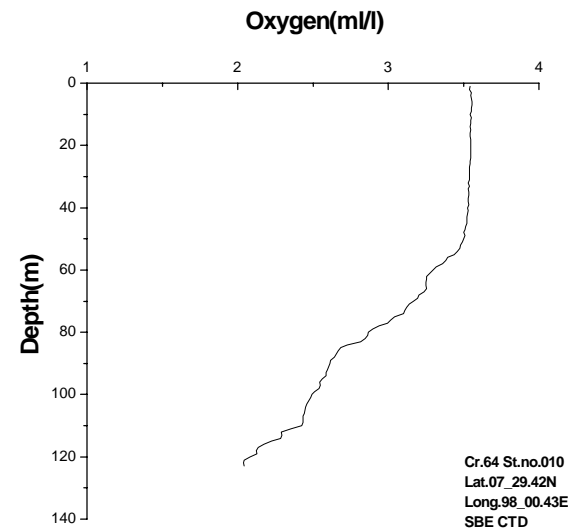
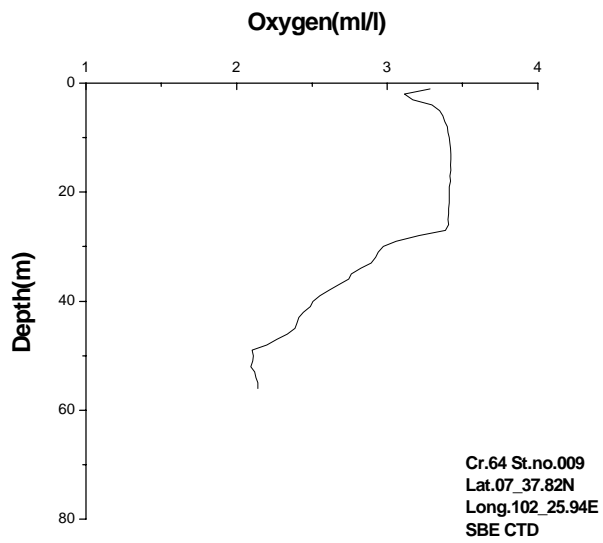
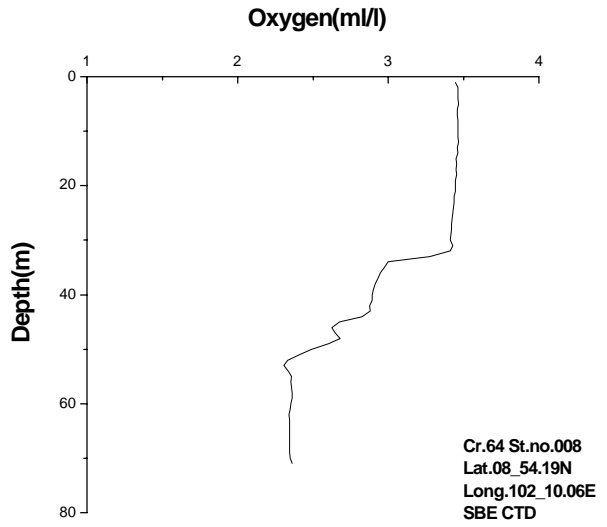
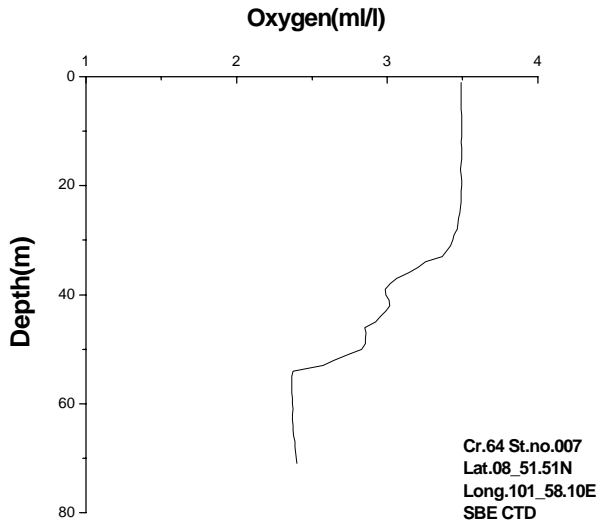
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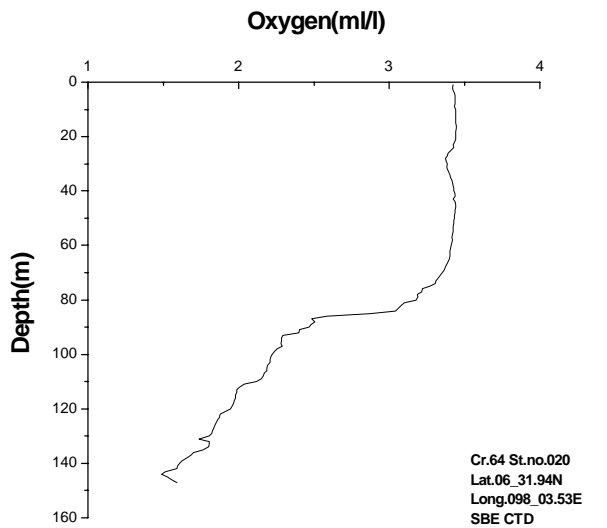
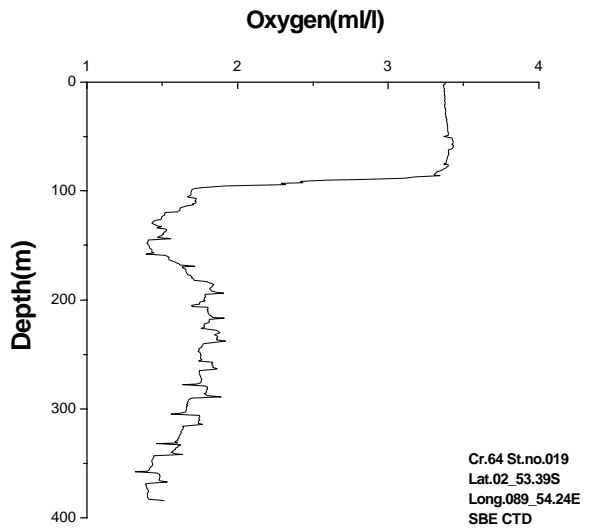
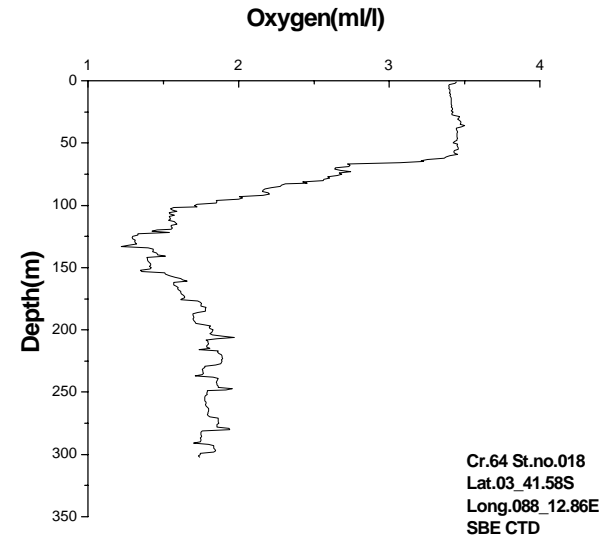
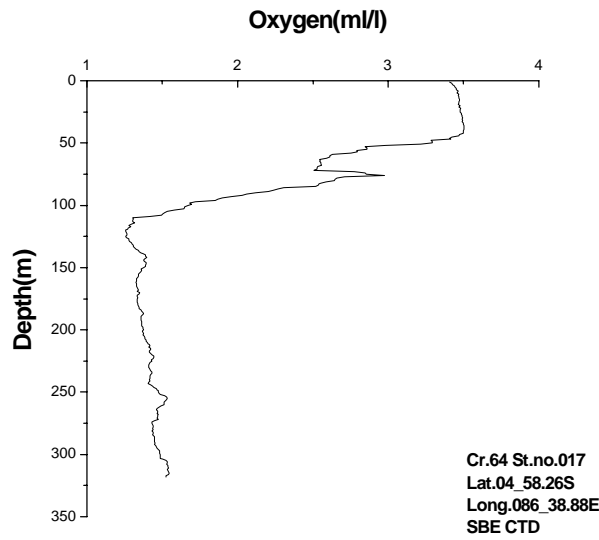
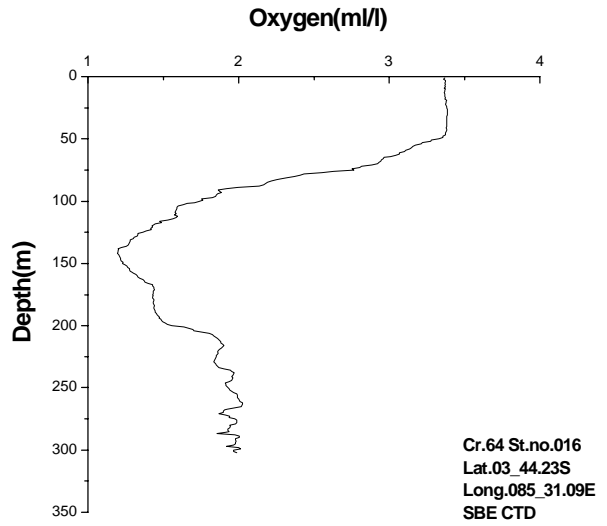
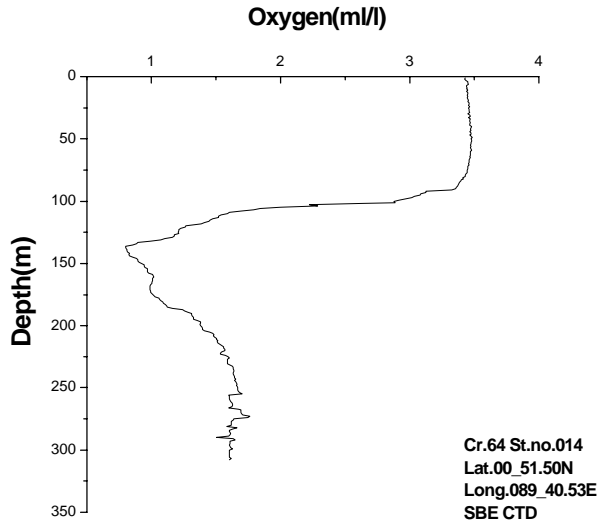
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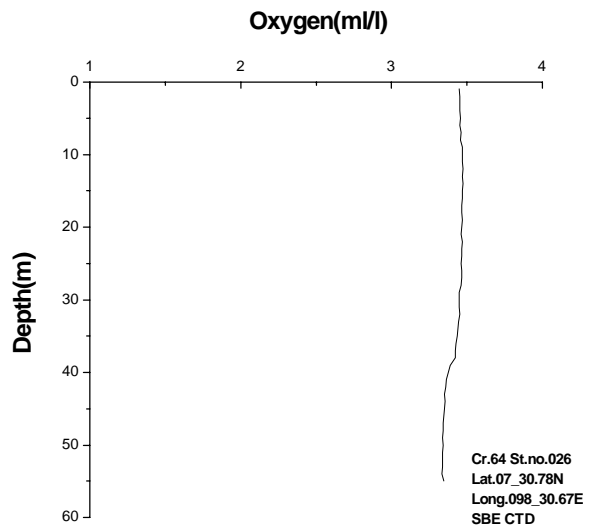
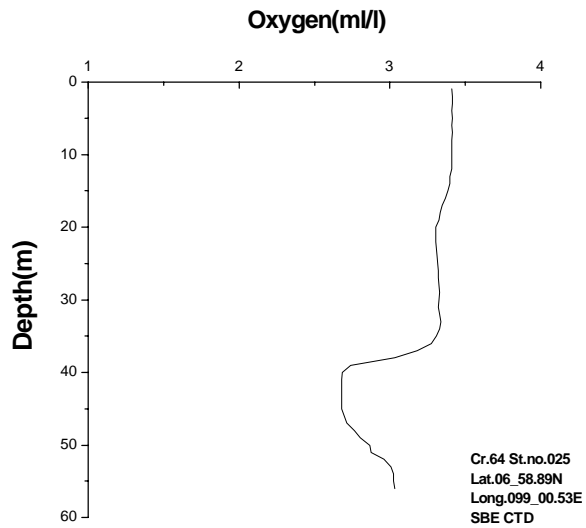
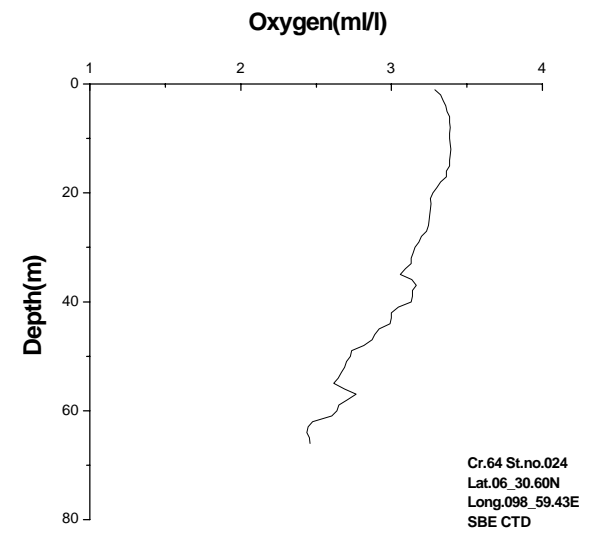
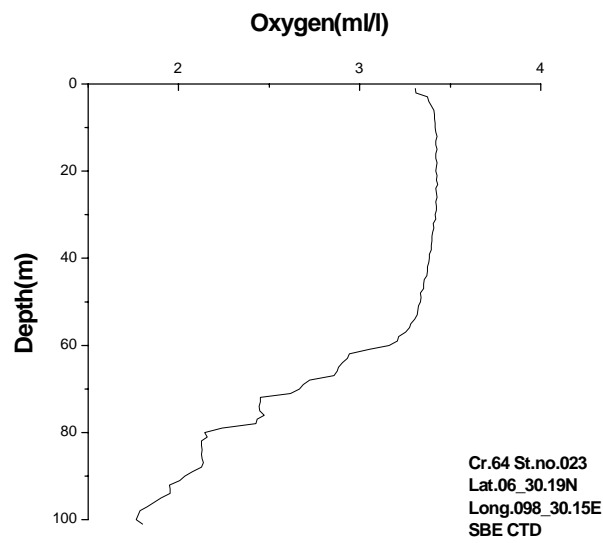
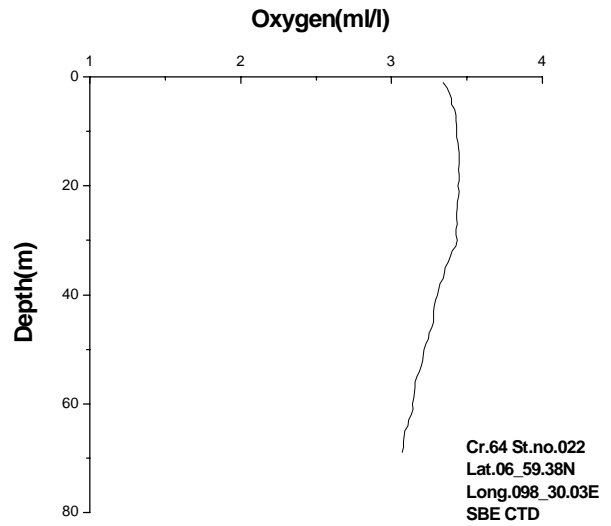
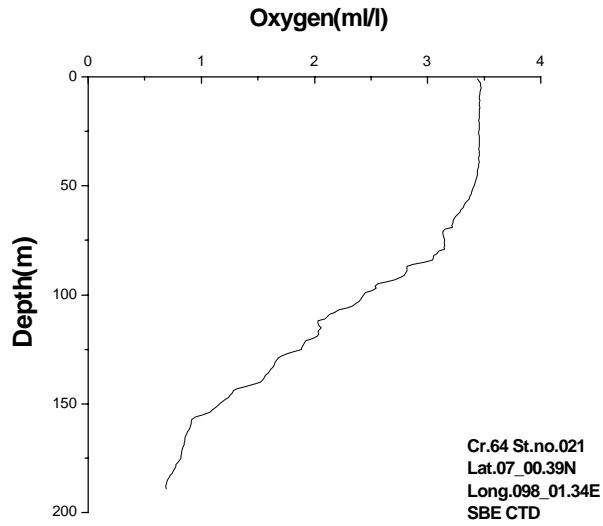
# Profile of Oxygen



# Profile of Oxygen

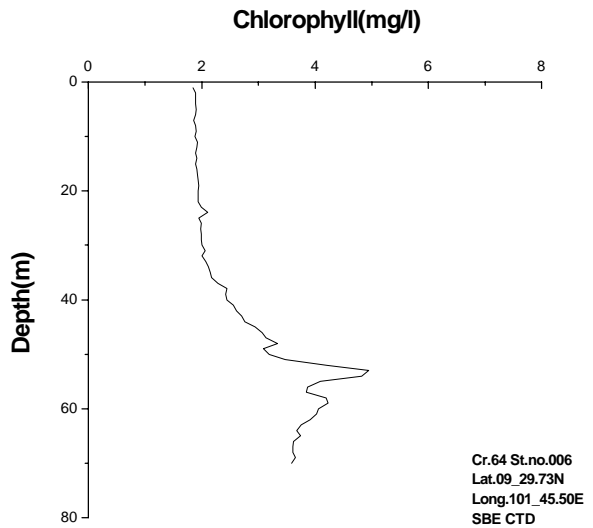
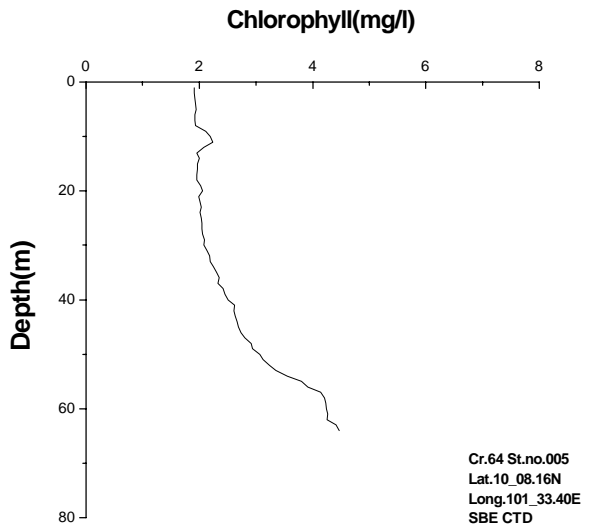
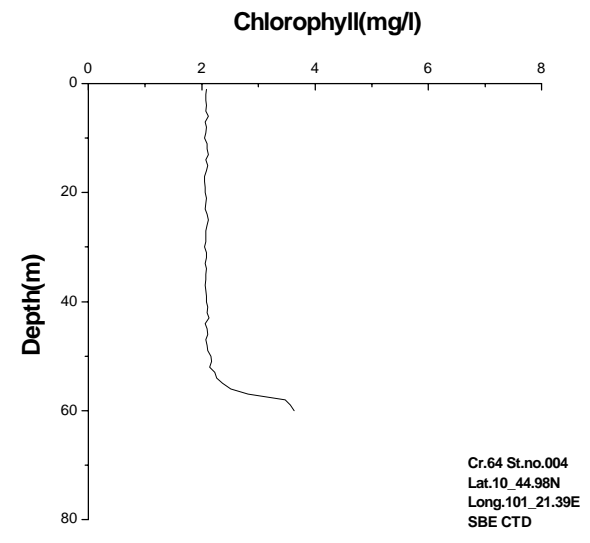
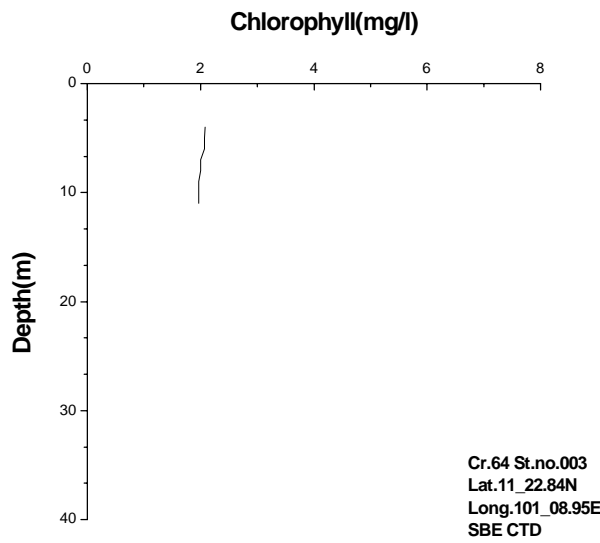
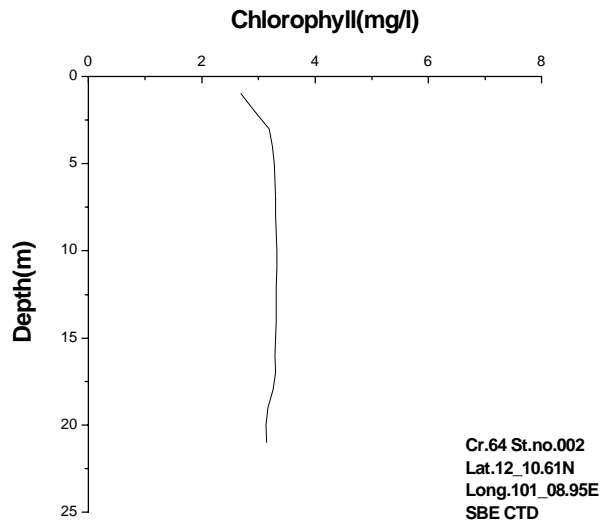
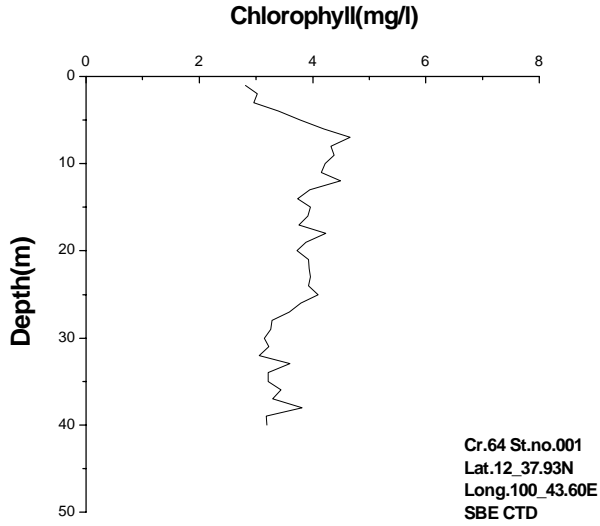


# Profile of Oxygen

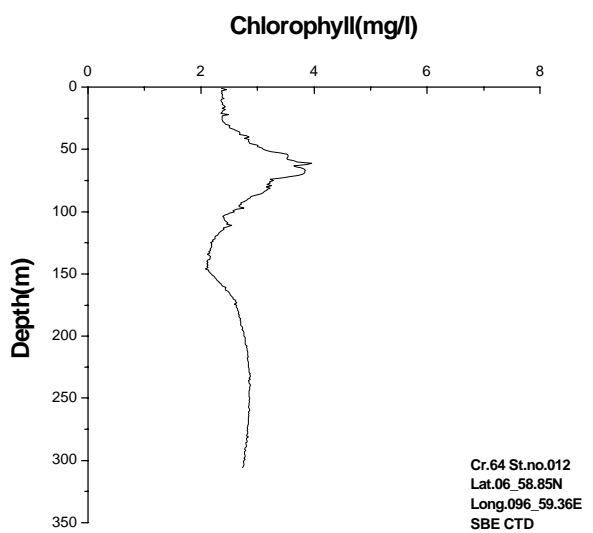
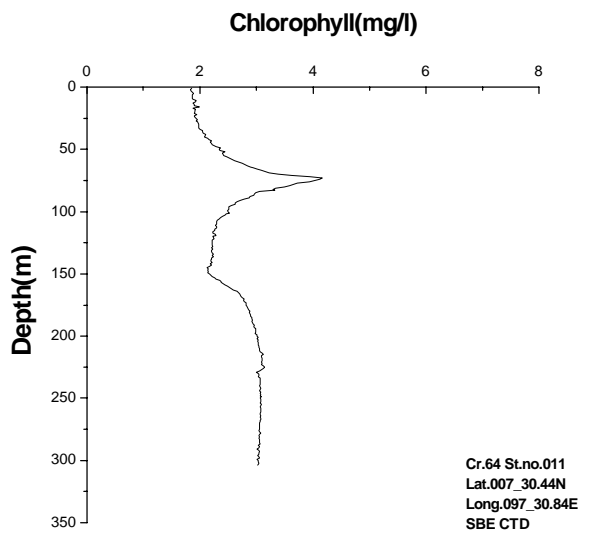
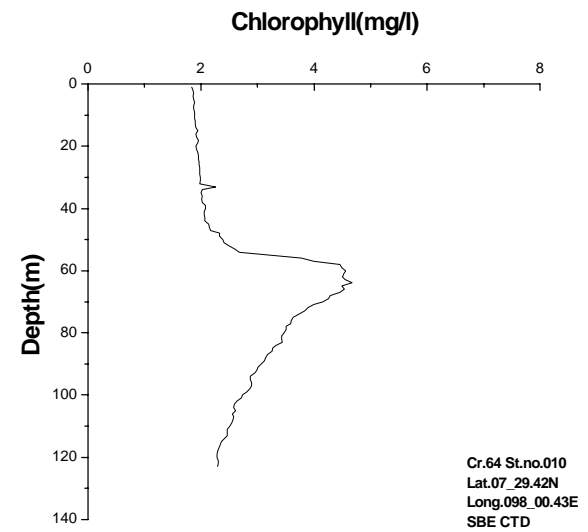
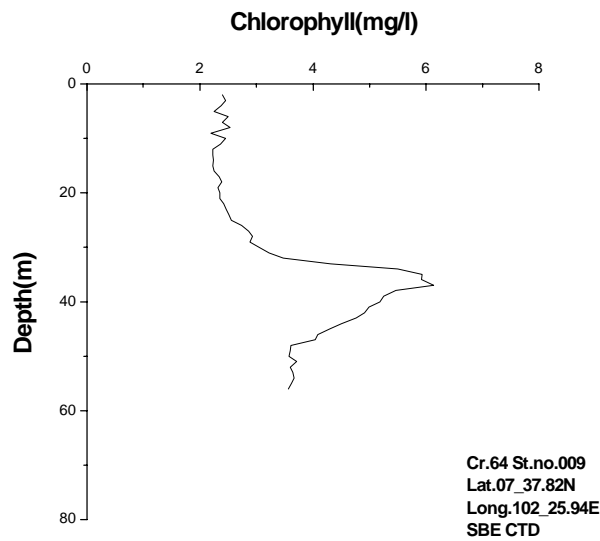
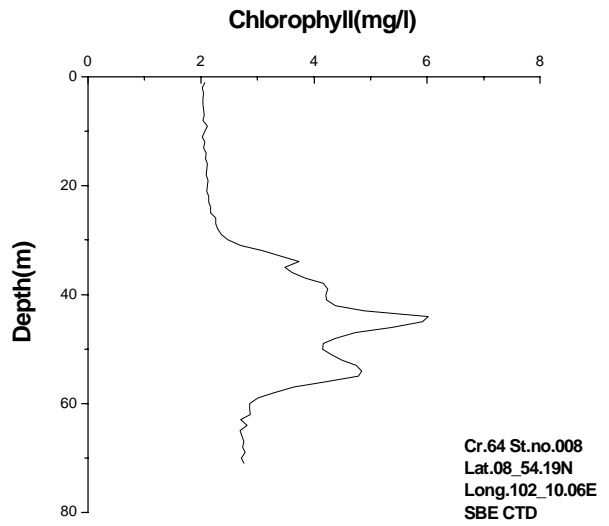
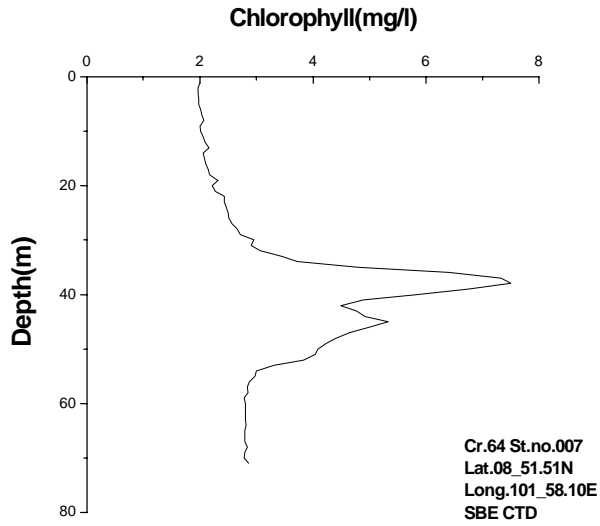




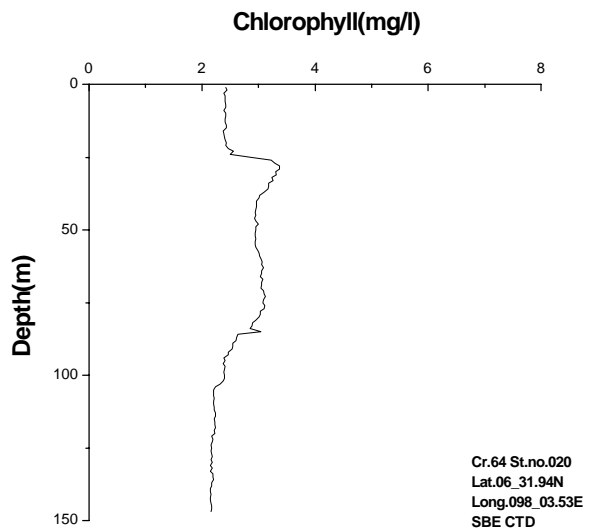
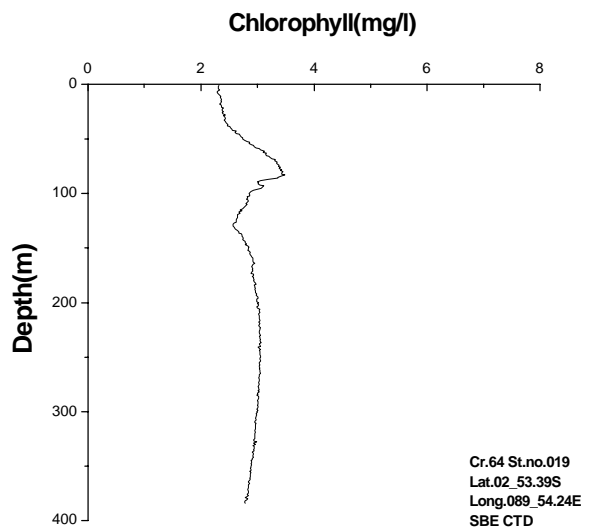
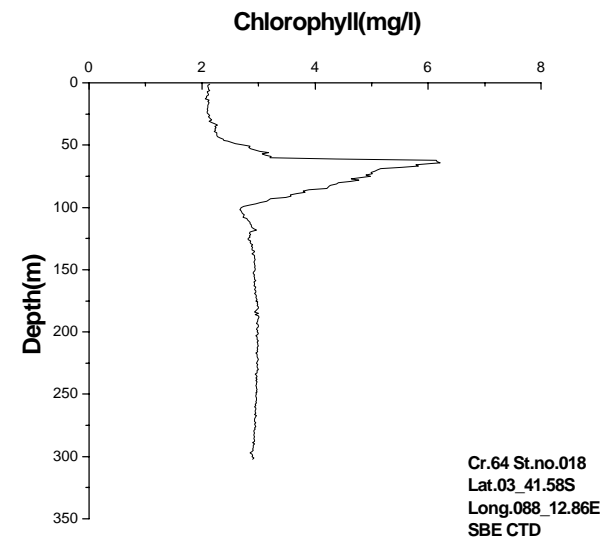
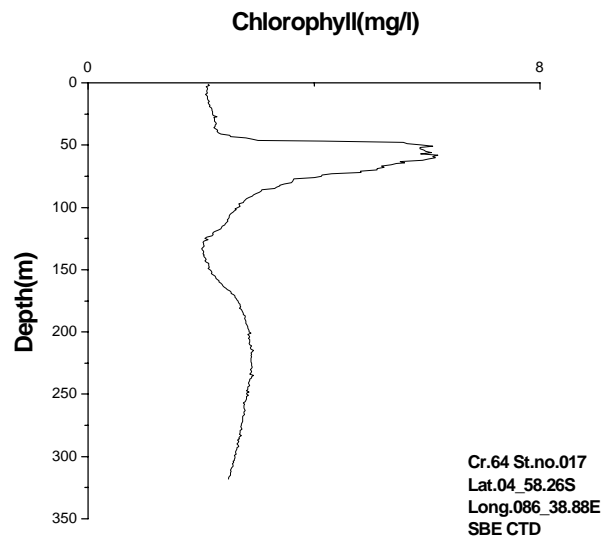
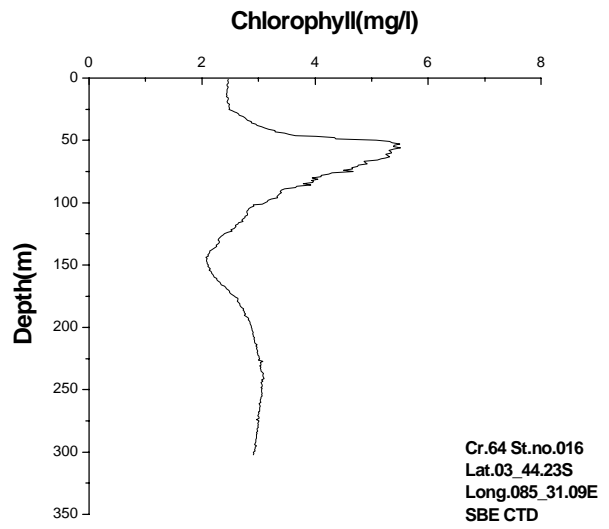
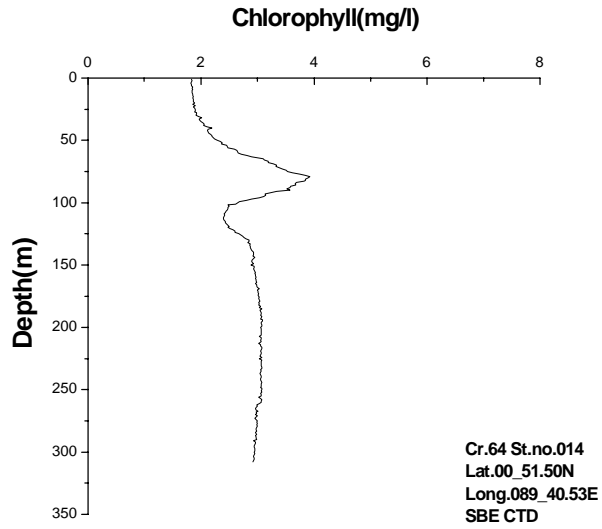
# Profile of Chlorophyll



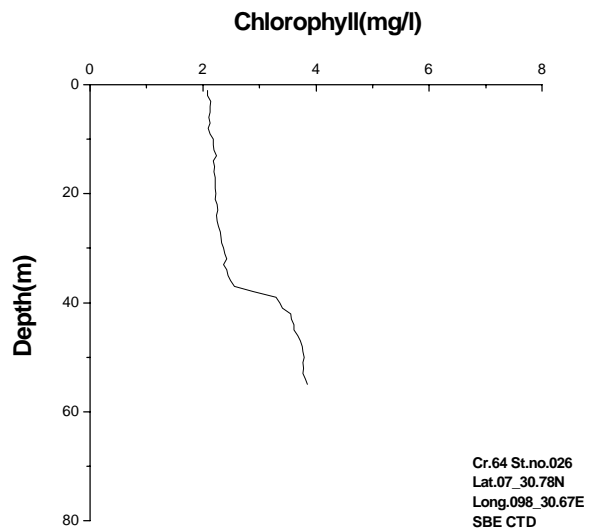
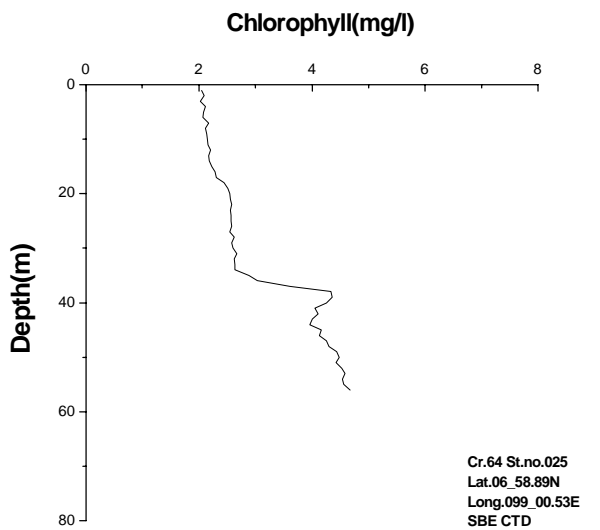
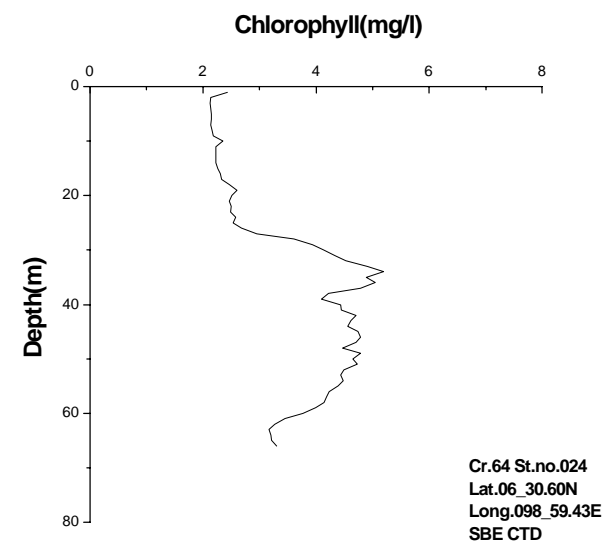
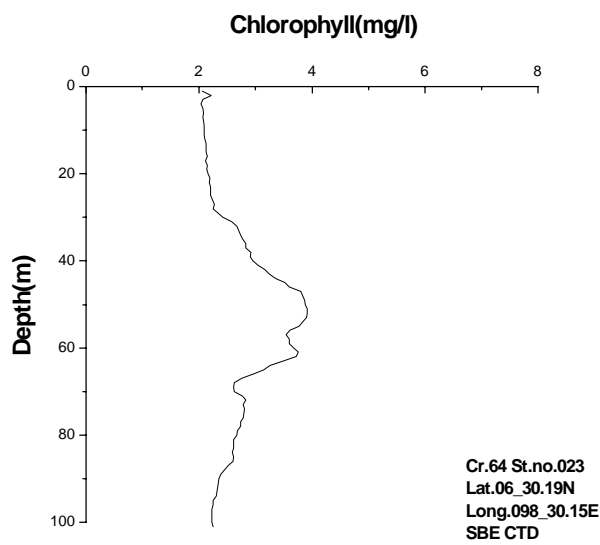
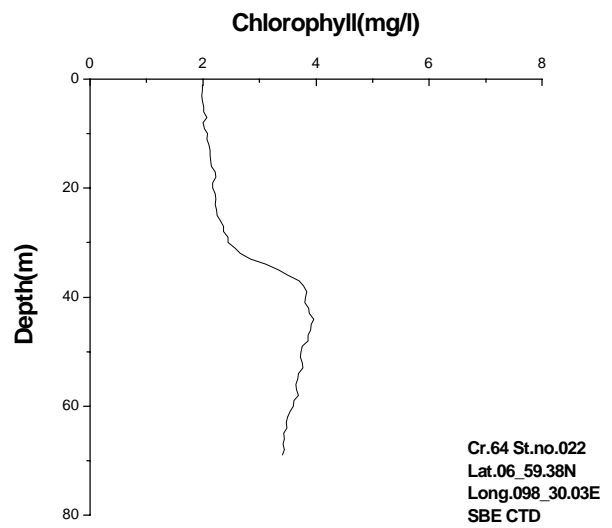
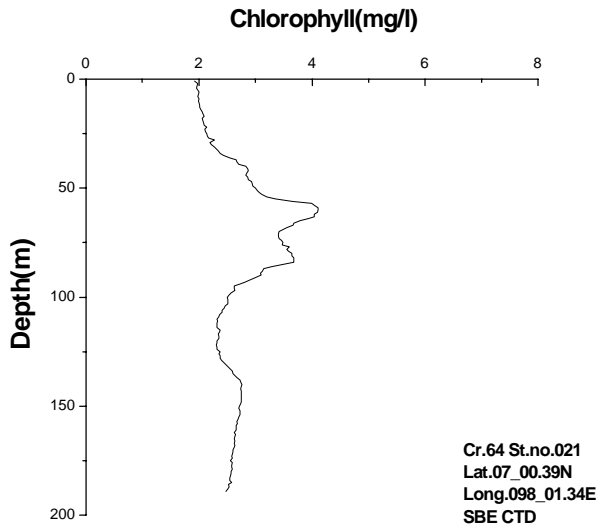
# Profile of Chlorophyll



# Profile of Chlorophyll



# Profile of Chlorophyll





## Cruise report on research activities

### 1. Cruise Summary

<b>Vessel:</b>	<b>MV. SEAFDEC</b>
<b>Cruise No.:</b>	65-3/2001
<b>Duration:</b>	27 October – 17 November 2001
<b>Objective:</b>	To do purse seine operation and fishing ground information collection
<b>Area of Operation:</b>	Indian Ocean
<b>Port of call:</b>	Phuket (Thailand)
<b>Researcher and Assist. Researcher:</b>	<ol style="list-style-type: none"> <li>1. Dr. Wudiato from DOF Indonesia</li> <li>2. Ms. Mahyam Mohammad Isa from DOF Malaysia (Fisheries Research Institute, Penang)</li> <li>3. Mr. Richard Rumpet from DOF Malaysia (Fisheries Research Institute, Sarawak)</li> <li>4. Mr. Abdul Harris Helmi Ahmad Arsha from DOF Malaysia (Fisheries Research Institute, Penang)</li> <li>5. Ms. Sopana Boonyapiwat from DOF Thailand</li> <li>6. Ms. Pattira Luedwitayapasit “</li> <li>7. Mr. Rerngchai Sujittrosakul “</li> <li>8. Ms. Jureerat Songnui “</li> <li>9. Mr. Syed Abdullah Syed Abdul Kadir from SEAFDEC/MFRDMD</li> <li>10. Mr. Zulkifli Talib from SEAFDEC/MFRDMD</li> <li>11. Mr. Isara Chanrachakit from SEAFDEC/TD</li> <li>12. Ms. Penjan Laongmanee “</li> <li>13. Mr. Pratakphol Prajakitt “</li> <li>14. Ms. Phatarajit Kaewnuratchadasorn “</li> <li>15. Mr. Sukchai Arnupapboon “</li> </ol>

### **Research Topic:**

<b>Research Topic</b>	<b>Responsible agency</b>
1. Study on fishing ground condition	TD, MFRDMD, DOF Indonesia
2. Species composition of tuna species	DOF Malaysia, DOF Thailand, TD
3. Species composition of by-catch species	DOF Malaysia, TD
4. Gonad maturity and fecundity of tuna species	DOF Malaysia (only skipjack), DOF Thailand
5. Length-weight relationship of tuna species	DOF Malaysia, DOF Thailand and TD
6. Growth and mortality rates of tuna species	DOF Malaysia
7. Heavy metal in tuna species	DOF Malaysia
8. Histamine level in tuna species	DOF Malaysia
9. Morphomeric and gill-raker count of tuna species	MFRDMD
10. Taxonomy of sharks caught by purse seine	MFRDMD
11. Age determination of tuna species	MFRDMD
12. Environmental condition in the thermocline layer	DOF Thailand, TD
Remark: tuna species = Yellowfin, Bigeye and Skipjack Tuna	

## 2. Observation Summary

### **Oceanographic study**

There were eleven oceanographic stations (table 1 and fig.1). Four stations were collected by Sea Bird Electric CTD (SBE CTD) model 19-03 (Conductivity, Temperature, Depth Recorder) and seven stations were collected by Falmouth Scientific CTD (FSI CTD). The SBE CTD composes with six sensors; temperature, conductivity, pressure, oxygen, chlorophyll a (WETstar fluorometer) and irradiant (PAR). The accuracy of temperature, conductivity and pressure sensor having an accuracy of 0.01 °c, 0.001 S/m and 0.25% of full-scale range. FSI CTD composes with temperature, conductivity and pressure sensor having an accuracy of  $\pm 0.003$  °c ,  $\pm 0.003$  mmhn and  $\pm 0.03\%$  respectively and three additional sensor pH, oxygen and fluorescence (Sea Tech fluorometer). Oxygen and pH sensor had malfunction since MV.SEAFFDEC cruise 63-1/2001. Oxygen and pH data in this cruise were determined from water sample.

The FSI CTD was equipped with twelve 2.5 liter bottles for *in situ* water sampling used for nutrient (nitrite, nitrate, phosphate and silicate), oxygen and pH determination. Water sample were collected at surface, 25, 50, 75, 100, 125, 150, 200, 300,500, chlorophyll maximum depth and the starting depth of thermocline layer.

Water samples for nutrient were immediately freeze and will be analyzed at Phuket Marine Biological Center Laboratory by staff of Oceanic Fisheries Division, Department of Fishery, Thailand. Dissolved oxygen was determined on board by a modification of the Winkler procedure (Parsons et al, 1984). Value of pH was measured by pH meter which having an accuracy of 0.002.

Large volumes of water sample were collected for chlorophyll-a and phytoplankton study by Vandorn Water sample at every 25 meter from surface to 150 meter for eight stations. Five liters were filter through Whatman GF/C filter paper then freeze the filter for chlorophyll-a determination at TD. Thirty liters were filter through 20  $\mu$ m plankton net for phytoplankton study.

Every six-hour during the cruise, surface water were filter for chlorophyll-a determination. There were 66 samples were collected during the cruise. Quantum sensor was set at the compass deck to collect solar radiation in every hour. Fig. 2 showed cruise track of the whole survey period.

### **Biology of Tuna study**

There was no fishing operation during the cruise. Therefore, the project concerned biology of Tuna cannot be done.

### **Squid larvae study**

At last week of the cruise, low-pressure condition covers fishing ground area. MV.SEAFFDEC have to leave fishing ground before the schedule for 2 days. The squid larvae survey in the Andaman Sea was shift from schedule of cruise no. 66-4/2001 to be done on this cruise. There were 10 Bongo net stations in the Andaman Sea (Fig.1). The SBE CTD were used to collect oceanographic data of all those station. Oceanographic data at station 13 can't be acquired, due to full memory space of SBE CTD during down cast.

### **Payaos**

15 payaos had been set during cruise 64-2/2001. During this cruise 11 payaos were checked. Three Payaos were picked up and reset again. Some drifting objects were found during searching. All information about payaos and drifting object were shown in fig 3.

### 3. Cruise memorandum

All oceanographic data were show in appendix. Oxygen data from SBE CTD sensor in station 1 to 4 and 10 to 19 are lower than from titration in station 5 to 9. This should came from the low sensitivity of oxygen sensor, which will be solved by determine their relationship with titration data in the next cruise.

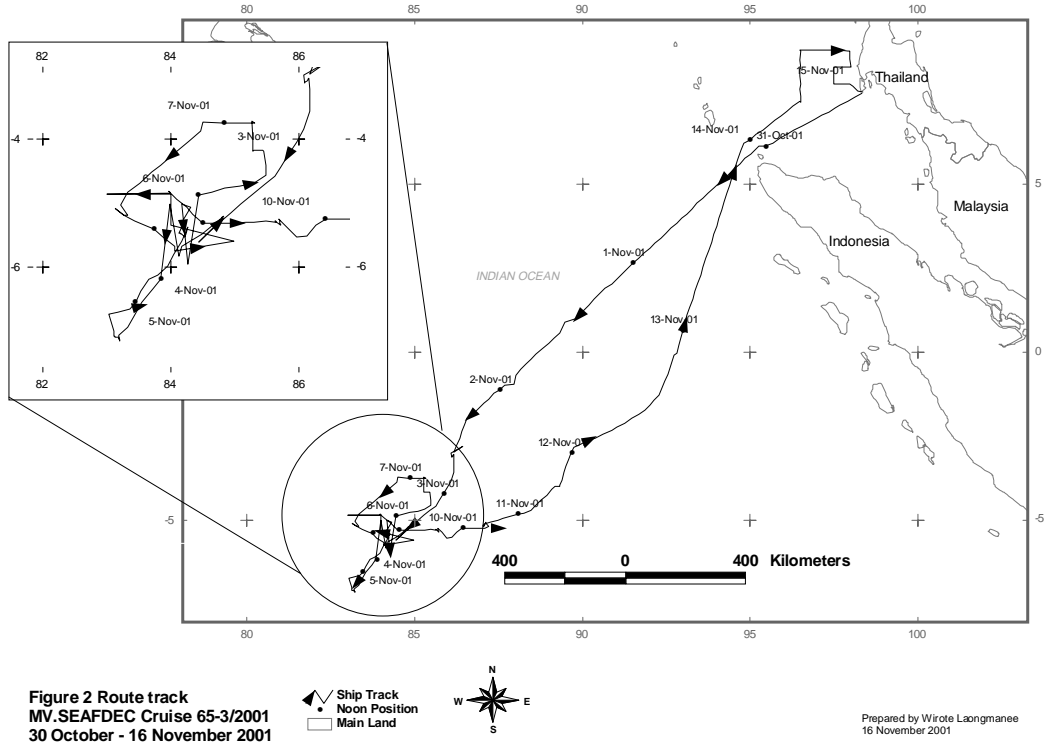
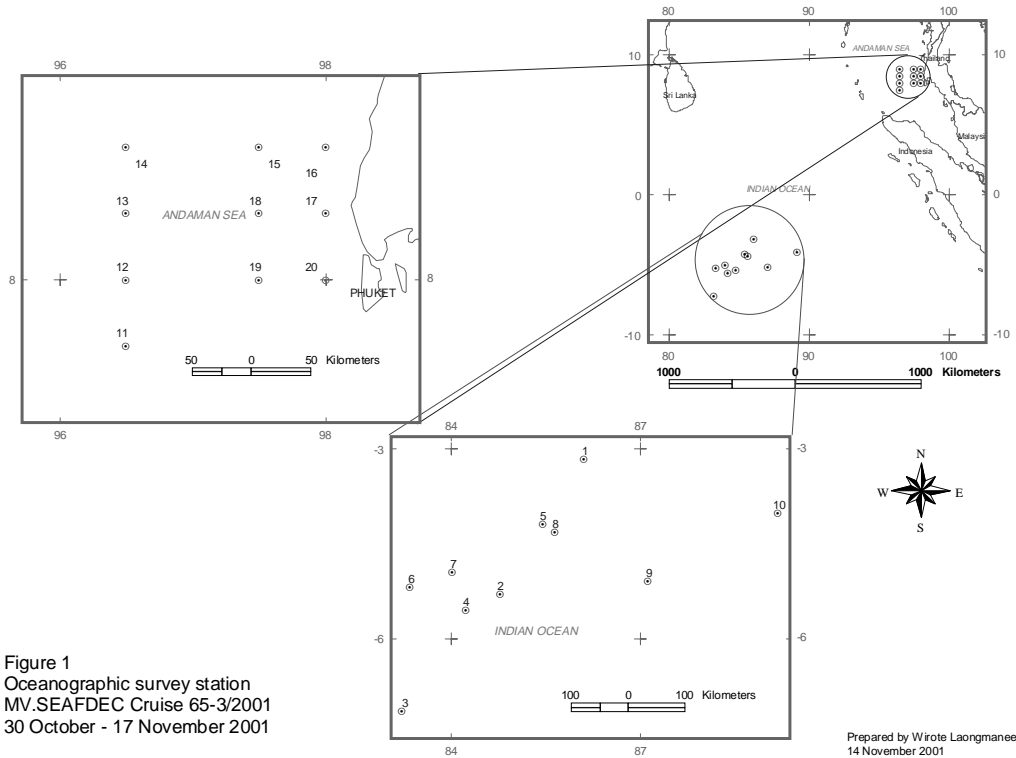
Oceanographic data and cruise report were given to participation researcher. The equation of relationship between SBE CTD and titration data will send to all research later.

After all researchers finished to analyze their sample and data, they will send data and report to SEAFDEC/TD for distributing to participation research and storing to SEAFDEC database.

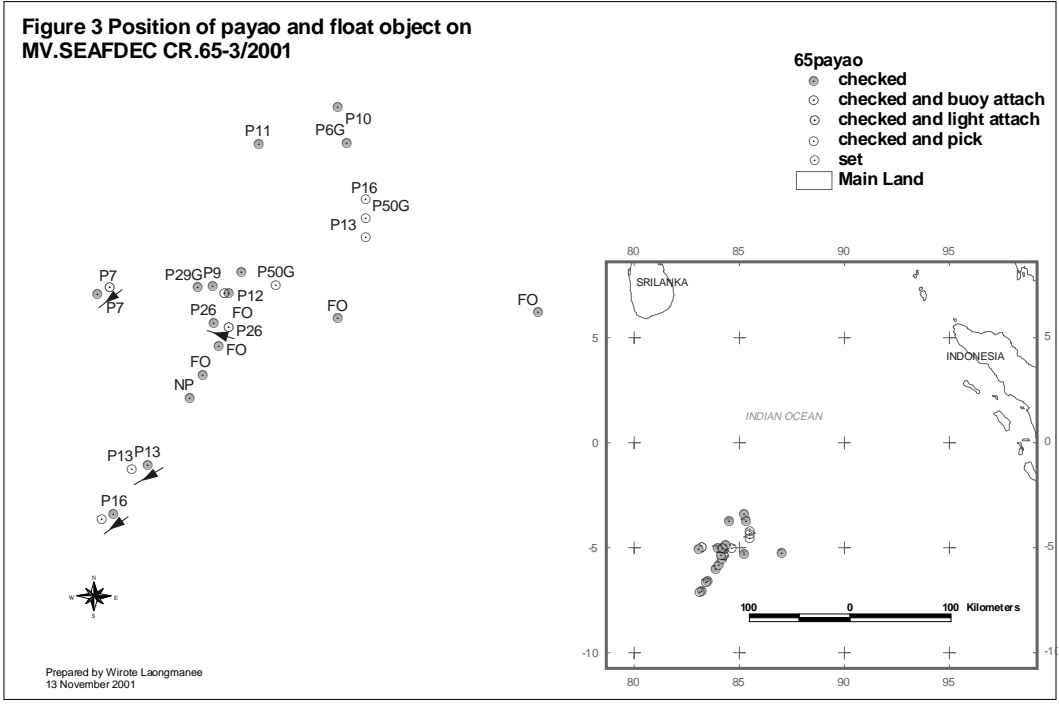
Table 1. Partial detail of oceanographic survey station during MV.SEAFDEC cruise no. 65- 3/2001

St.no.	Date(local)	Time (local)	Latitude	Longitude	Max depth of CTD	Instrument		
						SBE CTD	FSI CTD	Vandorn Bongo net
1	2-Nov-01	23.57	3_08.73 S	86_06.39 E	500	X		
2	3-Nov-01	18.12	5_18.04 S	84_46.07 E	500	X		
3	4-Nov-01	17.25	7_08.97 S	83_12.95 E	500	X		
4	5-Nov-01	19.25	5_32.86 S	84_13.58 E	500	X		X
5	6-Nov-01	18.15	4_10.83 S	85_27.15 E	500		X	X
6	7-Nov-01	21.10	5_11.50 S	83_20.72 E	500		X	X
7	8-Nov-01	18.00	4_56.57 S	84_00.66 E	500		X	X
8	9-Nov-01	17.50	4_18.48 S	85_38.29 E	500		X	X
9	10-Nov-01	16.45	5_05.18 S	87_07.13 E	500		X	X
10	11-Nov-01	18.45	4_00.50 S	89_10.92 E	500		X	X
11	14-Nov-01	21.00	7_28.58 N	96_30.59 E	500	X		X
12	15-Nov-01	00.30	7_58.96 N	96_30.40 E	500	X		X
13	15-Nov-01	03.40	8_29.85 N	96_30.25 E	450	X		X
14	15-Nov-01	06.45	9_01.31 N	96_30.18 E	403	X		X
15	15-Nov-01	12.00	9_00.21 N	97_29.23 E	117	X		X
16	15-Nov-01	14.45	8_59.67 N	97_59.56 E	40	X		X
17	15-Nov-01	17.2	8_28.99 N	97_59.75 E	55	X		X
18	15-Nov-01	20.15	8_30.10 N	97_28.83 E	200	X		X
19	15-Nov-01	23.15	8_00.19 N	97_29.59 E	46	X		X
20	16-Nov-01	2.25	8_00.02 N	97_59.56 E	60	X		X

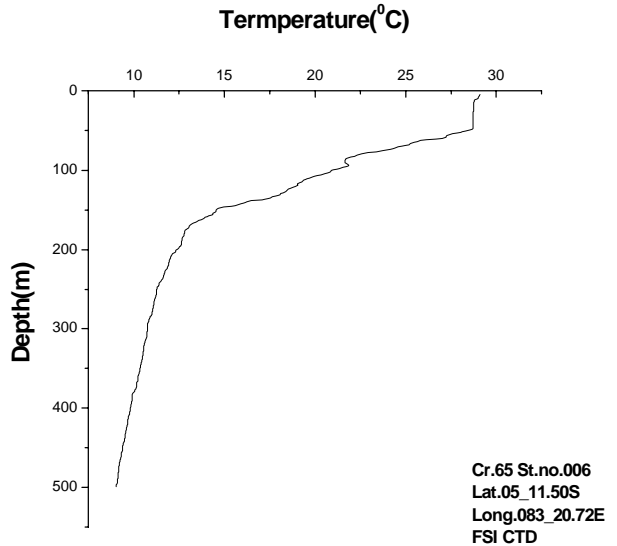
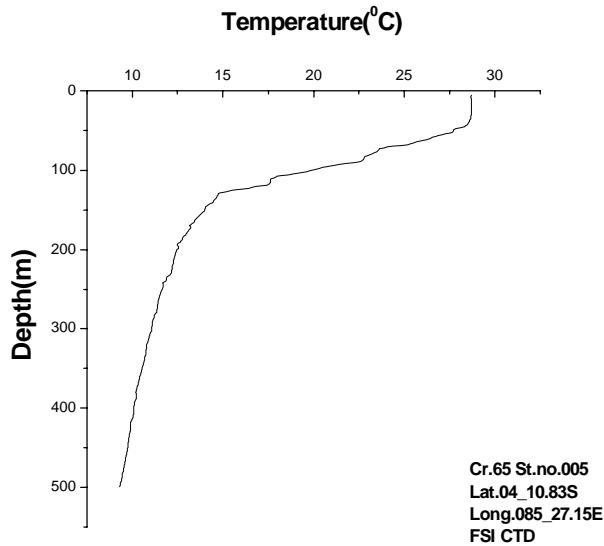
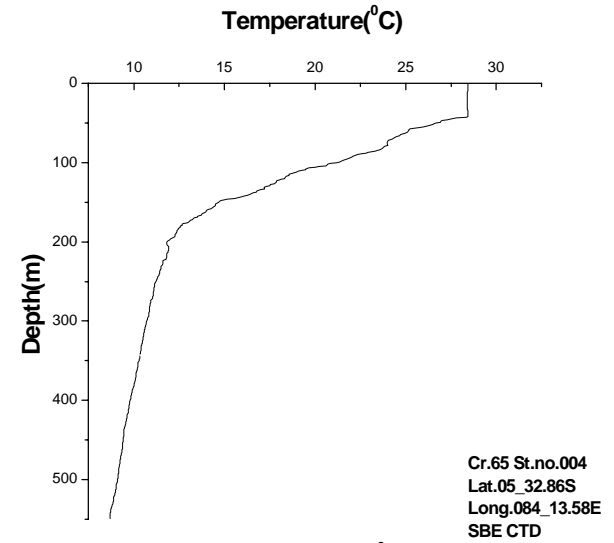
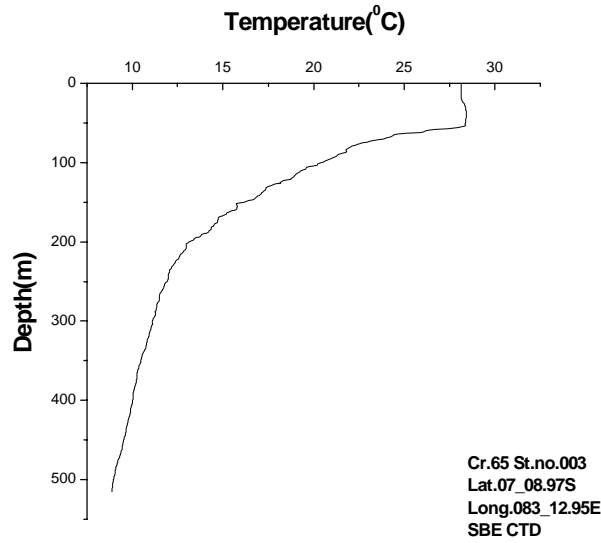
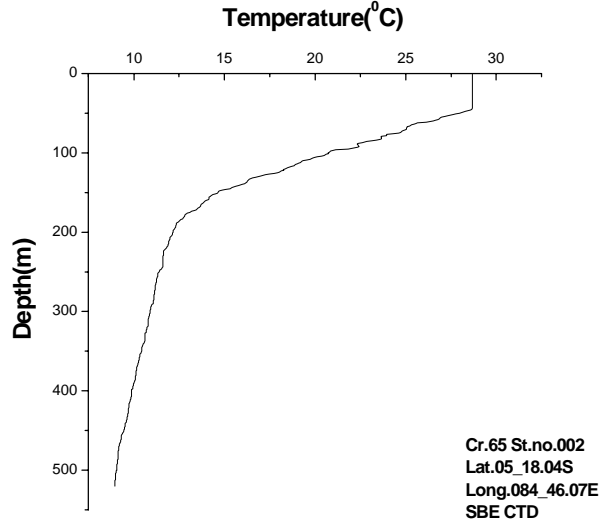
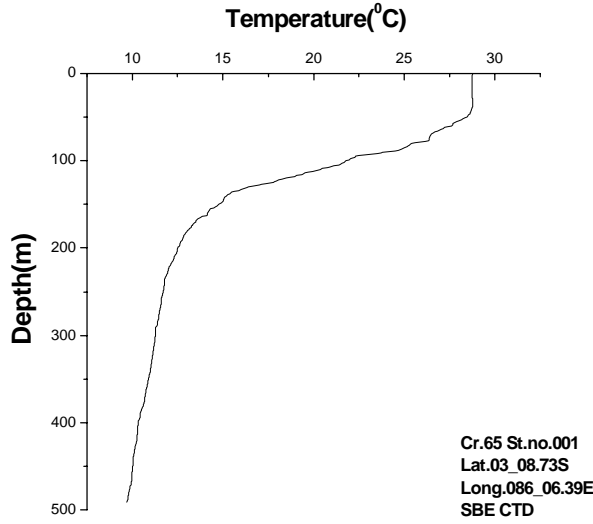




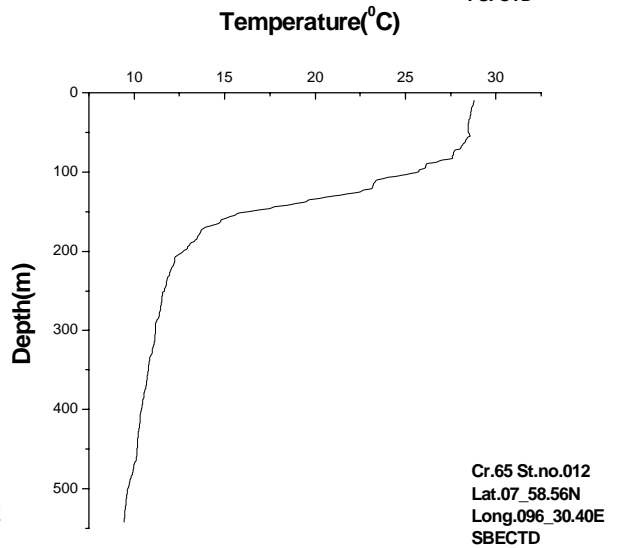
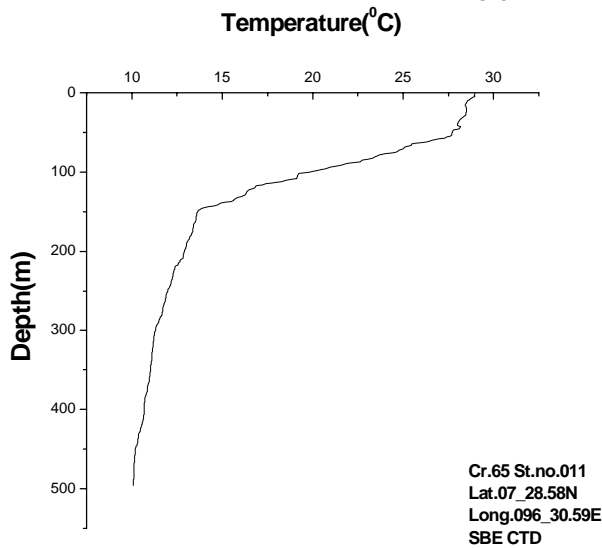
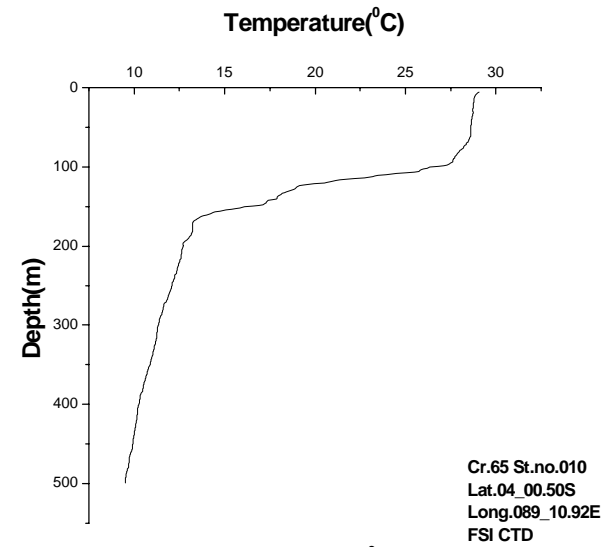
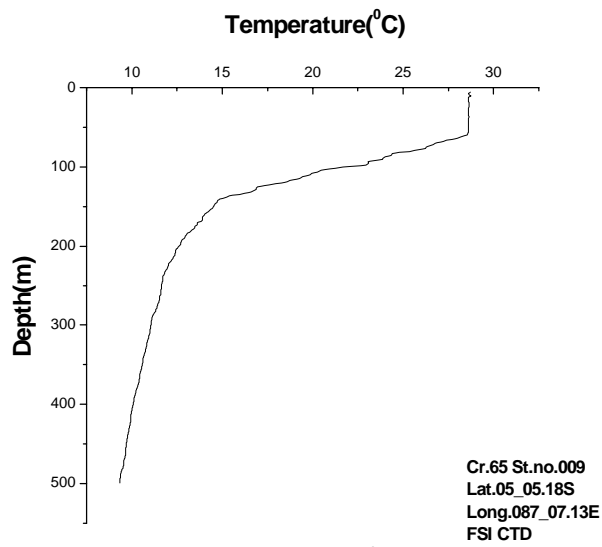
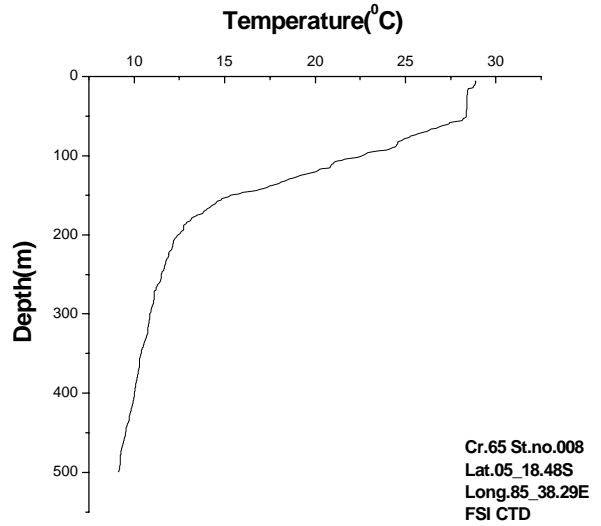
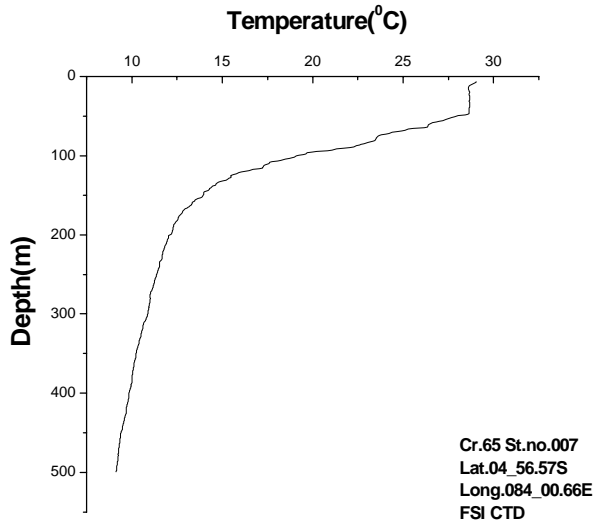
**Figure 3 Position of payao and float object on MV.SEAFFDEC CR.65-3/2001**



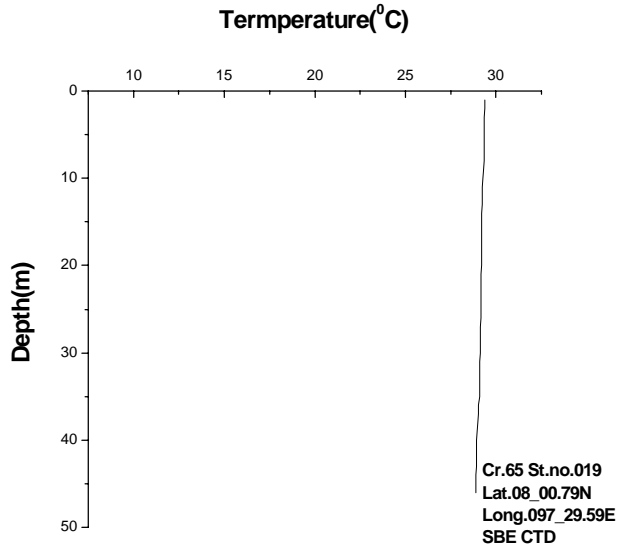
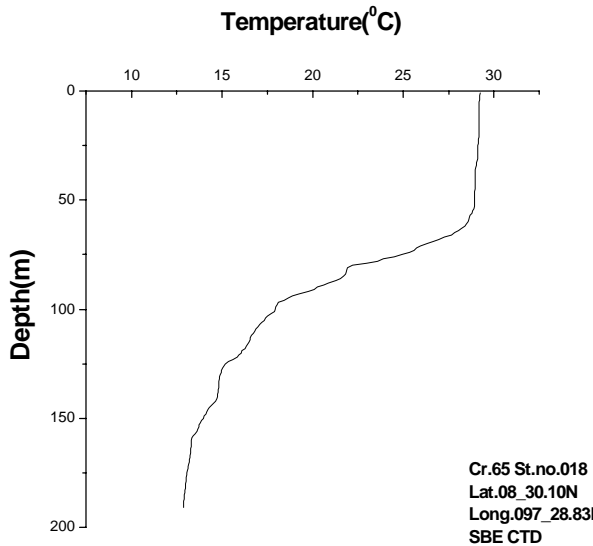
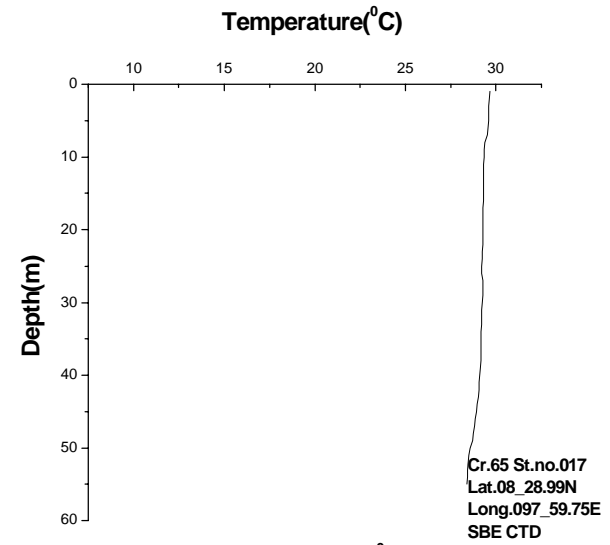
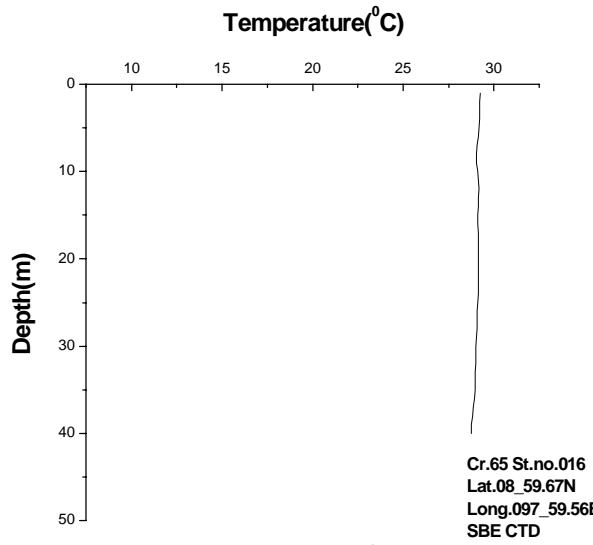
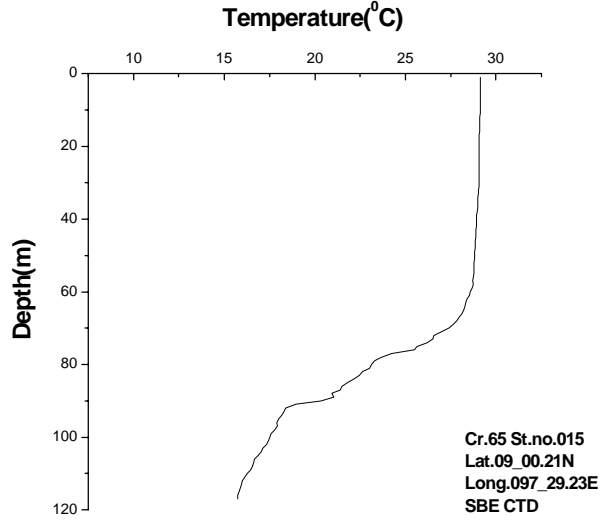
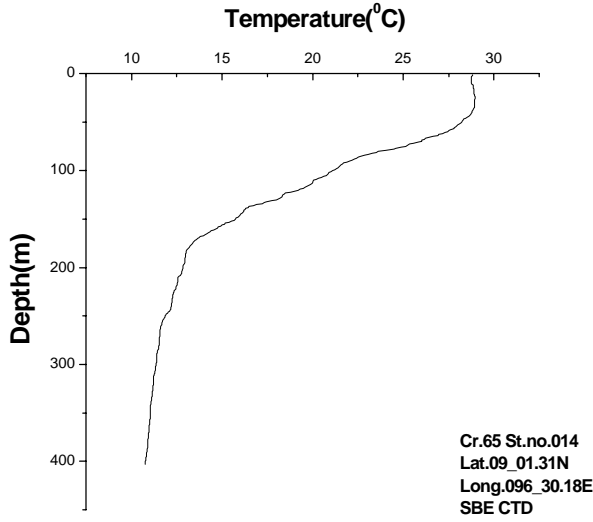
### Profile of Temperature



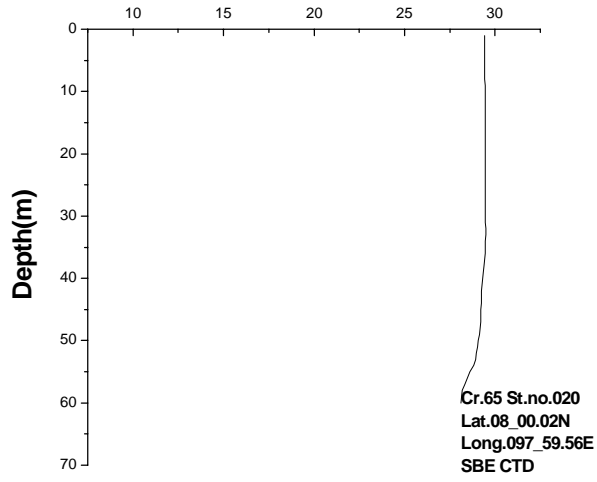
### Profile of Temperature



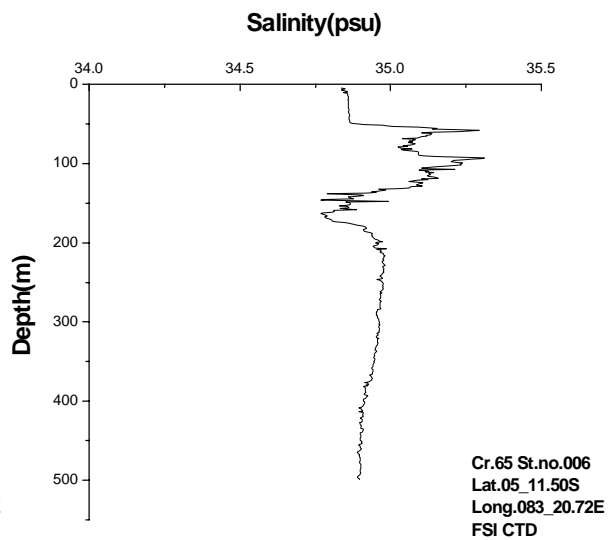
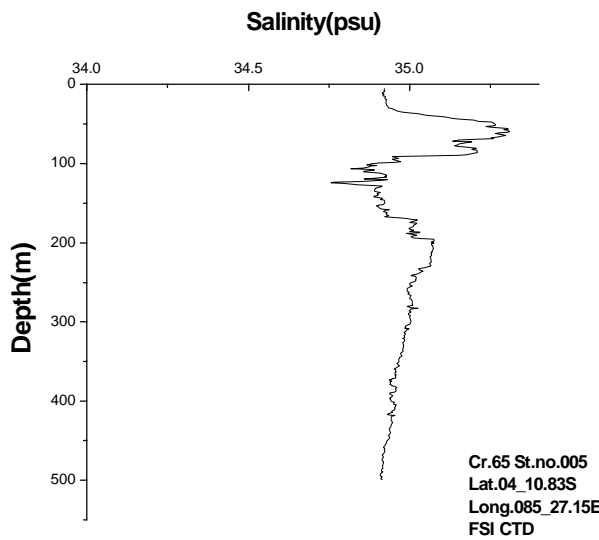
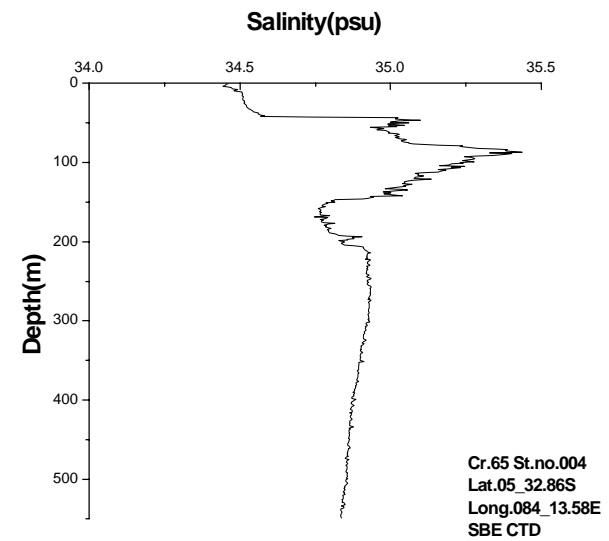
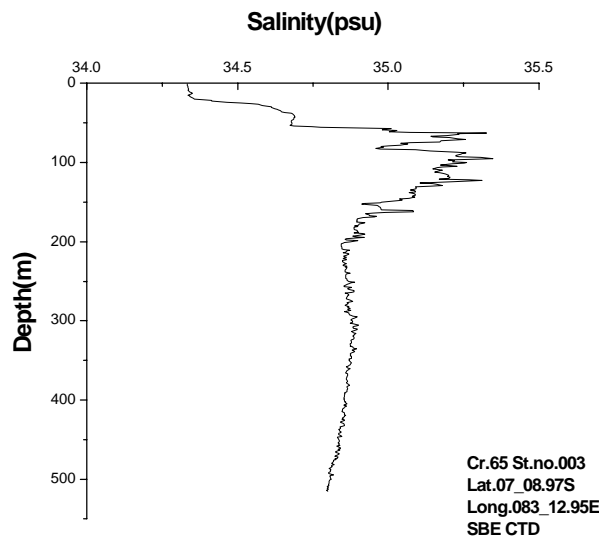
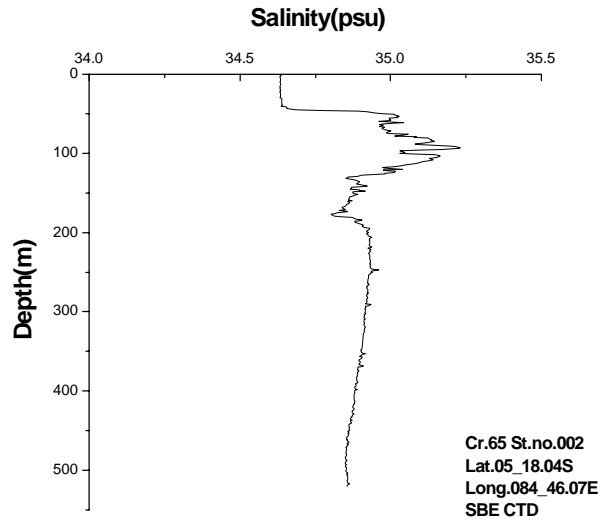
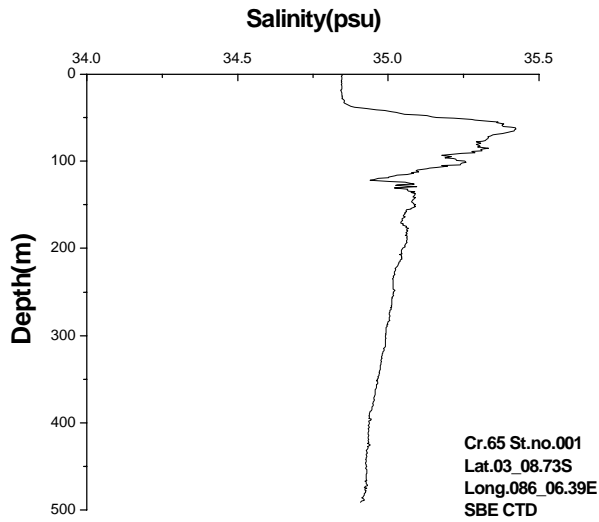
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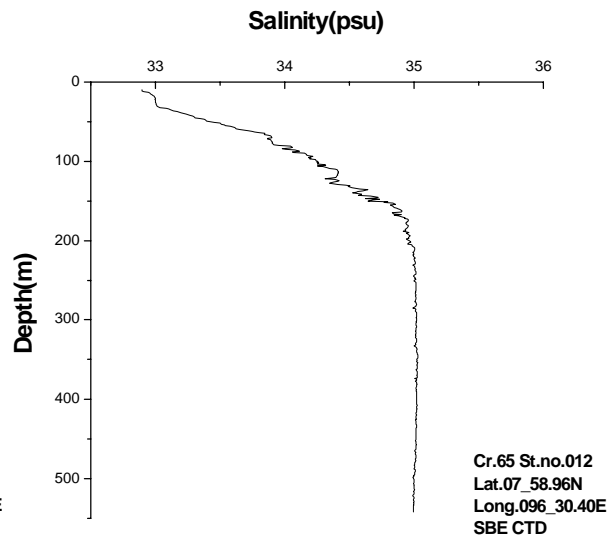
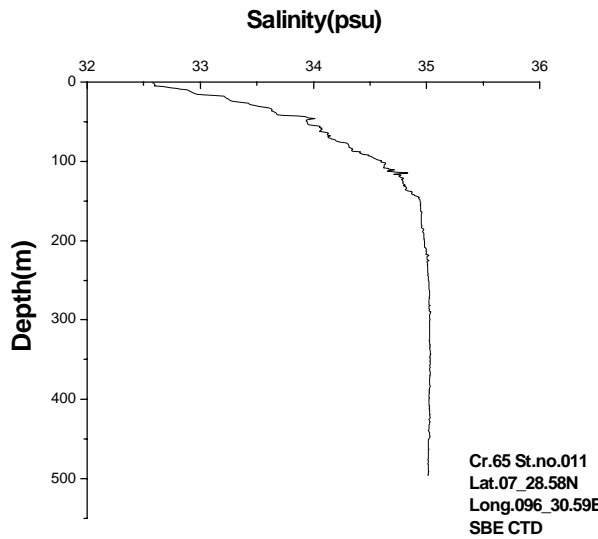
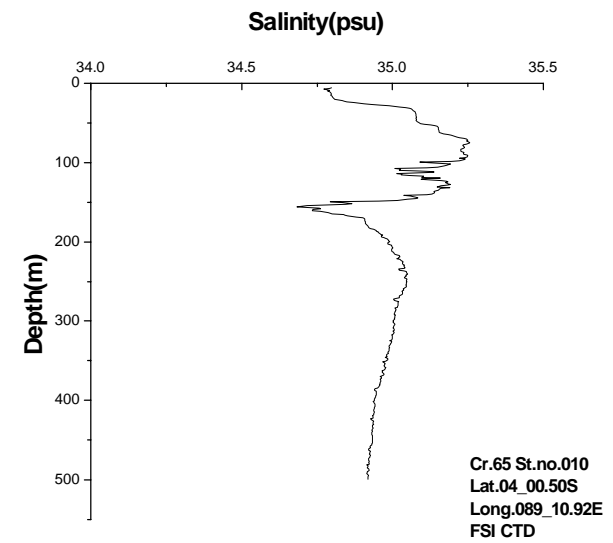
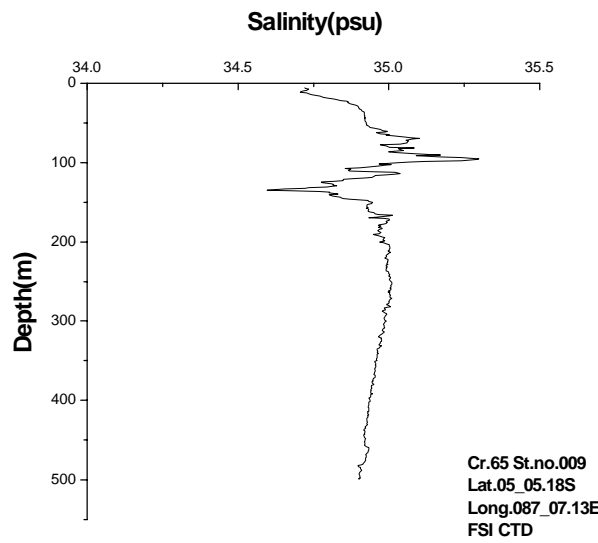
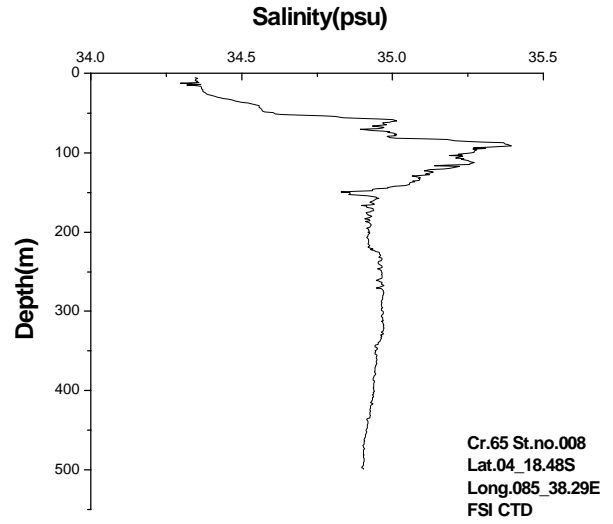
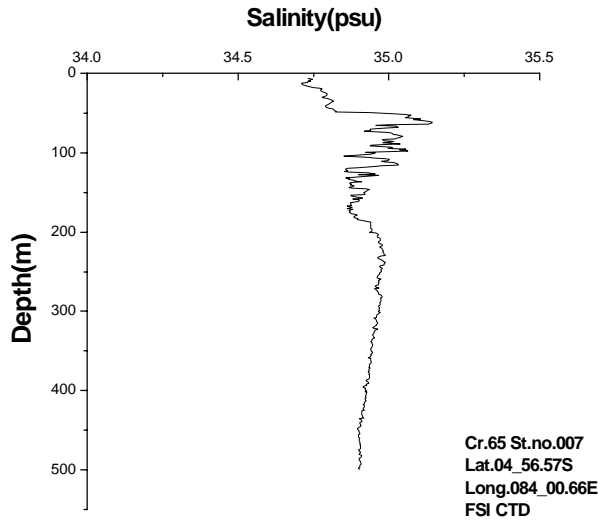
### Profile of Temperature



**Profile of Salinity**

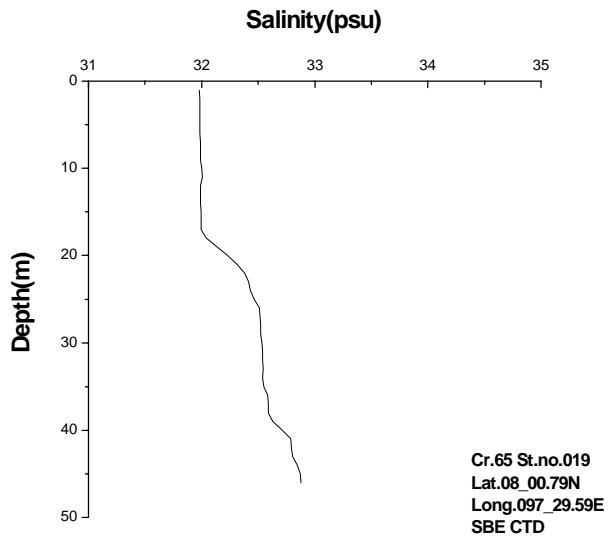
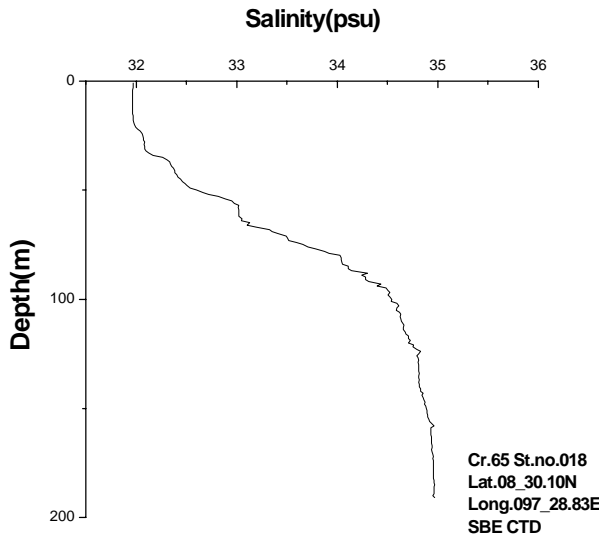
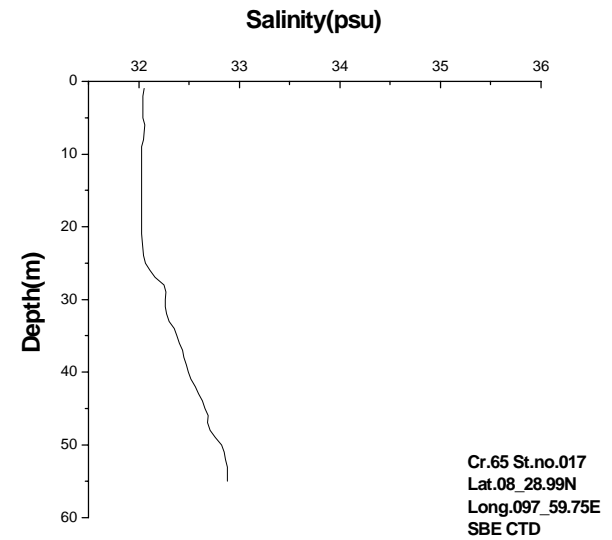
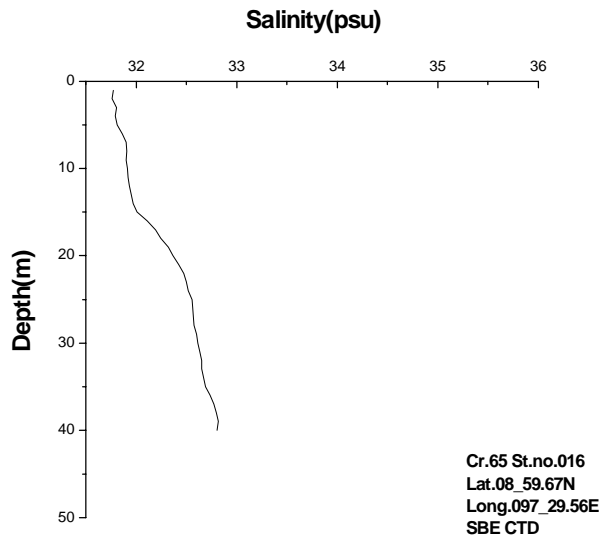
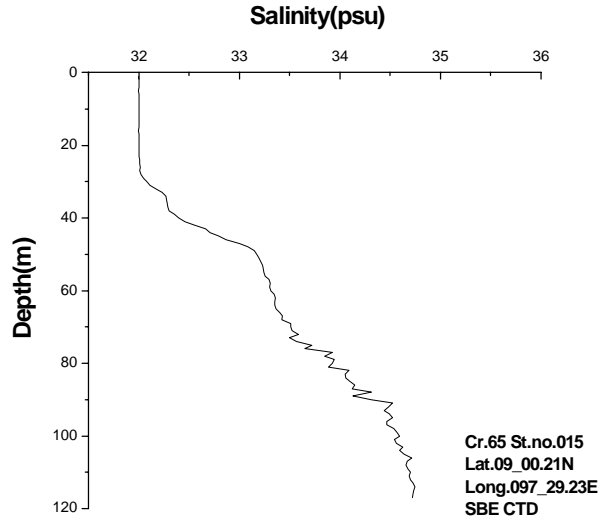
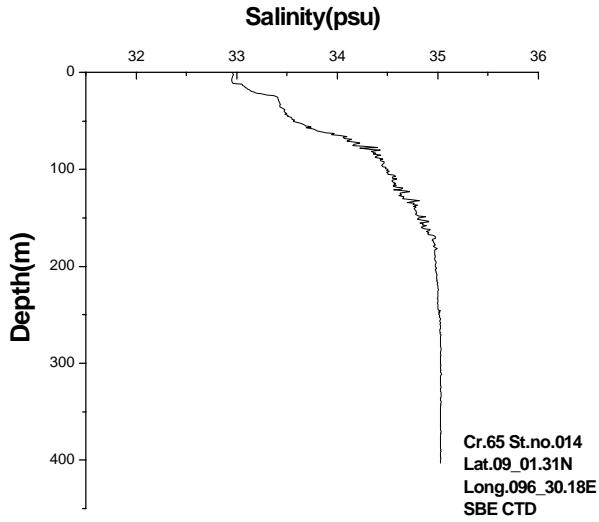


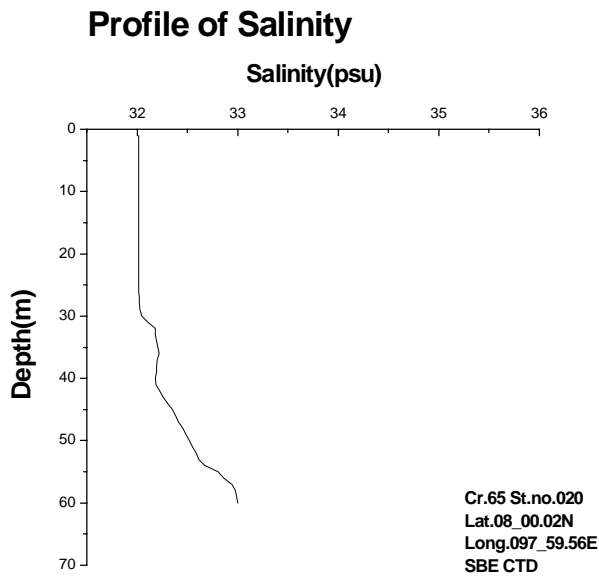
**profile of Salinity**



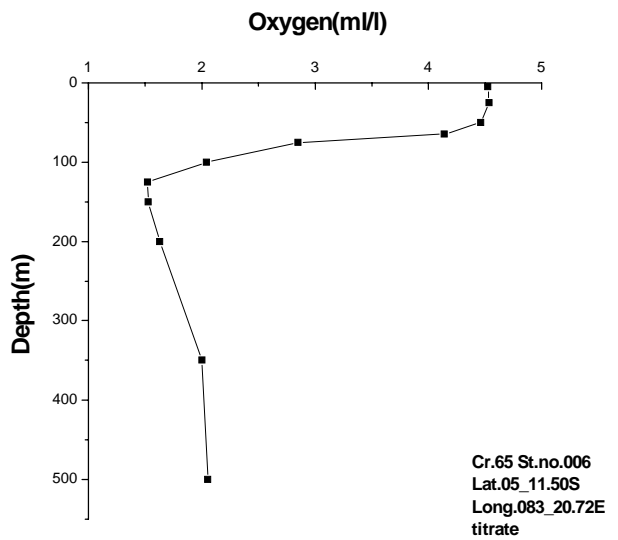
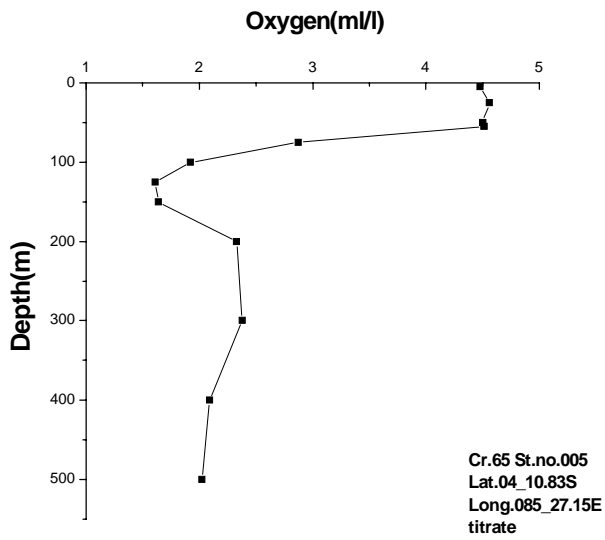
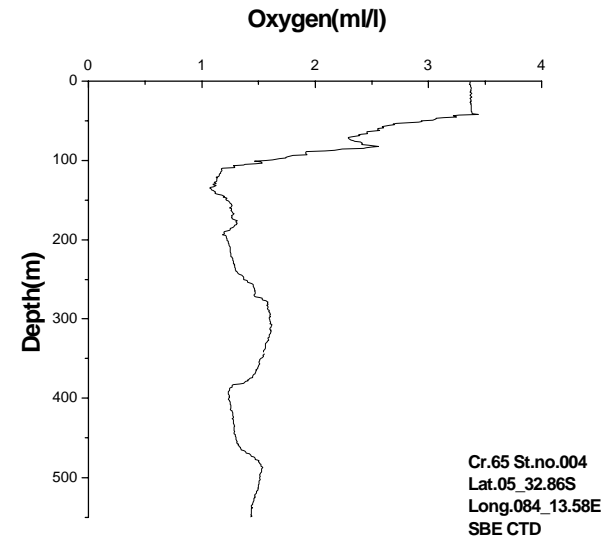
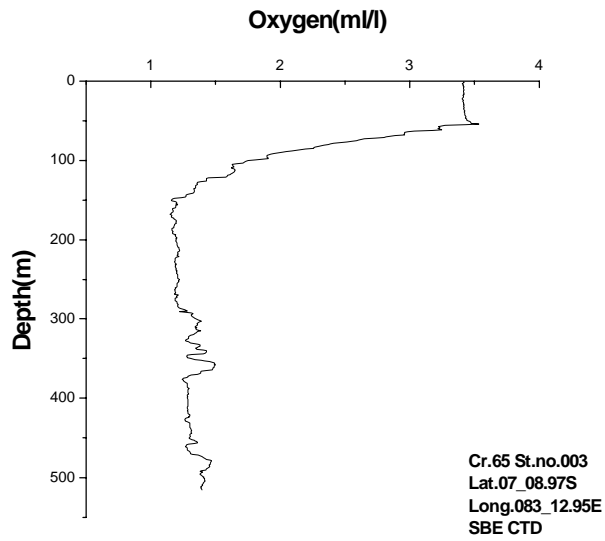
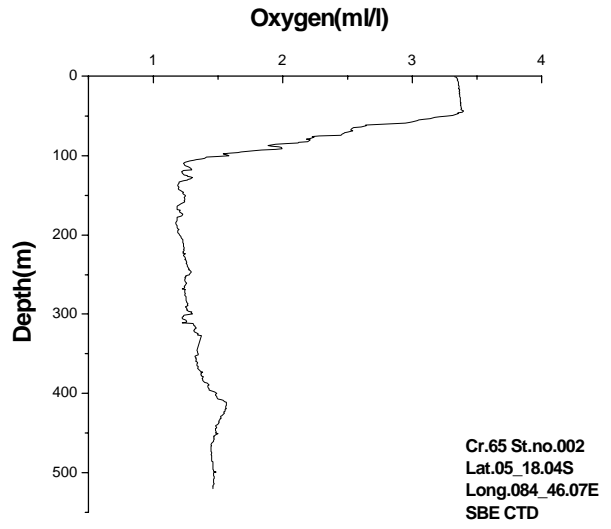
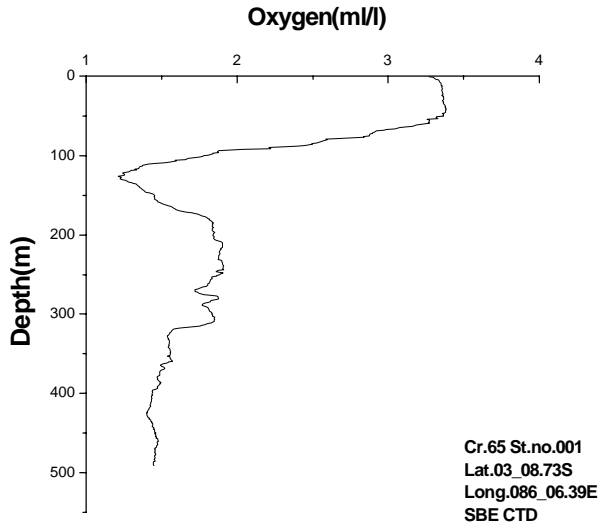


**Profile of Salinity**

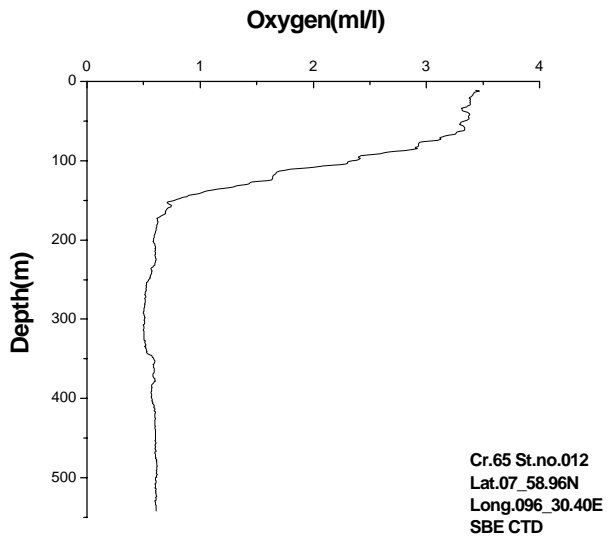
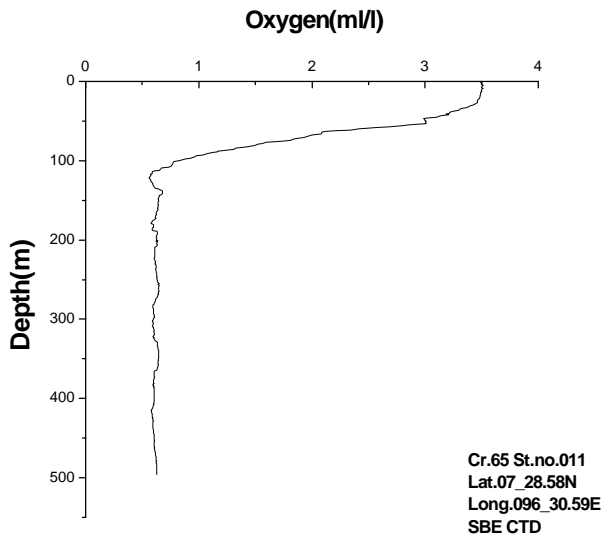
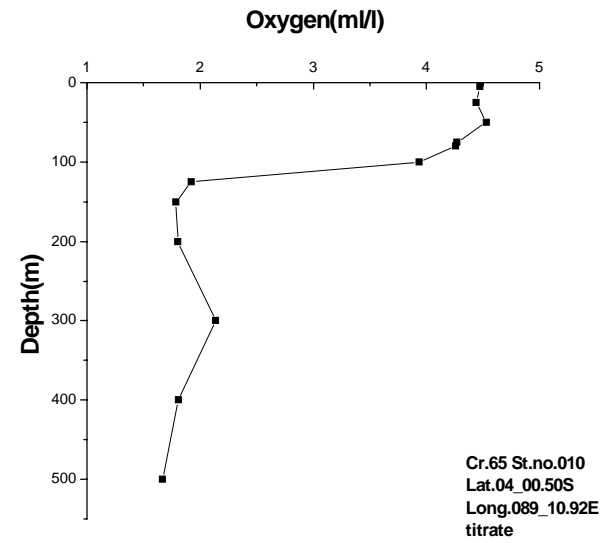
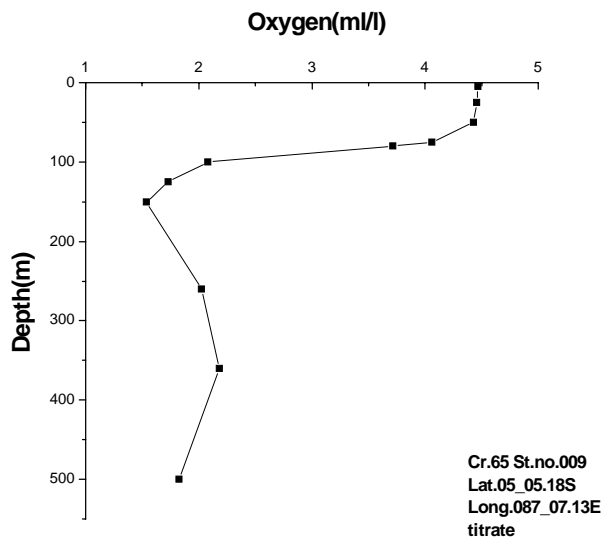
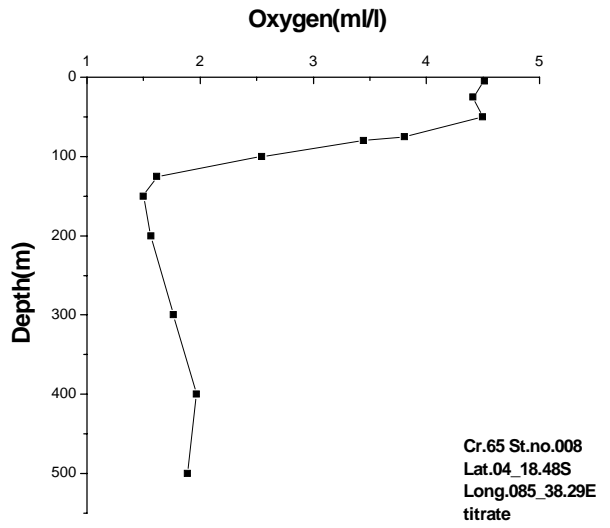
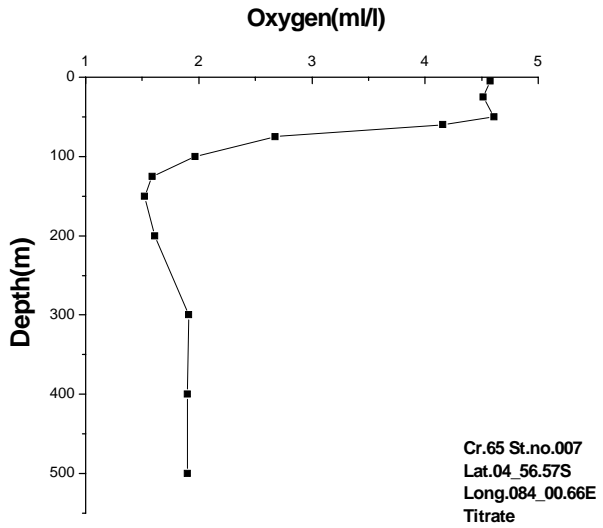




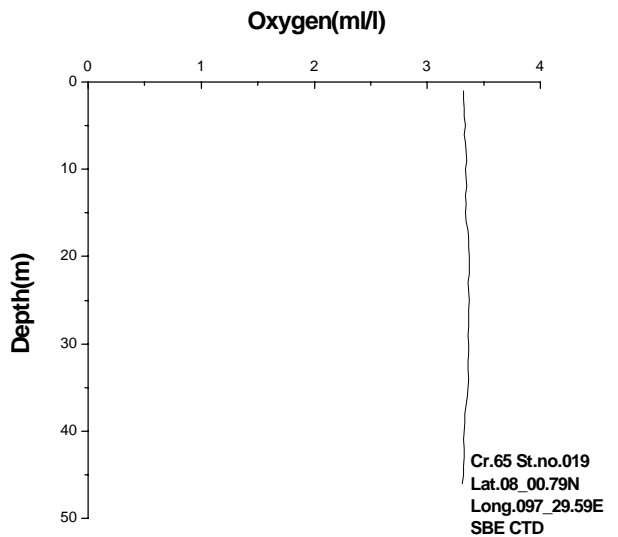
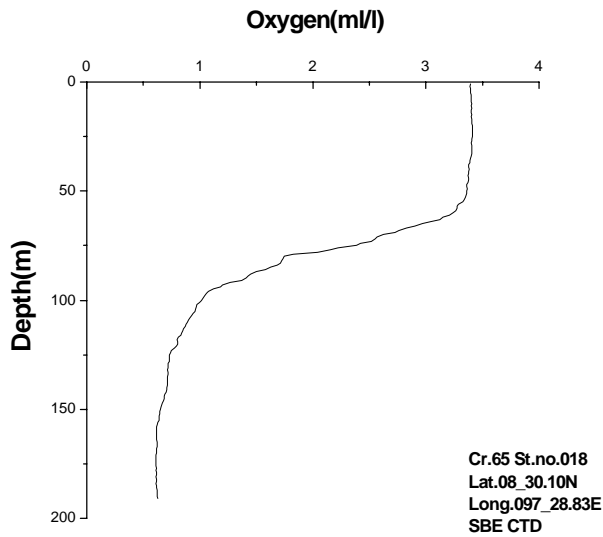
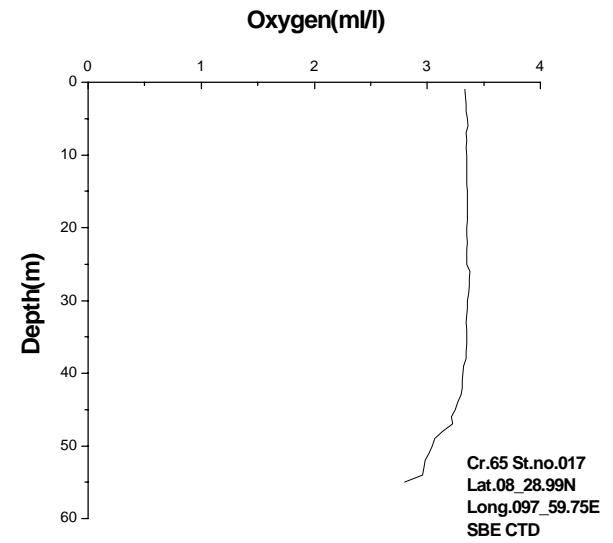
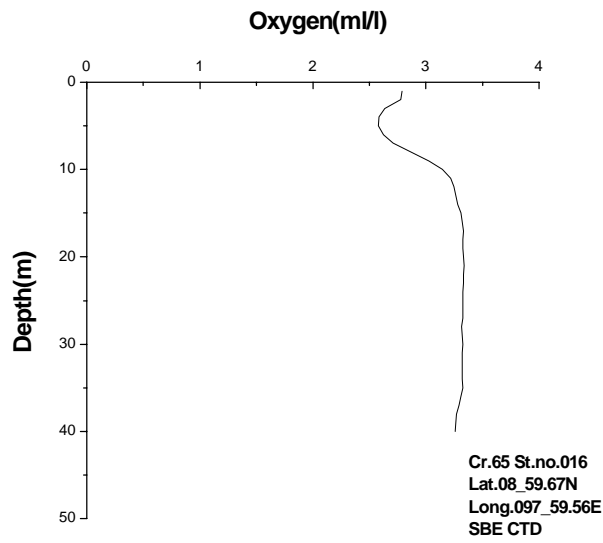
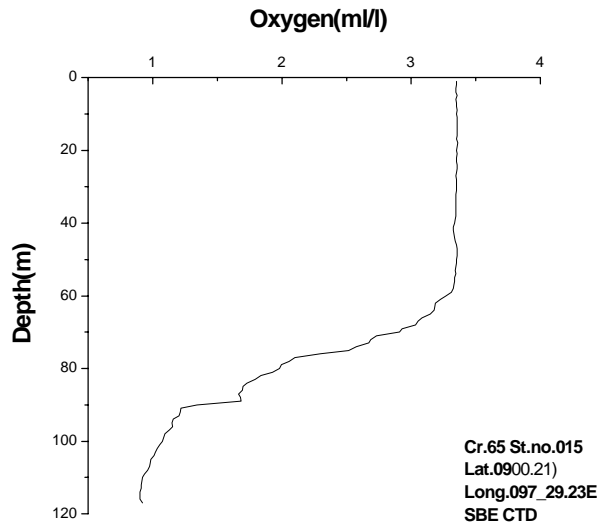
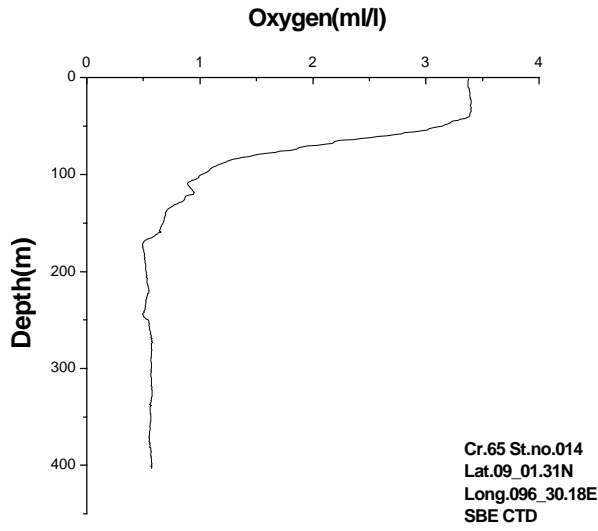
**Profile of Oxygen**

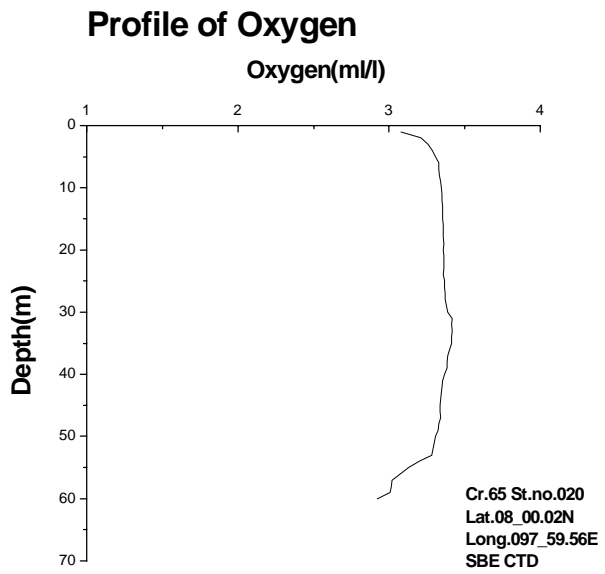


### Profile of Oxygen

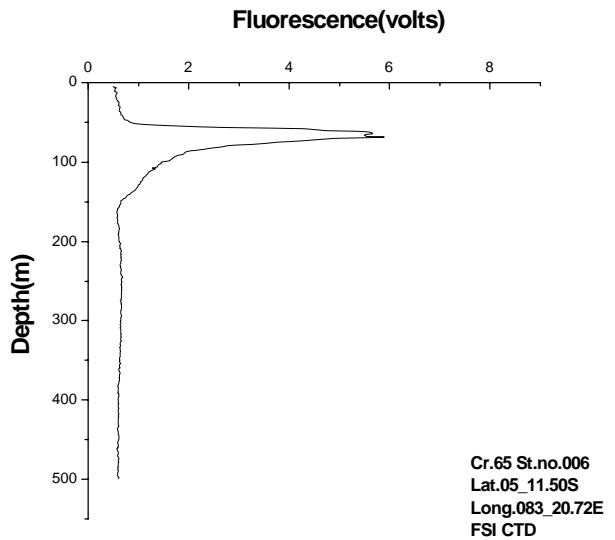
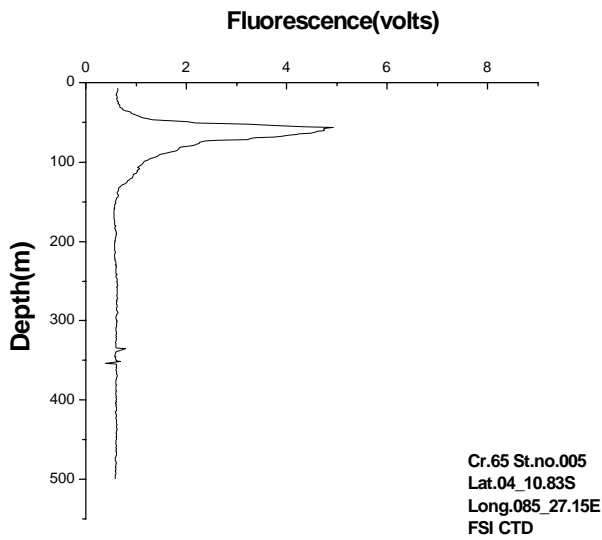
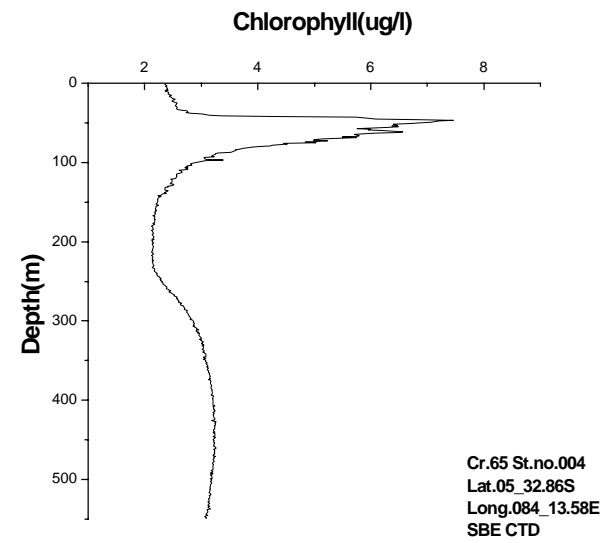
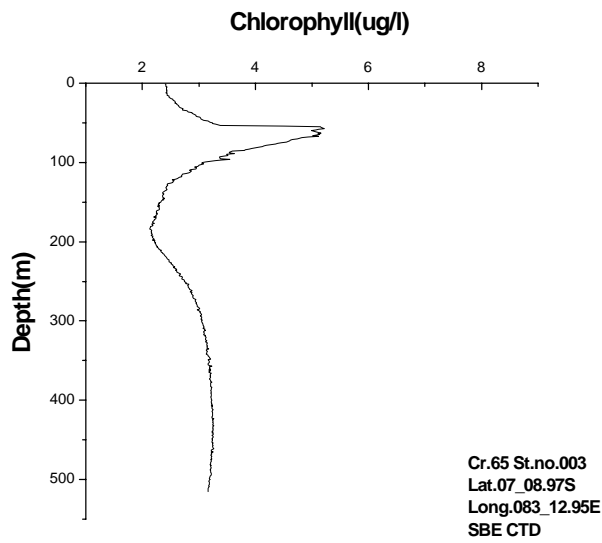
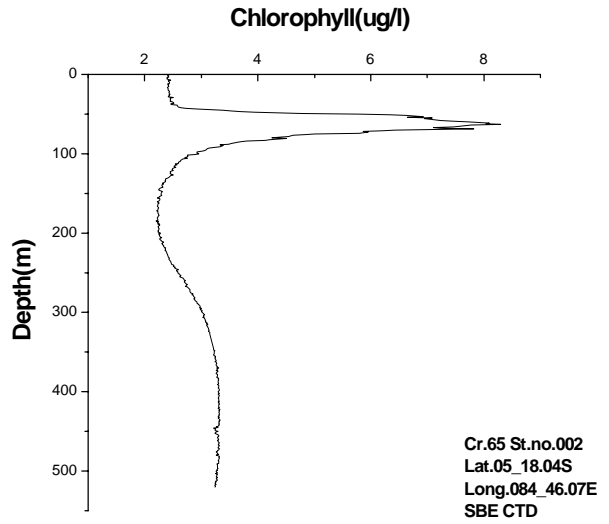
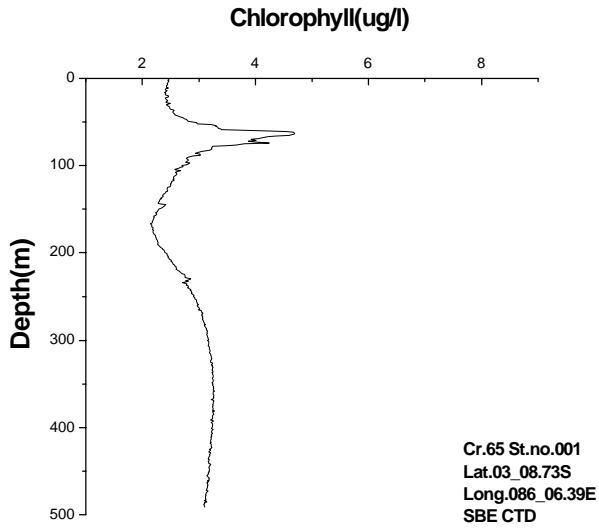


### Profile of Oxygen

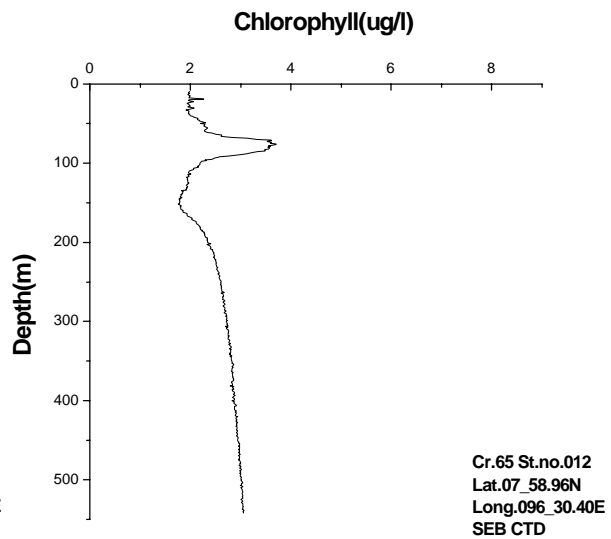
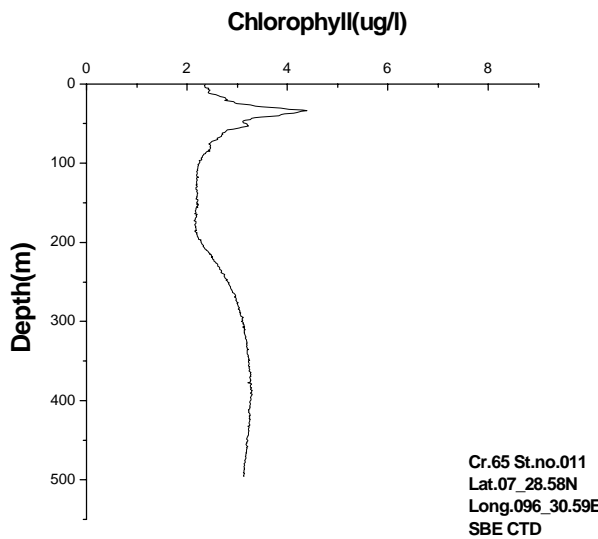
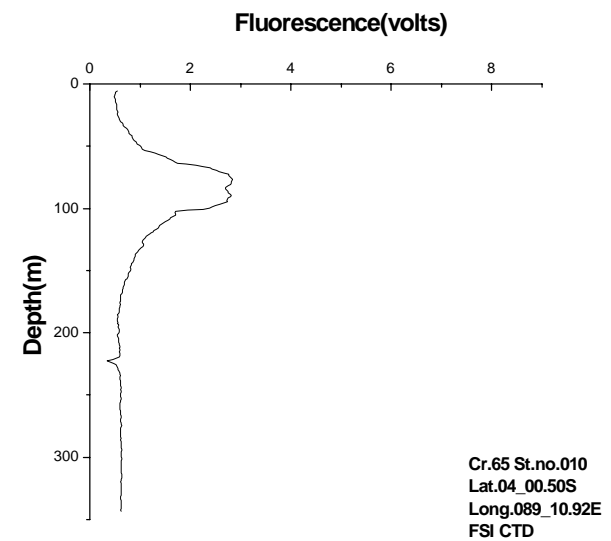
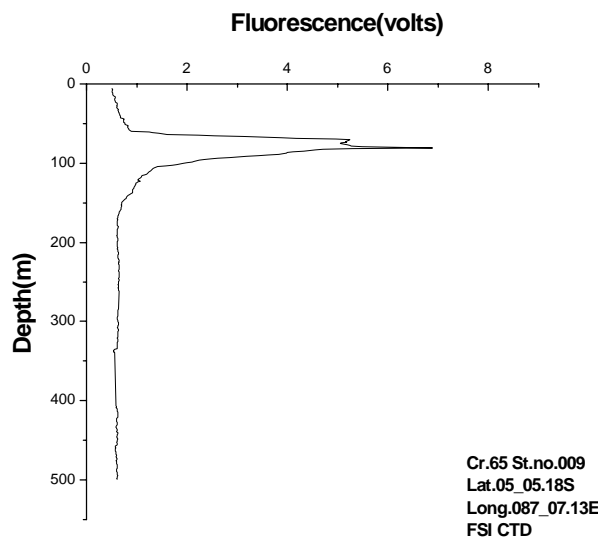
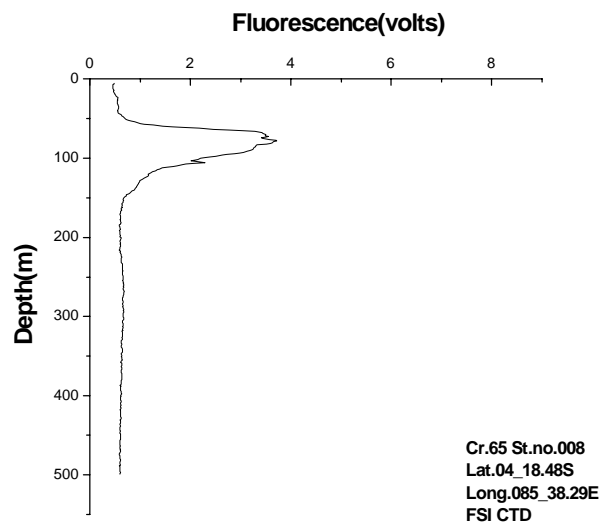
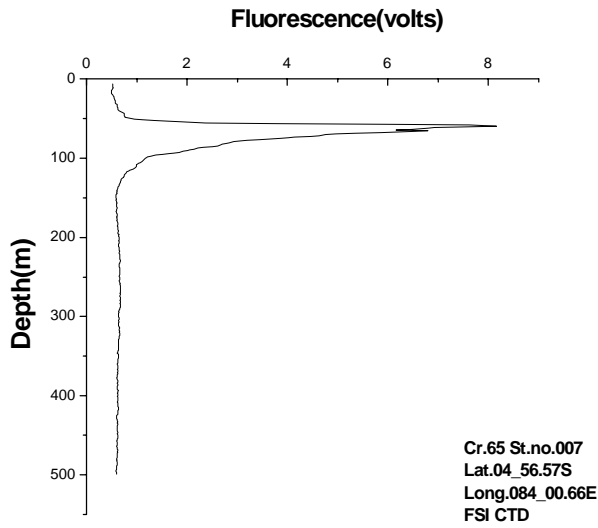




### Profile of Chlorophyll

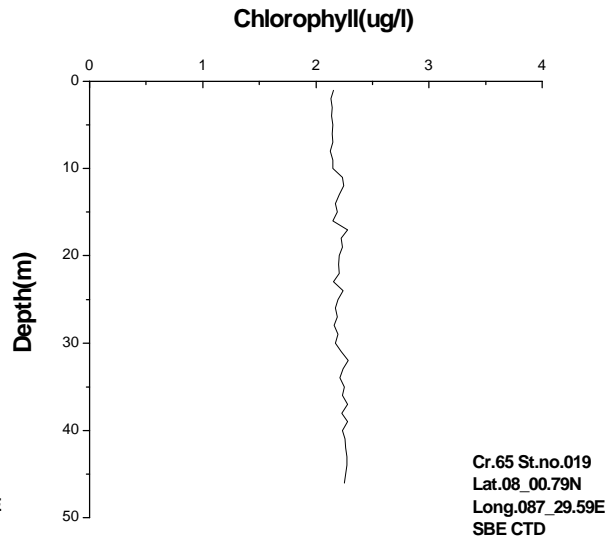
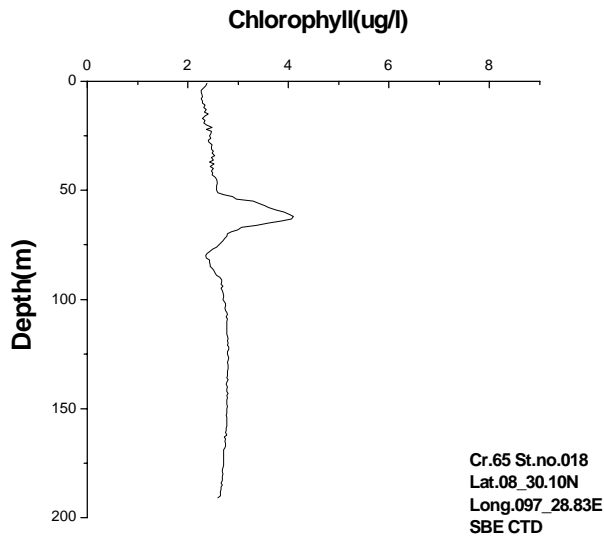
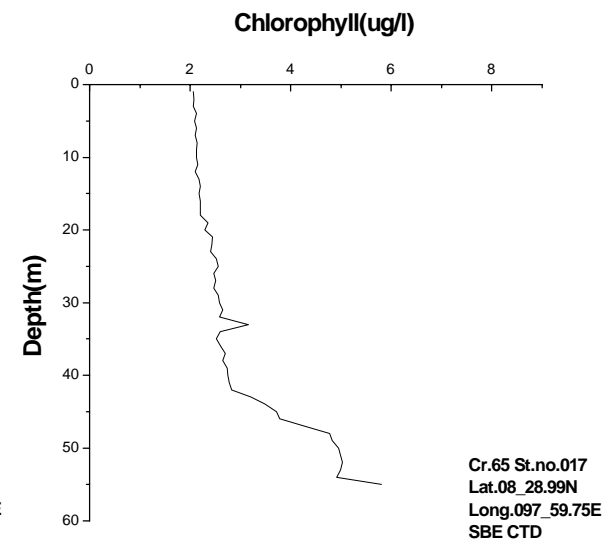
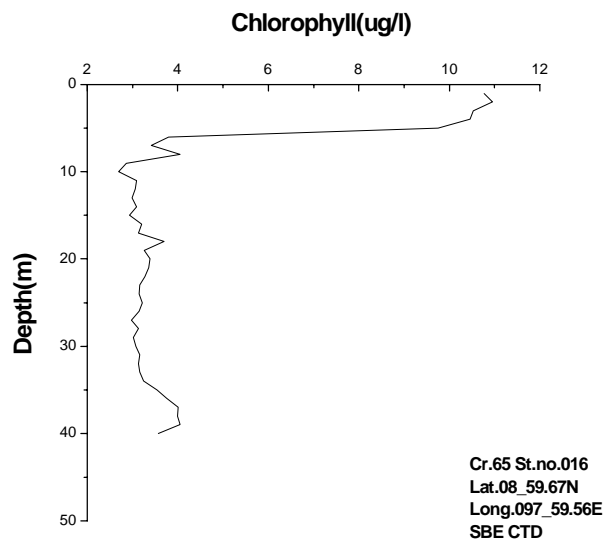
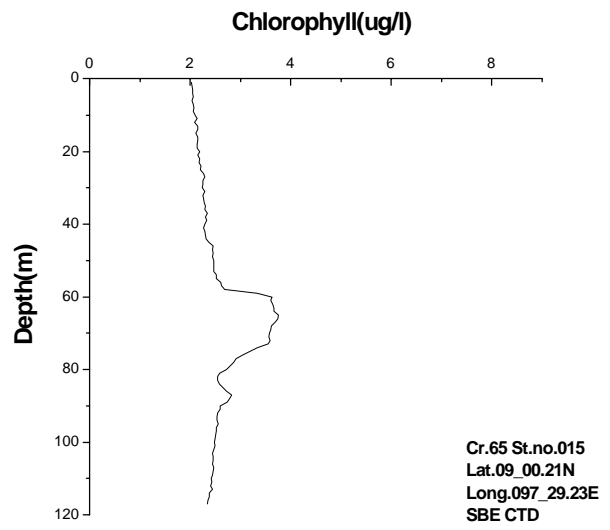
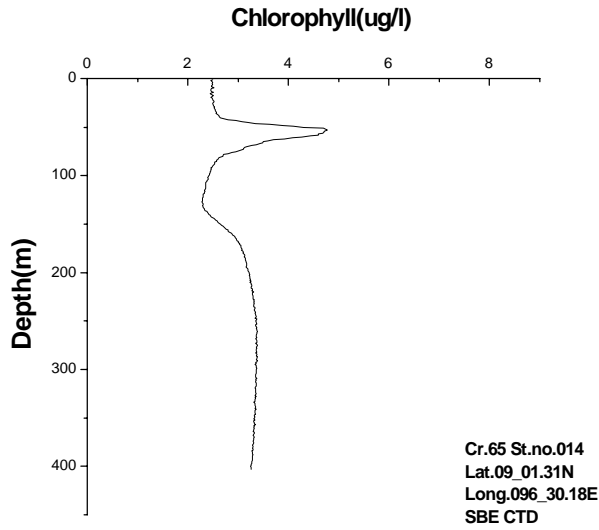


### Profile of Chlorophyll

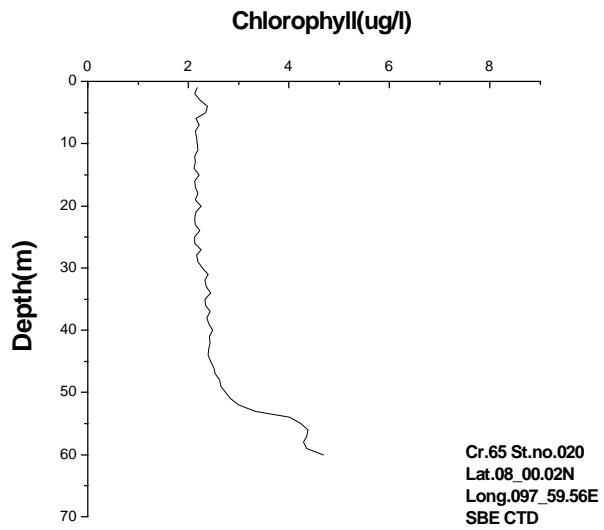




**Profile of Chlorophyll**



## Profile of Chlorophyll





## Cruise report on research activities

### 1. Cruise Summary

<b>Vessel:</b>	<b>MV. SEAFDEC</b>
<b>Cruise No.:</b>	66-4/2001
<b>Duration:</b>	28 November-11 December 2001
<b>Objective:</b>	To carry out shipboard training for the regular fishing technology course trainees, fishing operation; purse seine, tuna longline, bottom vertical longline and automatic squid jigging and fishing ground information collection
<b>Area of Operation:</b>	Indian Ocean
<b>Port of call:</b>	Phuket (Thailand)
<b>Researcher and Assist. Researcher:</b>	<ol style="list-style-type: none"> <li>1. Mr. Isara Chanrachakit</li> <li>2. Ms. Penjan Laongmanee</li> <li>3. Mr. Pratakphol Prajakjit</li> <li>4. Ms. Pattarajit Kaewnuratchadasorn</li> </ol>

### 2. Observation Summary

#### **Oceanographic study**

There were 13 oceanographic stations. (Table 1 and Fig.1). Three stations were collected by Sea Bird Electric CTD (SBE CTD) model 19-03 (Conductivity, Temperature, Depth Recorder), four stations were collected by Falmouth Scientific CTD (FSI CTD), eight stations were collected by XBT (Expendable Bathythermograph). The SBE CTD composes with six sensors; temperature, conductivity, pressure, oxygen, chlorophyll a (WETStar fluorometer) and irradiant (PAR). FSI CTD composes with temperature, conductivity and pressure sensor having an accuracy of  $\pm 0.003$  mmhn,  $\pm 0.003$  °c and  $\pm 0.03\%$  respectively and three additional sensor pH, oxygen and fluorescence (Sea Tech fluorometer). However, oxygen and pH sensor had malfunction. Therefore they were determined from water sample.

The FSI CTD was equipped with twelve 2.5 liter bottles for *in situ* water sampling used for oxygen and pH determination. Water sample were collected at surface, 25, 50, 75, 100, 125, 150, 200, 300,500, chlorophyll maximum depth and the starting depth of thermocline layer.

Dissolved oxygen were determination by Winkler procedure (Parsons et al, 1984). The Value of pH was measured by pH meter (Fisher Scientific: Accumet 1002), which having an accuracy of 0.002.

Seawater samples were filtered every 6 hours(0600 hr, 1200 hr,1800 hr and 2400 hr) to determine chlorophyll-a concentration. 58 samples were collected during the cruise. Profiles of some oceanographic data were shown in Appendices.

## Fishing and Catch information

One operation of automatic squid jigging, one operation of tuna longline, and two operations of bottom vertical longline were demonstrated for the fishing course trainees. Total catches of all fishing operation were recorded.

Two automatic squid jigging machines were demonstrated at latitude 3° 52.4 S, longitude 85° 24.9 E. Total Catch were 3.58 kg of purpleback flying squids. Most of them were female. The mantle length was between 10.5-24.0 cm.

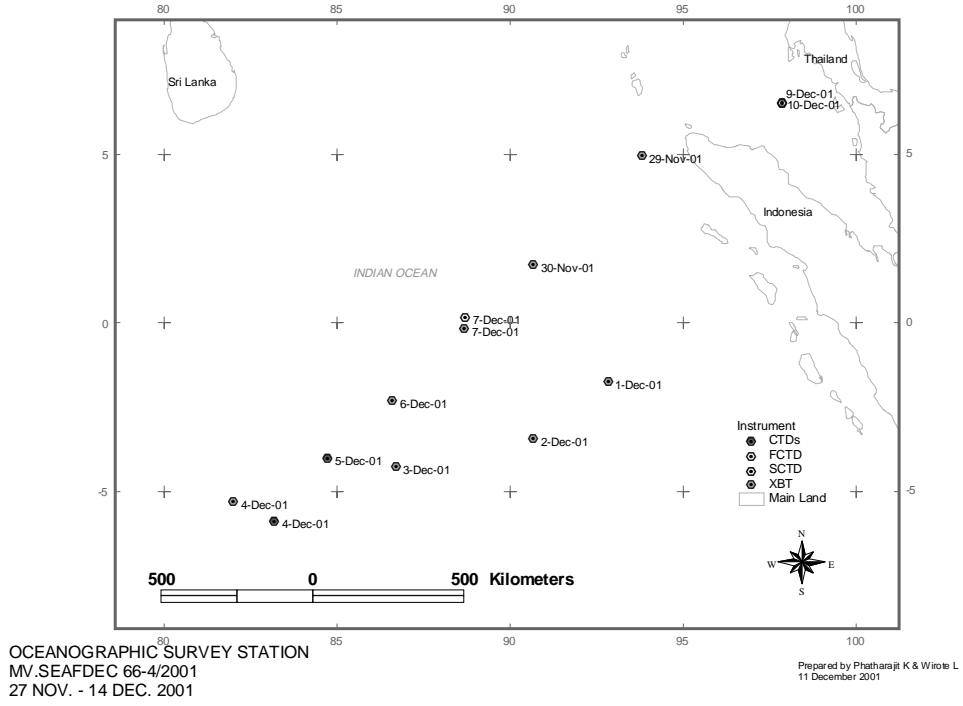
Tuna longline station was from Lat. 0° 05.4 S, Long. 88° 42.8 E to Lat. 0° 10.1 N, Long. 88° 40.9 E with 600 hook-lines. The catches were shark and 2 lancets.

Two bottom vertical longline operations were demonstrated in the Andaman Sea. First operation was demonstrated in the early morning at 6° 33.7 N, 98° 05.0 E (2.1 NM distance). The main catch was spiny dog-shark, golden snapper, grouper, etc. The second operation was demonstrated in the afternoon at 6° 34.5 N, 98° 05.8 E (1.8 NM distance). Catches were golden snapper, grouper, etc. Fishing logsheets were attached in the appendices.

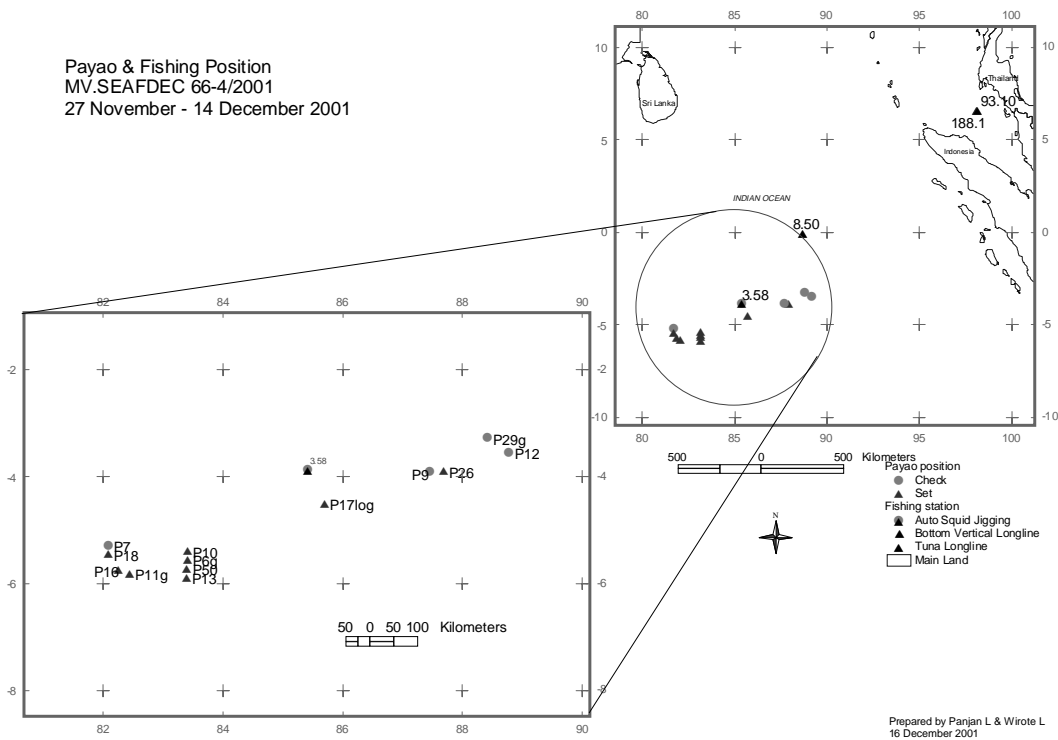
Thirteen payaos were checked for the amount of aggregating fish. Unfortunately, no tuna school aggregate at any payaos. Therefore, there were no purse seine data. Drifting direction of nine payaos were to the EEZ of Indonesia. There were picked up and set at positions as showed in Fig.2.

**Table 1.** Partial detail of oceanographic survey station during MV.SEAFFDEC cruise no. 66-4/2001

St no.	Date (Local)	Time (Local)	Time (Thai)	Latitude	Longitude	Max depth (m)	Oceanographic equipment		
							SBE CTD	FSI CTD	XBT
1	29-Nov-01	13.10	13.10	4_57.77 N	93_55.19 E	760			x
2	30-Nov-01	13.05	13.05	1_43.76 N	90_41.44 E	760			x
3	1-Dec-01	13.05	13.05	1_44.87 S	92_54.47 E	760			x
4	2-Dec-01	13.00	13.00	3_25.99 S	90_42.09 E	760			x
5	3-Dec-01	12.03	13.03	4_15.39 S	86_37.20 E	760			x
6	4-Dec-01	11.57	12.57	5_17.96 S	81_47.25 E	760			x
7	4-Dec-01	20.26	21.26	5_52.85 S	83_00.26 E	500	x	x	
8	5-Dec-01	18.12	19.12	4_08.00 S	84_34.68 E	500	x	x	
9	6-Dec-01	12.05	13.05	2_18.43 S	86_30.89 E	760			x
10	7-Dec-01	01.30	02.30	0_10.46 S	88_39.35 E	760			x
11	7-Dec-01	05.19	06.19	0_10.16 N	88_40.40 E	500		x	
12	9-Dec-01	21.00	21.00	6_34.08 N	98_05.64 E	120		x	
13	10-Dec-01	13.10	13.10	6_32.85 N	98_04.78 E	130	x		



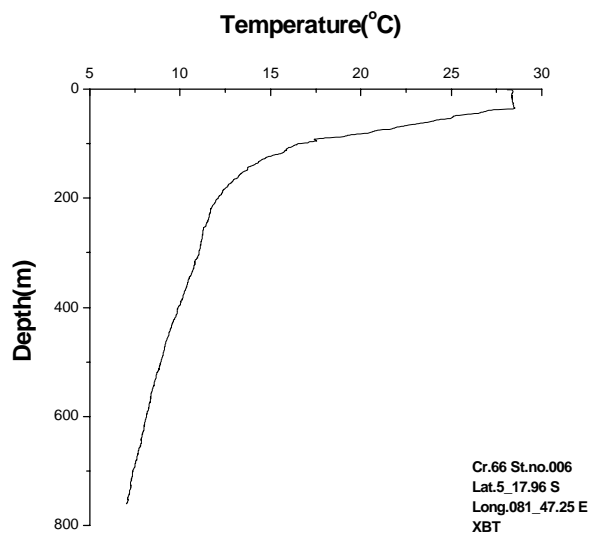
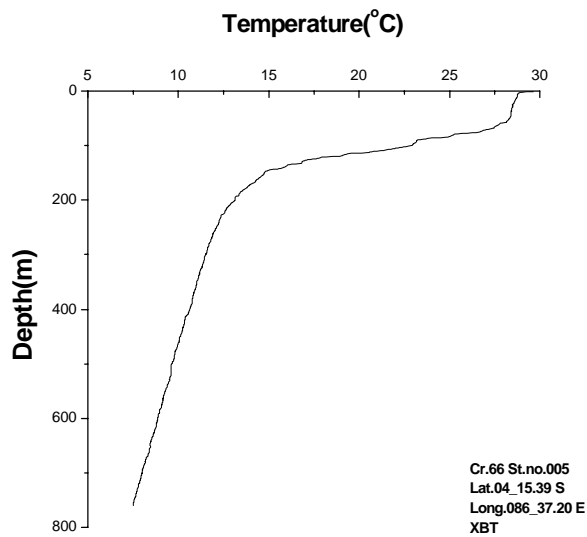
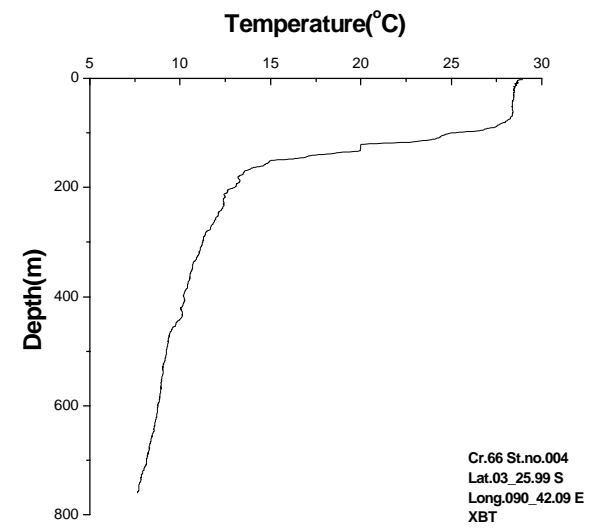
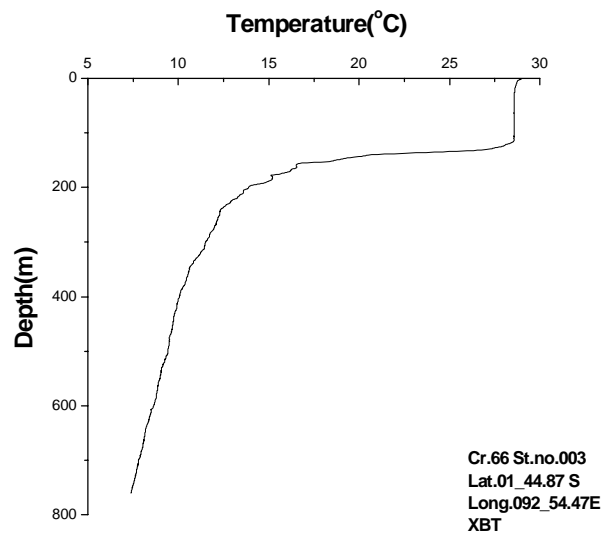
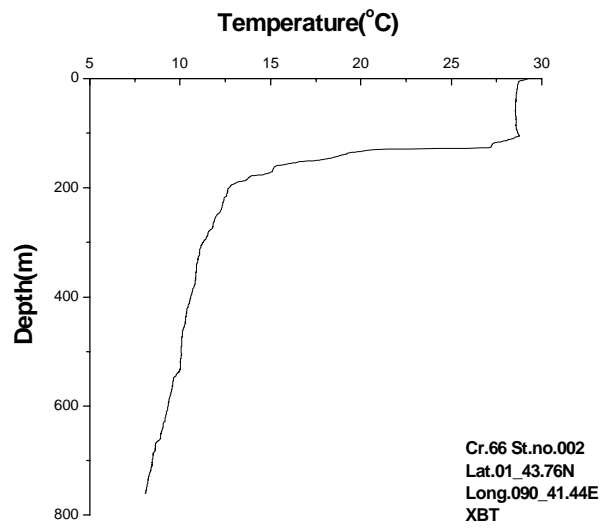
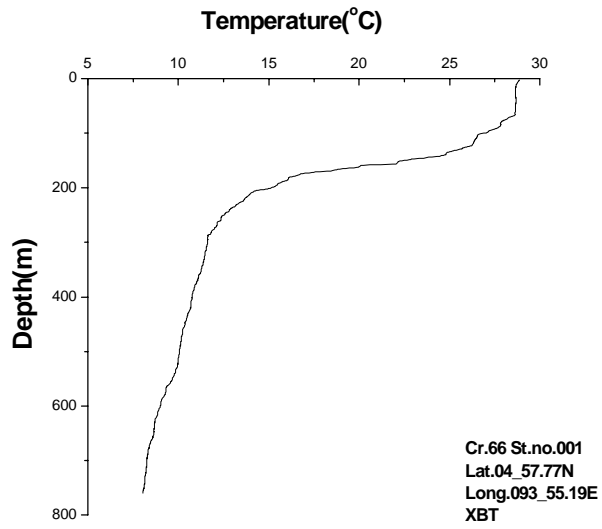
**Figure 1. Oceanographic stations**



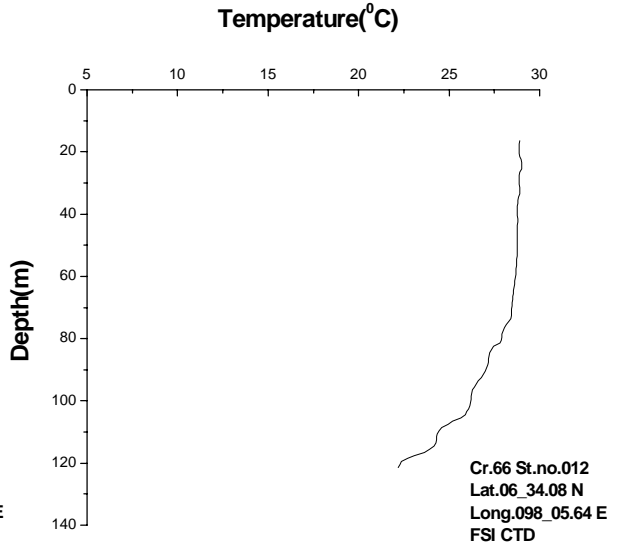
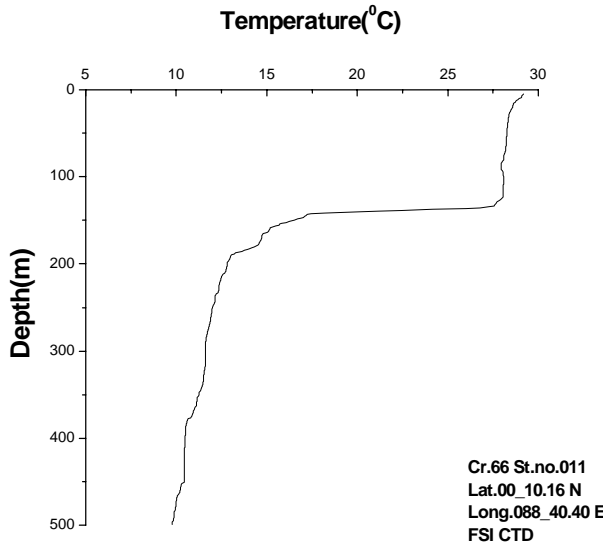
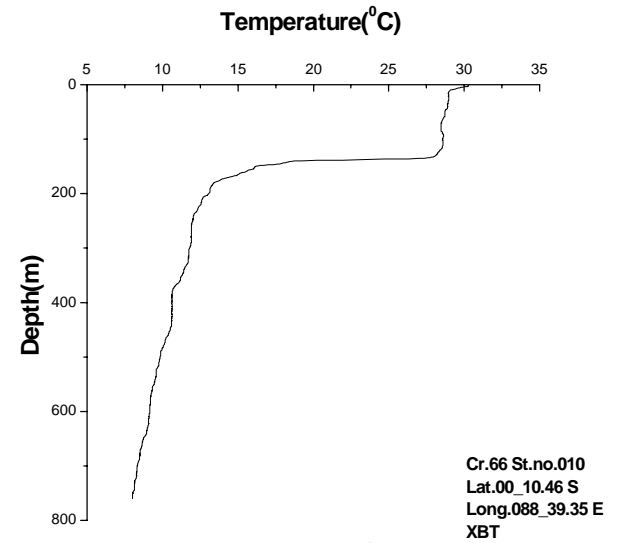
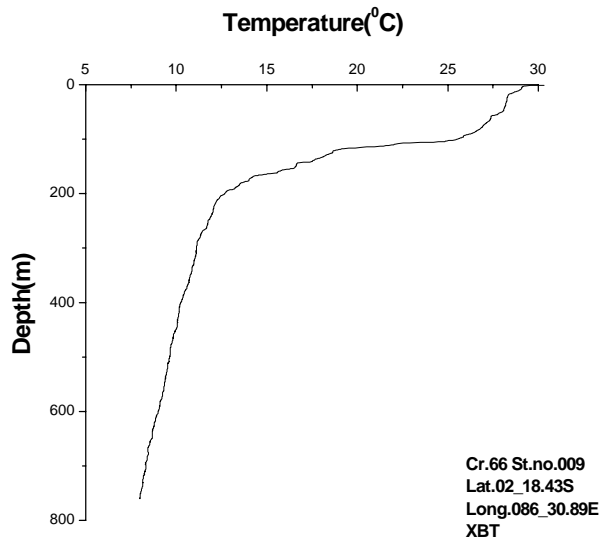
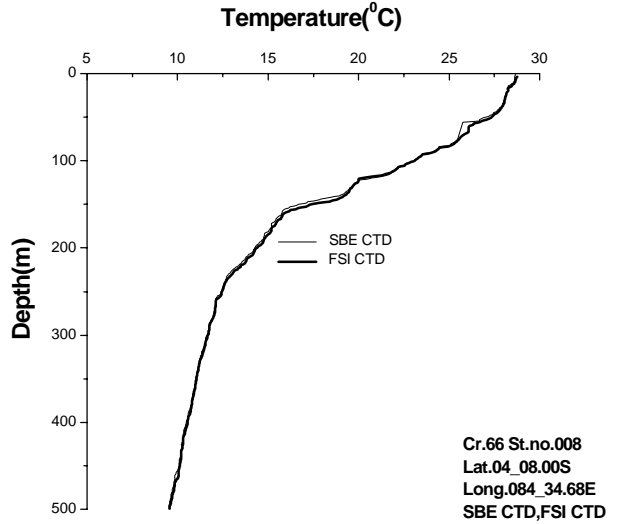
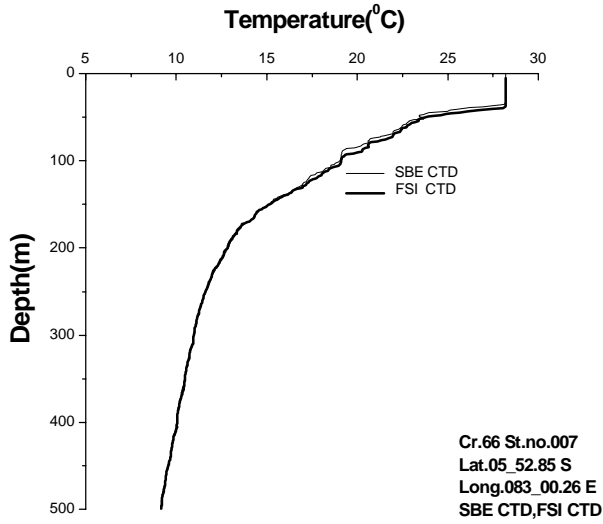
**Figure 2. Map of payaos and fishing operation stations**

## **Appendices**

## Profile of Temperature

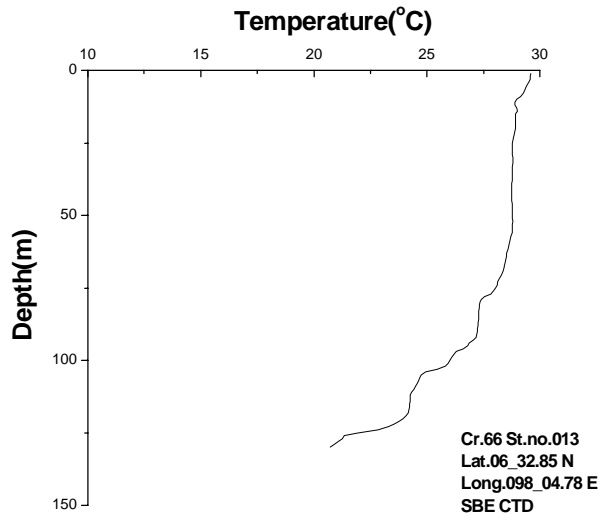


### Profile of Temperature

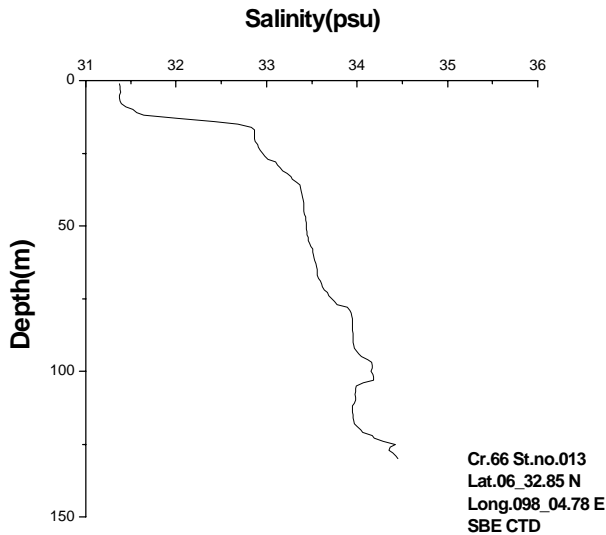
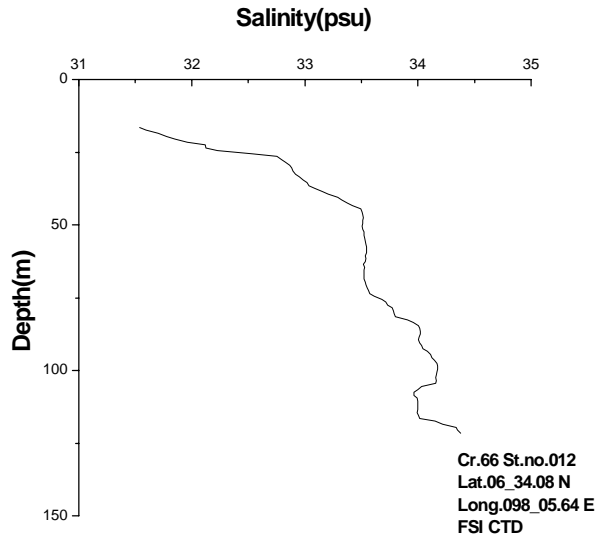
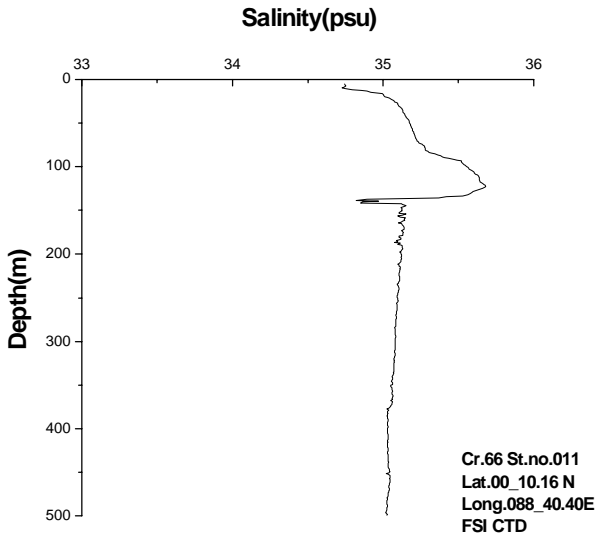
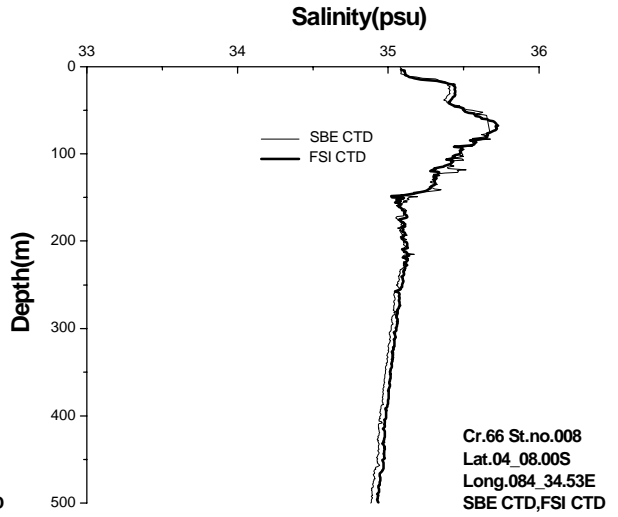
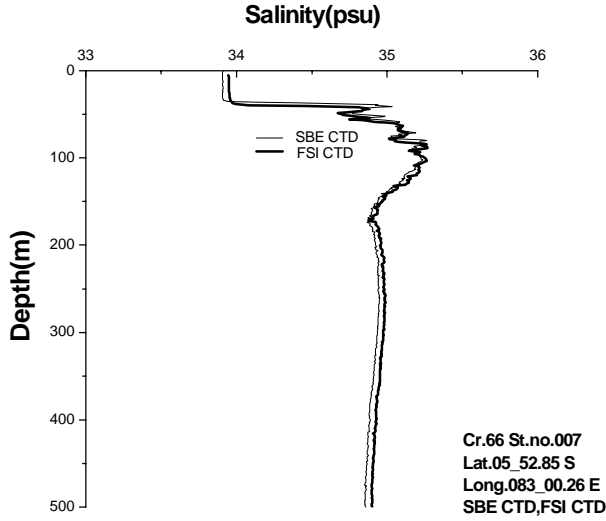




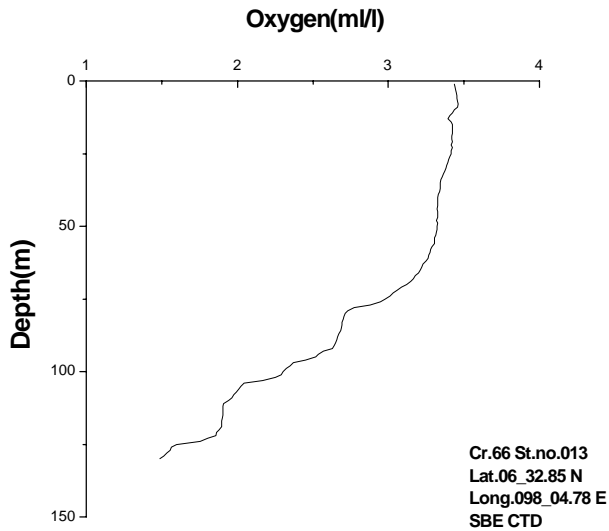
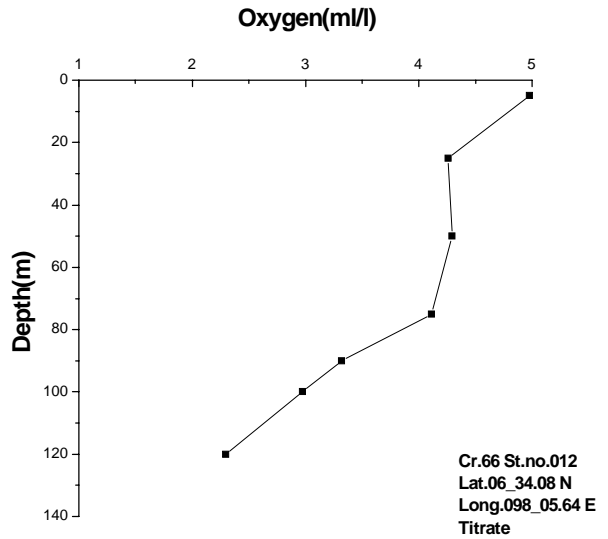
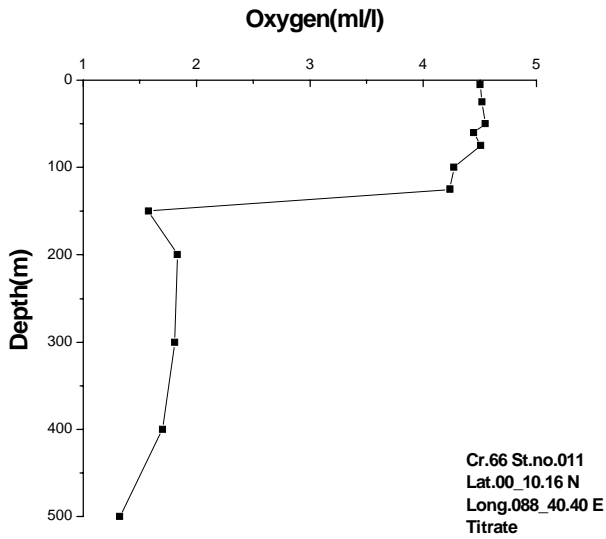
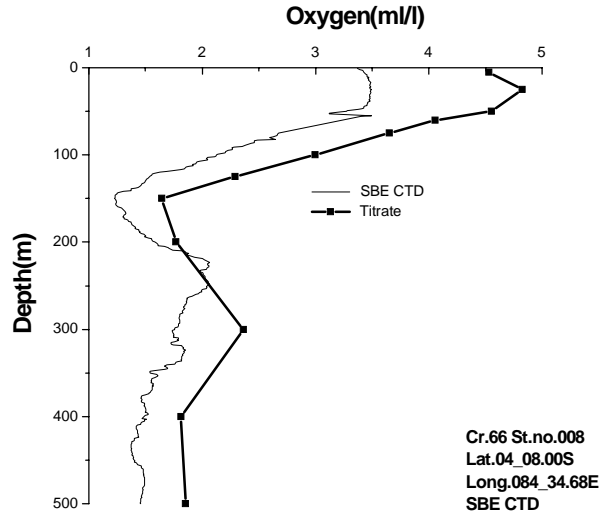
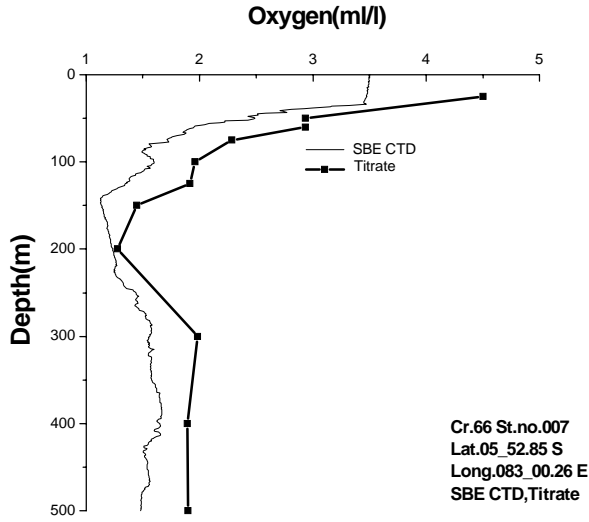
### Profile of Temperature



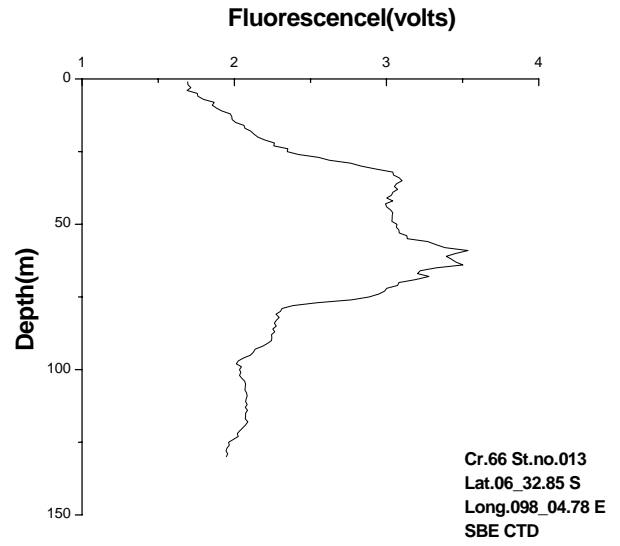
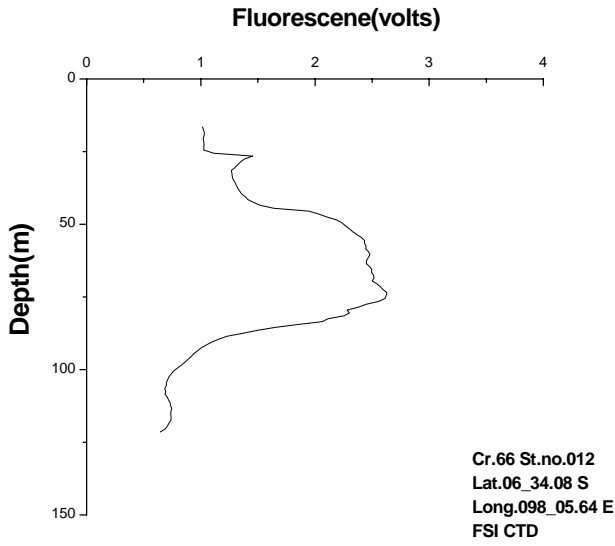
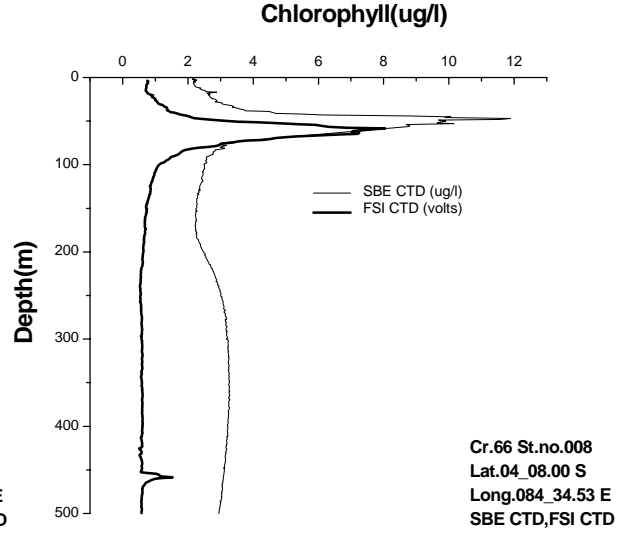
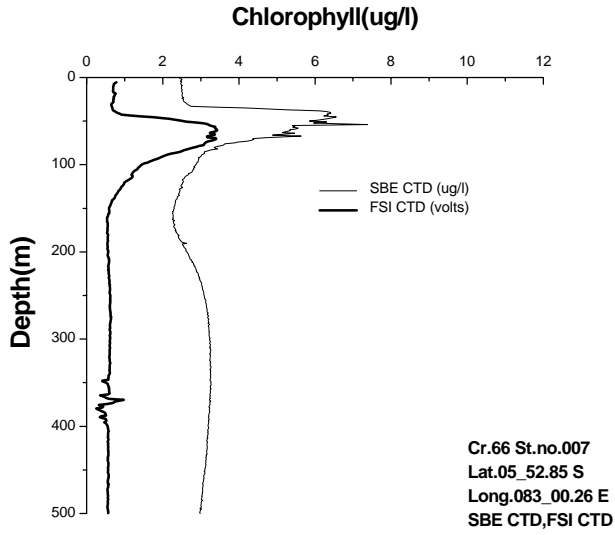
### Profile of Salinity



### Profile of Dissolved Oxygen



**Profile of Fluorescence and chlorophyll-a**





## SEAFDEC Fishing Logsheet

Recorder: Pattarajit

Operation Information											
Vessel Name MV.SEAFDEC			Gear	Type of Gear: Automatic Squid Jiggin			Number of Gear 2				
Cruise no. 66-4/2001				Operation no.: 01			Memo: Unit=machine				
Station no. 001				Operation distance : - NM							
Date (dd/mm/yyyy) 05-12-2001			Position	Start	Latitude: 04_08.1	N / S	Time (local)	Shooting	Start: 20:10		
Depth of Capture 000 - 150 m					Longitude: 084_34.5	E / W			Finish: 01:00		
Vessel Speed 0 kt				Finish	Latitude: 04_07.9	N / S			Start:		
Engine Speed 000 rpm					Longitude: 084_36.4	E / W			Finish:		
Environmental Information											
Air	Temperature 27.0 °C			Water							
	Pressure: 1010.3 mbar			Color (Forel or Ule scale) -	Transparency - m	Surface Temp. 28.8 °C	Sea Depth - m	Stage of sea Slight	Current (ground / water / true track)	Surface	Speed : 0.1 kt
	Humidity: 85.2 %									50 m	Speed : 0.4 kt
	Wind Speed : 4.8 kt									100 m	Speed : 0.7 kt
Direction : 180 deg			Direction : 027 deg								
Weather condition: BC			Direction : 022 deg								
Bottom			Oceanographic stations								
Bottom Temp. : - C			Type of instrument : SBE CTD			Memo :					
Type of bottom: -			File no.: SE66st08mctd								
Catch Information											
No.	Species	Weight (kg)	No.	Species	Weight (kg)	Remarks					
1	Purpleback Flying Squid(Male)	0.09	14			Male=1 ind.					
2	Purpleback Flying Squid(Female)	3.49	15			Female=23 ind.					
3			16								
4			17								
5			18								
6			19								
7			20								
8			21								
9			22								
10			23								
11			24								
12			25								
13			<b>Total</b>		3.58						



Recorder: Pattarajit

Operation Information										
Vessel Name MV.SEAFDEC			Gear	Type of Gear: Tuna Longline			Number of Gear 75 Baskets			
Cruise no. 66-4/2001				Operation no.: 01			Memo: 8 hook/basket			
Station no. 002				Operation distance : 15 NM						
Date (dd/mm/yyyy) 07-12-2001			Position	Start	Latitude: 00_05.4	N / S	Time (local)	Shooting	Start: 04:06	
Depth of Capture - m					Longitude: 088_42.8	E / W			Finish: 06:04	
Vessel Speed 8 kt				Finish	Latitude: 00_10.1	N / S	Hauling	Start: 11:55		
Engine Speed 0450 rpm					Longitude: 088_40.9	E / W		Finish: 15:20		
Environmental Information										
Air	Temperature 28.0 °C			Water						
	Pressure: 1009.5 mbar			Current (ground / water / true track)	Color (Forel or Ule scale) -	Surface	Speed : 0.1 kt			
	Humidity: 73.8 %						Transparency - m	Direction : 315 deg		
	Wind Speed : 1.9 kt							50 m	Speed : 0.5 kt	
	Direction : 0 deg				Sea Depth - m	Direction : 066 deg				
Weather condition: -			Stage of sea -		100 m	Speed : 0.4 kt				
Bottom			Direction : 081 deg							
Bottom Temp. : - C			Oceanographic stations							
Type of bottom: -			Type of instrument : FSI CTD			Memo : Thermocline~130-160 m.				
			File no.: SE66st11ictd							
Catch Information										
No.	Species	Weight (kg)	No.	Species	Weight (kg)	Remarks				
1	Shark	7	14			During hauling the lines, we lost 1 yellowfin tuna with 30 kg. weight and released 1 shark about 40 kg.				
2	Lancet	1.2	15							
3	Lancet	1.3	16							
4			17							
5			18							
6			19							
7			20							
8			21							
9			22							
10			23							
11			24							
12			25							
13			Total		9.5					



## SEAFDEC Fishing Logsheet

Recorder: Pattarajit

Operation Information													
Vessel Name		MV.SEAFDEC		Gear	Type of Gear: Bottom Vertical Longline			Number of Gear 52 Baskets					
Cruise no.		66-4/2001			Operation no.: 01			Memo: 3 branchline/basket					
Station no.		003			Operation distance : 2.1 NM								
Date (dd/mm/yyyy)		10-12-2001		Position	Start	Latitude: 06_33.7	N/ S	Time (local)	Shooting	Start: 05:30			
Depth of Capture		140 - 160	m			Longitude: 098_05.0	E/ W			Finish: 06:07			
Vessel Speed		8 kt			Finish	Latitude: 06_31.7	N/ S			Start: 08:05			
Engine Speed		0450 rpm				Longitude: 098_04.6	E/ W			Finish: 09:40			
Environmental Information													
Air	Temperature		28.0 °C		Water								
	Pressure:		1010.0 mbar		Color (Forel or Ule scale) -	Transparency - m	Surface Temp. 29.4 °C	Sea Depth - m	Stage of sea	Calm			
	Humidity:		80.0 %								Current (ground / water / true track)	Surface	Speed : 0.1 kt
	Wind Speed :		8.7 kt									50 m	Speed : 0.6 kt
Direction :		0 deg		100 m								Speed : 0.7 kt	
Weather condition		BC		Bottom		Direction : 272 deg		Direction : 161 deg					
Bottom Temp. :		22.4 C		Oceanographic stations									
Type of bottom:		-		Type of instrument : FSI CTD			Memo :						
				File no.:			SE66st12ictd						
Catch Information													
No.	Species	Weight (kg)	No.	Species	Weight (kg)	Remarks							
1	Golden snapper (51)	59.9	14										
2	Black Grouper (2)	6.0	15										
3	Grouper (18)	58.4	16										
4	Jobfish (7)	9.8	17										
5	Sweetlip(2)	1.0	18										
6	Armour searobin (3)	2.4	19										
7	Spiny dogshark(53)	43.0	20										
8	Cat shark(13)	4.5	21										
9	Eel (3)	1.0	22										
10	Dogshark (1)	1.3	23										
11	Alfonsinos	0.8	24										
12			25										
13				<b>Total</b>	188.1								


**SEAFDEC Fishing Logsheet**

Recorder: Pattarajit

Operation Information											
Vessel Name MV.SEAFDEC			Gear	Type of Gear: Bottom Vertical Longline			Number of Gear 50 Baskets				
Cruise no. 66-4/2001				Operation no.: 02			Memo: 3 branchline/basket				
Station no. 004				Operation distance : 1.8 NM							
Date (dd/mm/yyyy) 10-12-2001			Position	Start	Latitude: 06_34.5	N/ S	Time (local)	Shooting	Start: 12:30		
Depth of Capture 100 - 137 m					Longitude: 098_05.8	E/ W			Finish: 13:04		
Vessel Speed 4 kt				Finish	Latitude: 06_32.9	N/ S			Start: 15:00		
Engine Speed 0450 rpm					Longitude: 098_04.9	E/ W			Finish: 16:22		
Environmental Information											
Air	Temperature 30.1 °C			Water							
	Pressure: 1011.7 mbar			Color (Forel or Ule scale) -	Transparency - m	Surface Temp. 29.8 °C	Sea Depth - m	Stage of sea Calm	Current (ground / water / true track)	Surface	Speed : 0.3 kt
	Humidity: 67.7 %									50 m	Speed : 0.7 kt
	Wind Speed : 6.7 kt									100 m	Speed : 0.5 kt
Direction : 10 deg			Direction : 232 deg								
Weather condition BC											
Bottom											
Bottom Temp. 20.5 C			Oceanographic stations								
Type of bottom: Rocky			Type of instrument : SBE CTD			Memo :					
			File no.: SE66st13mctd								
Catch Information											
No.	Species	Weight (kg)	No.	Species	Weight (kg)	Remarks					
1	Golden snapper (78)	59.0	14								
2	Black Grouper (2)	8.0	15								
3	Grouper (20)	18.5	16								
4	Soldier (3)	3.0	17								
5	Sweetlip(10)	0.4	18								
6	Armour searobin (1)	3.0	19								
7	Ray (1)	0.4	20								
8			21								
9			22								
10			23								
11			24								
12			25								
13			<b>Total</b>		93.1						





## Cruise report on research activities

### 1. Cruise Summary

<b>Vessel:</b>	<b>MV. SEAFDEC</b>
<b>Cruise No.:</b>	67-5/2001
<b>Duration:</b>	14 December 2001 – 30 January 2002
<b>Objective:</b>	To do purse seine operation and fishing ground information collection
<b>Area of Operation:</b>	Indian Ocean
<b>Port of call:</b>	Phuket (Thailand)
<b>Researcher and Assist. Researcher:</b>	<ol style="list-style-type: none"> <li>1. Mr. Baithur Sjarif from DOF Indonesia</li> <li>2. Ms. Sopana Boonyapiwat from DOF Thailand</li> <li>3. Ms. Pattira Luedwitayapasit “</li> <li>4. Mr. Rerngchai Sujittrosakul “</li> <li>5. Mr. Somjet Sornkrut “</li> <li>6. Mr. Arnukorn Boutson from Kasetsart university</li> <li>7. Mr. Isara Chanrachakit from SEAFDEC/TD</li> <li>8. Ms. Pattarajit Kaewnuratchadasorn “</li> <li>9. Mr. Sukchai Arnupapboon “</li> <li>10. Mr. Pratakphol Prajakjit (14 Dec 01- 7 Jan 02)</li> <li>11. Ms. Penjan laongmanee “</li> </ol>

### **Research Topics:**

Research Topic	Responsible agency
1. Study on fishing ground condition	TD
2. Species composition of tuna species	DOF Thailand, TD
3. Species composition of by-catch species	TD
4. Gonad maturity and fecundity of tuna species	DOF Thailand
5. Length-weight relationship of tuna species	DOF Thailand and TD
6. Environmental condition in the thermocline layer	DOF Thailand, TD
7. Current around the eastern Indian ocean	Kasetsart university

### 1. Observation Summary

#### **Oceanographic study**

Fishing ground condition studies in the Indian Ocean were carried from latitude 00\_07.32N to 07.23.56S and longitude 092\_51.15E to 082\_49.49E. There were nineteen oceanographic stations (table1 and fig.1).

The oceanographic data were collected from surface to 500 meter depths by Sea Bird Electric

CTD (SBE CTD) model 19-03 (Conductivity, Temperature, Depth Recorder) that compose of six sensors; temperature, conductivity, pressure, oxygen, chlorophyll a (WETStar fluorometer) and irradiance (PAR). The accuracy of temperature, conductivity and pressure sensor having an accuracy of 0.01 °c, 0.001 S/m and 0.25% of full-scale range. Profiles of oceanographic data were shown in appendix.

Water samples of eleven stations were collected for studying nutrient, chlorophyll-a and phytoplankton. Large volumes of water sample were collected from surface to 150 meter depths every 25 meter depths interval by Vandorn Water sampler. Nutrient's samples were freeze immediately. Thirty liters of water sample from Vandorn were filtered through 20 µm plankton net then preserved in 5% formalin solution for phytoplankton study. Five liters were filtered through Whatman GF/C filter paper then freeze the filter paper for chlorophyll-a determination at SEAFDEC/TD.

Every six-hour during the cruise, surface water were filtered for chlorophyll-a determination. There were 66 samples were collected during the cruise. Quantum sensor was set at the compass deck to collect solar radiation in every hour.

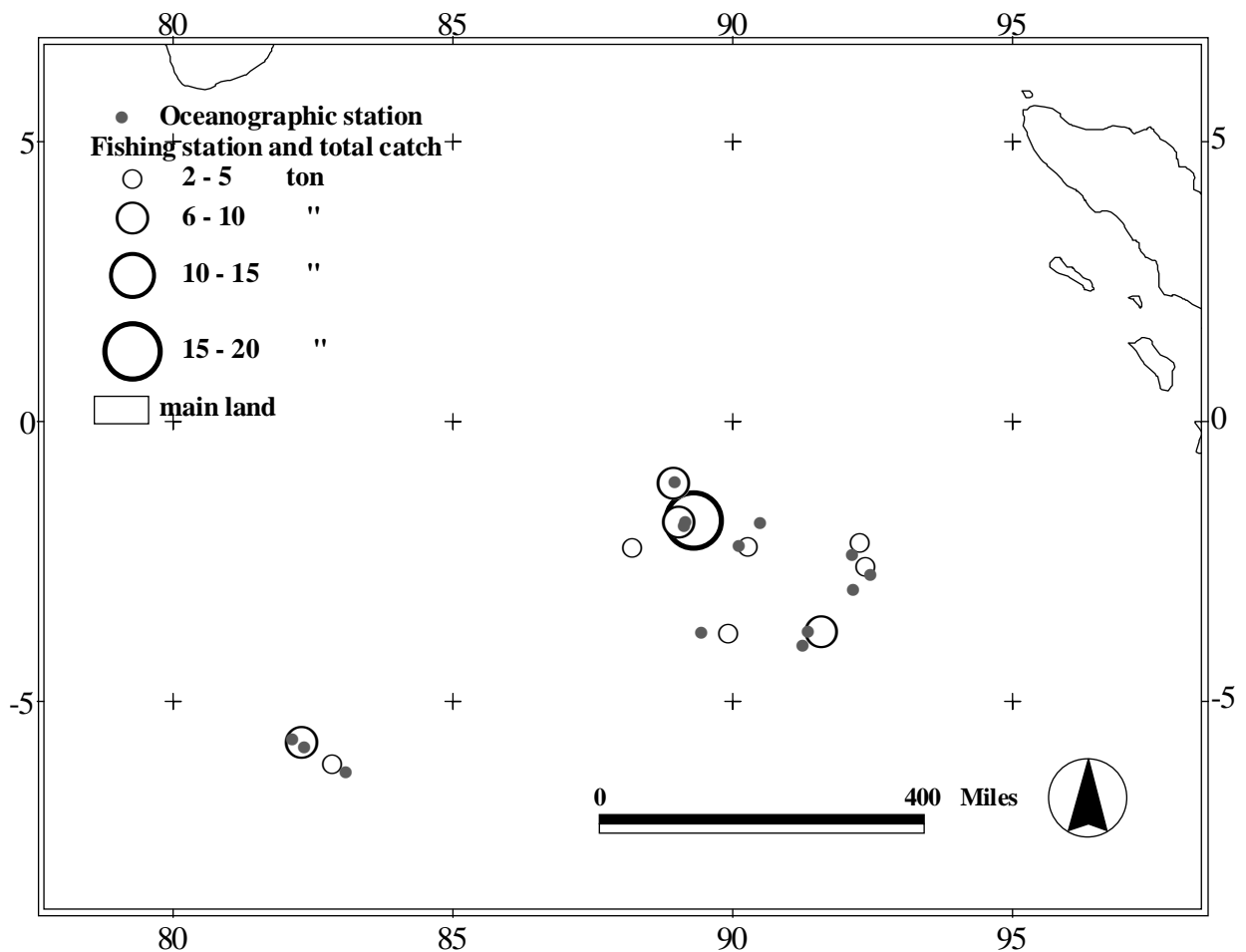


Figure 1 Map of oceanographic and fishing station and the total catch

Table 1 Partial detail of oceanographic survey station during MV.SEAFFDEC cruise no. 67-5/2001

Station no.	Date (local)	Time	Latitude	Longitude	Max depth of CTD	Instrument		
						CTD	Vandorn	Flow-meter
1	16-Dec-01	22:00	02_46.40S	092_51.50E	500	*	*	*
2	17-Dec-01	9:00	03_01.94S	092_20.38E	500	*	*	*
3	18-Dec-01	17:00	02_25.03S	092_17.58E	500	*		
4	19-Dec-01	20:45	03_45.47S	091_39.39E	500	*	*	*
5	20-Dec-01	19:00	03_48.18S	089_48.49E	500	*	*	*
6	22-Dec-01	1:25	05_41.38S	082_16.24E	500	*		
7	23-Dec-01	13:10	05_50.83S	082_39.12E	500	*	*	*
8	26-Dec-01	13:20	01_49.61S	090_52.41E	500	*	*	*
9	27-Dec-01	17:40	04_01.97S	091_29.42E	500	*		*
10	29-Dec-01	20:41	06_17.28S	083_12.49E	500	*	*	*
11	31-Dec-01	18:41	02_14.02S	090_13.69E	500	*		*
12	2-Jan-02	0:10	01_48.84S	089_20.15E	500	*		*
13	2-Jan-02	13:05	01_53.53S	089_17.36E	500	*	*	*
14	3-Jan-02	15:30	01_06.01S	089_01.50E	500	*		*
15	13-Jan-02	18:25	02_40.95S	088_24.62E	500	*	*	*
16	15-Jan-02	5:50	07_23.56	087_43.86E	500	*		*
17	17-Jan-02	17:20	02_07.69S	088_15.54E	500	*	*	*
18	18-Jan-02	15:40	02_08.43S	087_43.31E	500	*	*	*
19	20-Jan-02	5:05	00_07.32N	082_49.49E	200	*		*
20	21-Jan-02	15:55	02_48.05N	088_46.36E	200	*		*

### Catch data collection

Eleven purse seine operations were carried out during this cruise (Table2). The catch almost less than 10 tons each operation. The amount of total catch was 70.5 tons. The main targets species were skipjack (*Kasuwonus pelagicus*), yellowfin tuna (*Thunnos albacares*), bigeye tuna (*Thunnus obesus*). The main catches were skipjack and yellowfin tuna (Table3)

150 samples of tuna species at each operation were sampling for gonad maturity and fecundity. About 100 to 200 sample were measured fork length, girth length and weight from the second scoop for catch composition study.

Table 2 The position of purse seine operations

Operation no	Date	Time		Position		Total catch (Ton)
		Start	Finish	Lat	Long	
1	18-Dec-01	5:47	11:50	02_37.6 S	092_22.4 E	2
2	19-Dec-01	5:52	10:15	02_12.1 S	092_17.6 E	3
3	20-Dec-01	5:50	9:45	03_47.9 S	091_36.1 E	9
4	21-Dec-01	5:55	9:10	03_49.4 S	089_56.0 E	5
5	23-Dec-01	6:50	10:40	05_46.0 S	082_19.5 E	8
6	24-Dec-01	6:23	9:45	06_08.0 S	082_52.5 E	2
7	1-Jan-01	6:02	9:20	02_16.3 S	090_18.1 E	1.5
8	2-Jan-02	6:08	10:35	01_46.9 S	089_19.1 E	20
9	3-Jan-02	6:06	9:40	01_48.8 S	089_03.3 E	10
10	4-Jan-02	6:06	10:05	01_07.2 S	088_57.3 E	8
11	18-Jan-02	5:48	9:50	02_17.9 S	088_12.7 E	2

Table 3 The summary of percent (%) by weight of the catch

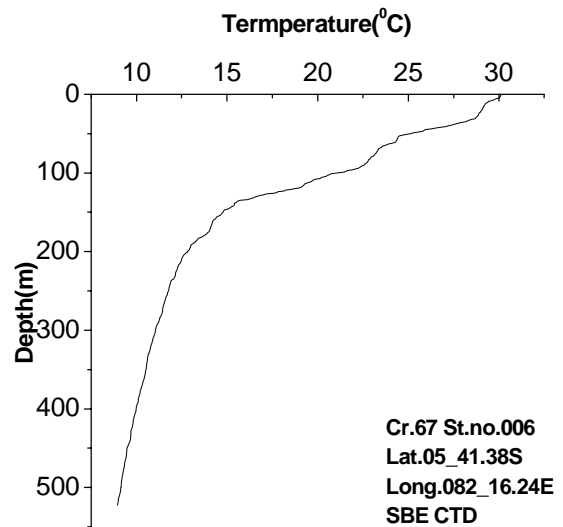
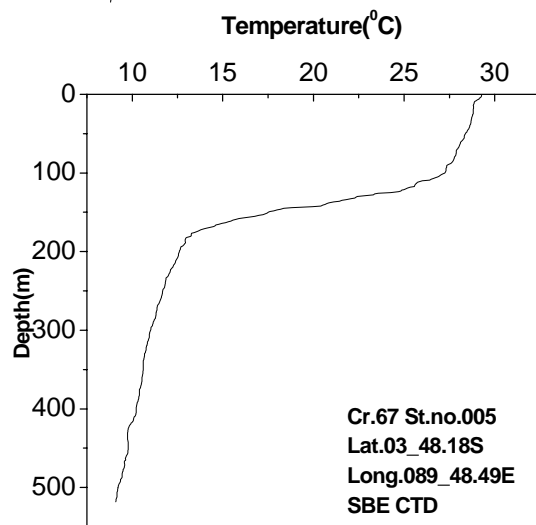
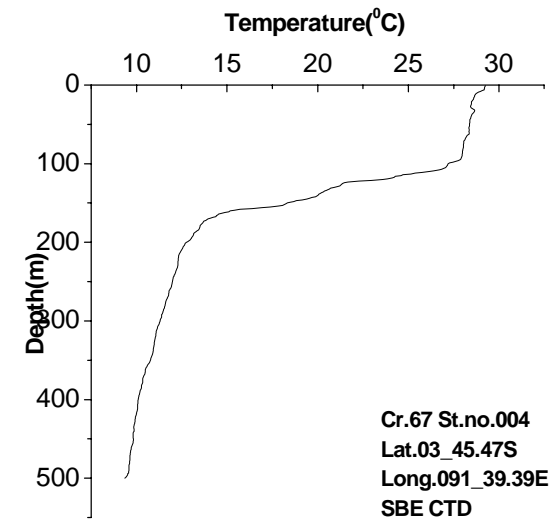
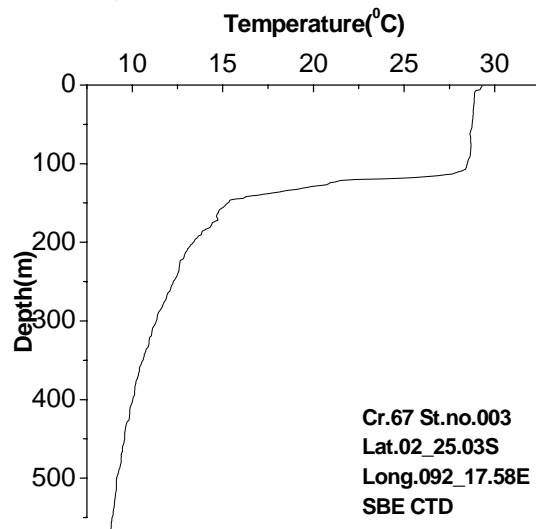
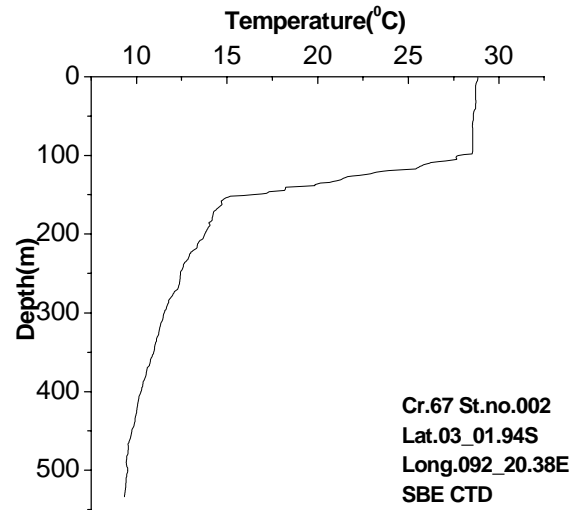
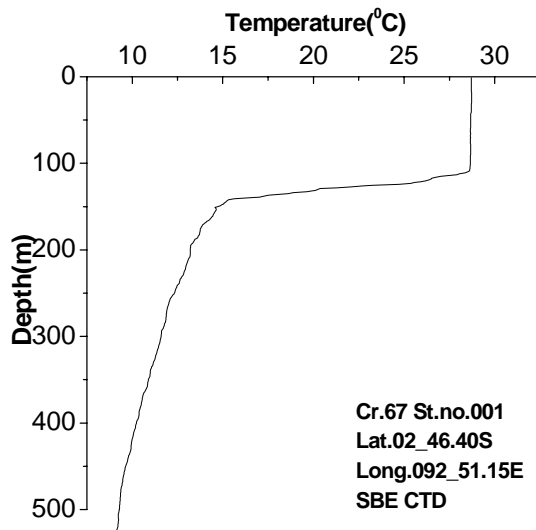
Operation no.	Percent (%) by weight			
	Skipjack	Yellowfin tuna	Bigeye tuna	Other spp.
1	39.6	57.5		2.9
2	31.56	57.37	3.79	7.29
3	51.75	39.48	4.64	4.13
4	58.9	36.87	1.91	2.32
5	57.2	42.35	-	0.45
6	6.62	58.85	0	7.56
7	-	95.16	-	4.84
8	85.5	7.6	6.52	0.38
9	79.7	7.4	9.3	3.6
10	49.4	32.4	14.2	4
11	75.97	14.71	9.31	0

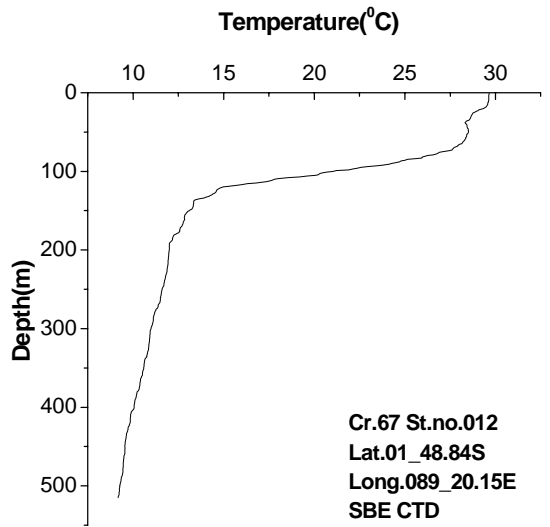
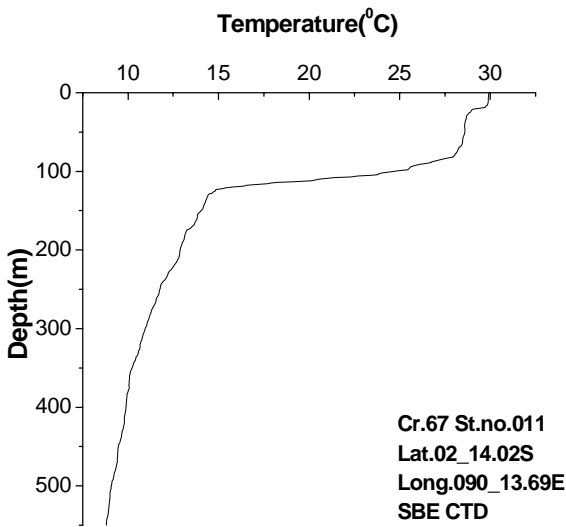
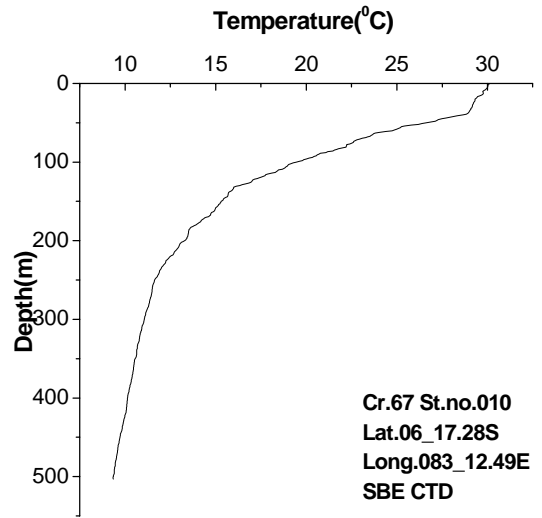
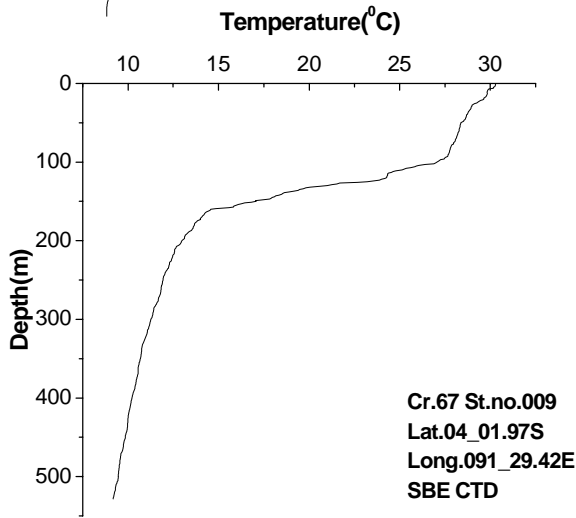
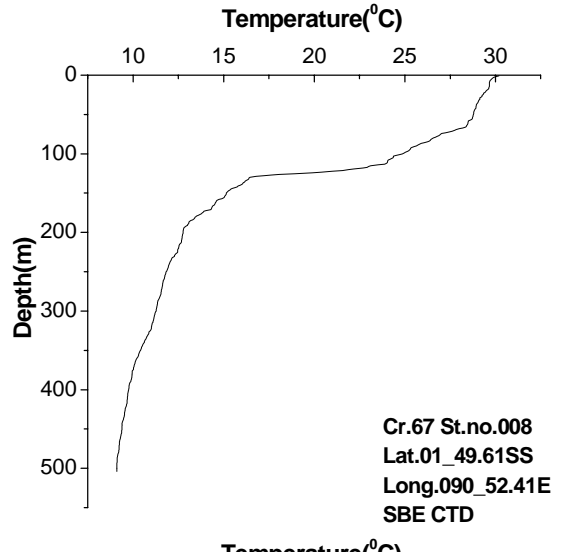
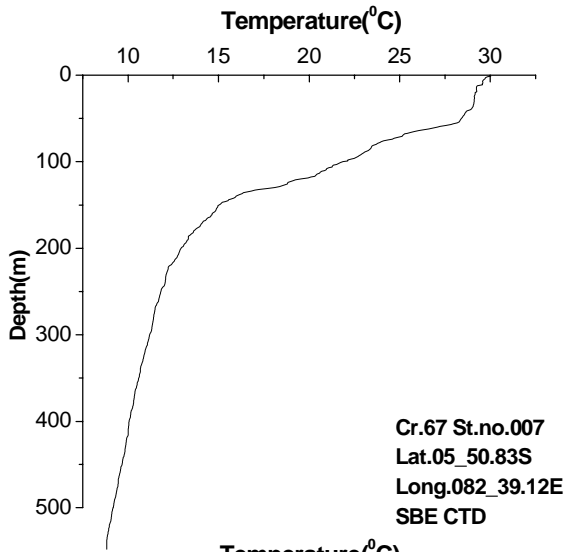
### 3. Cruise memorandum

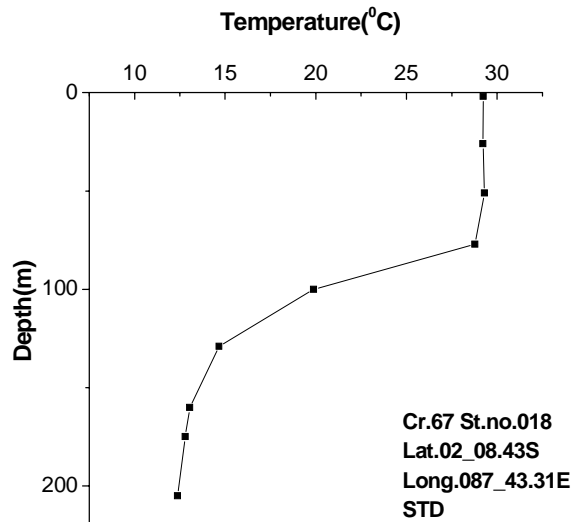
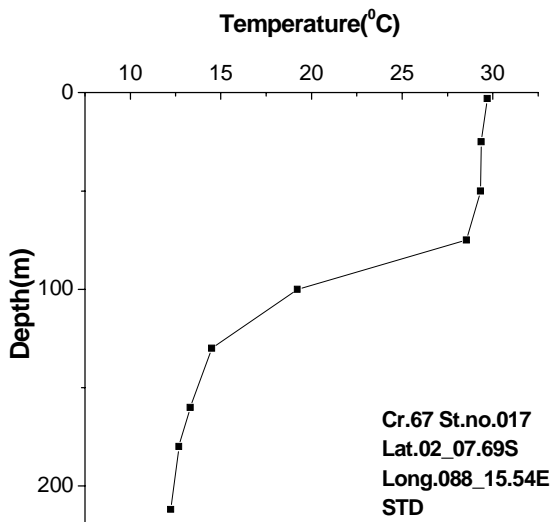
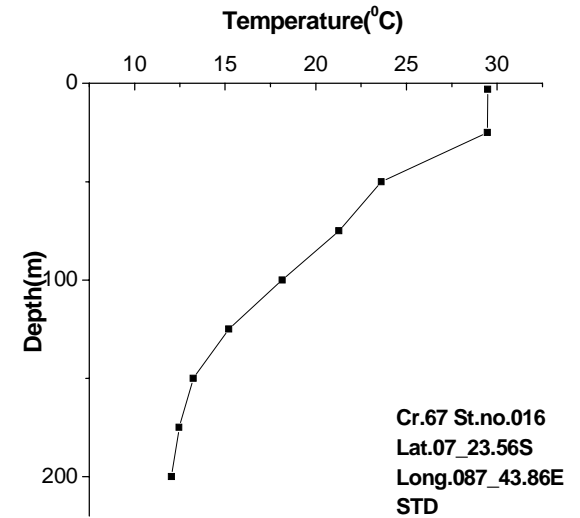
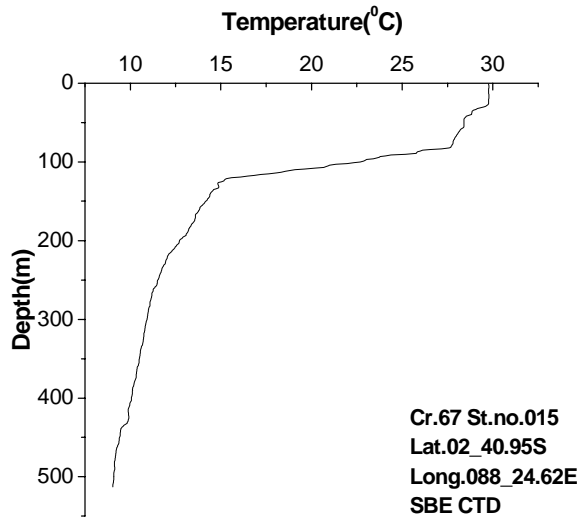
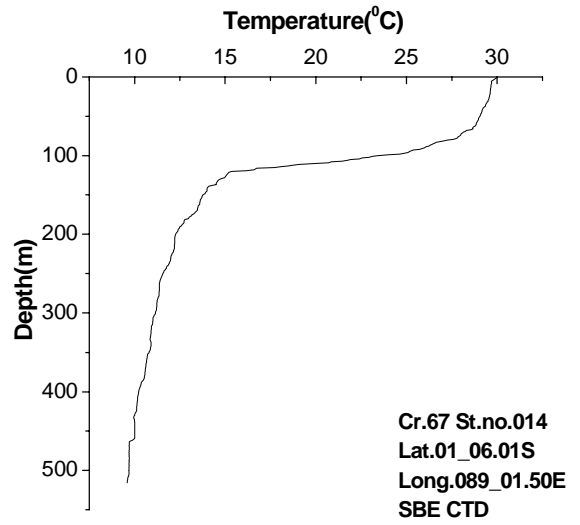
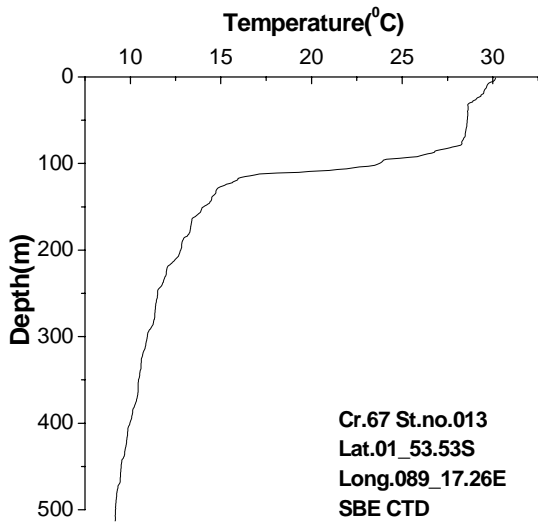
All oceanographic data and catch data were shown in appendix. All oceanographic data and cruise report was sent to participation researchers. After all researchers finished to analyze their sample and data, they will send data and report to SEAFDEC/TD for distributing to participation research and storing to SEAFDEC database.

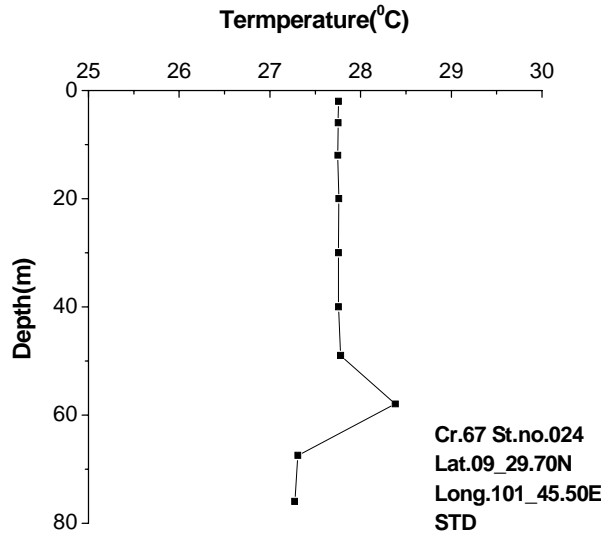
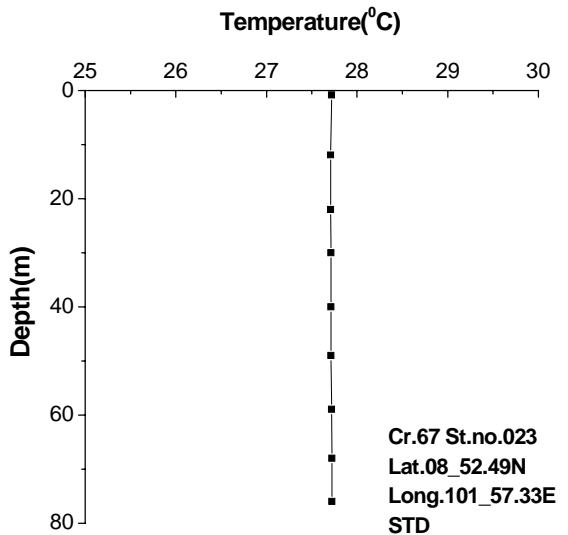
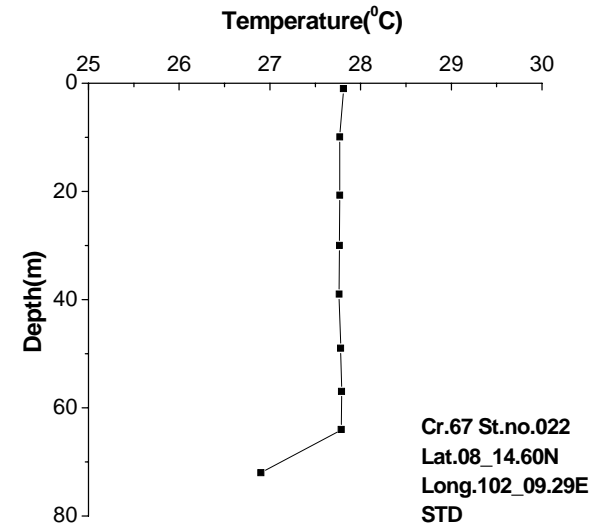
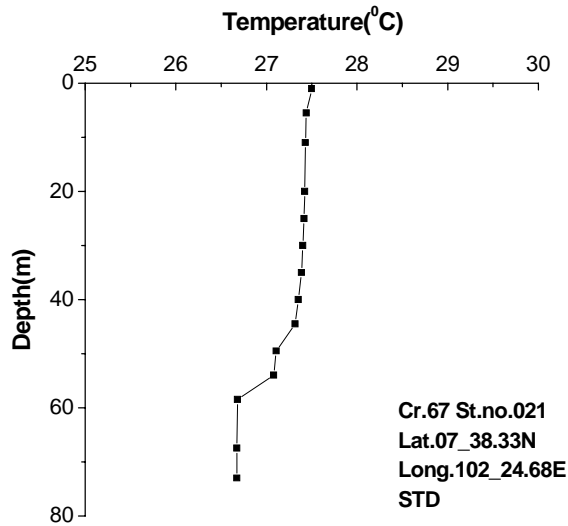
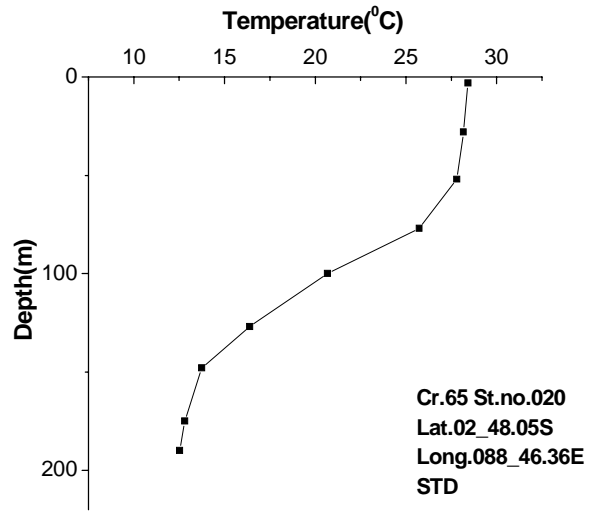
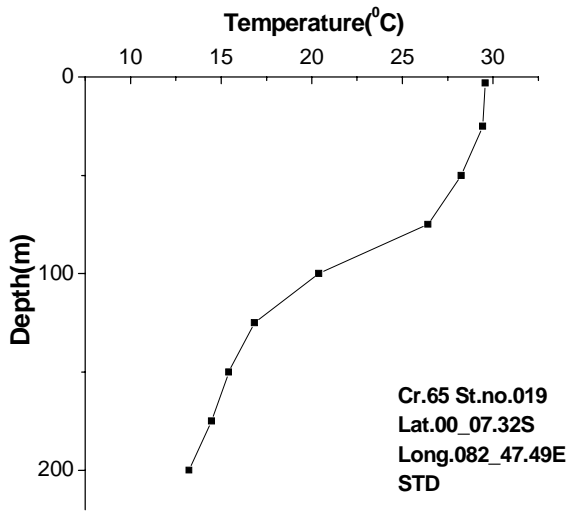
**Remark:** During this cruise, SBE CTD had malfunction since station 16. The SBE CTD was unable communication to the computer. The data uploading could not established. Oceanographic data from station no. 16 to 20 were collected using STD of Kasetsart University researcher.

## Profiles of Temperature

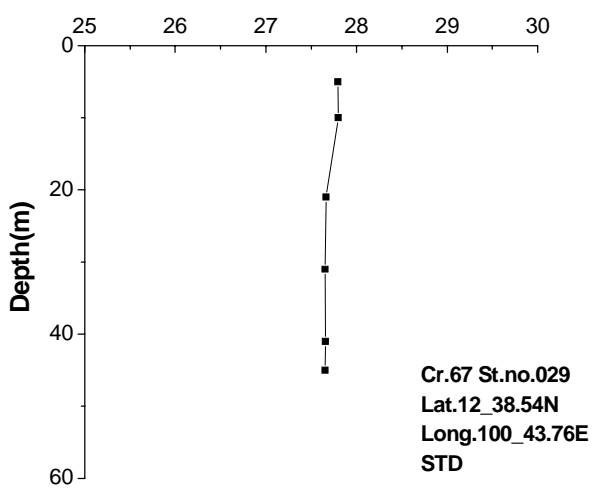
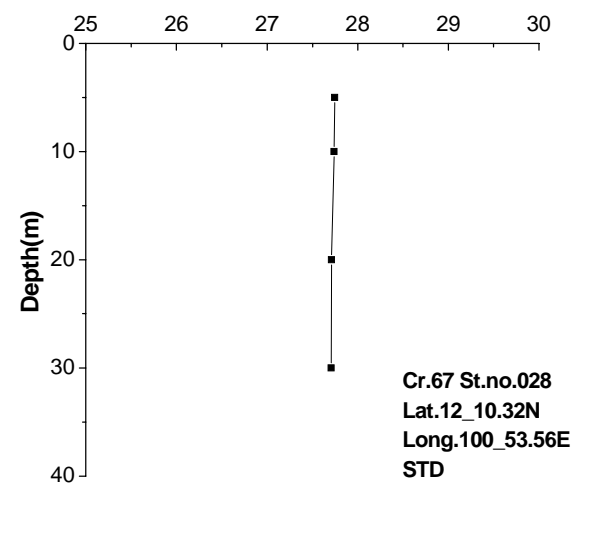
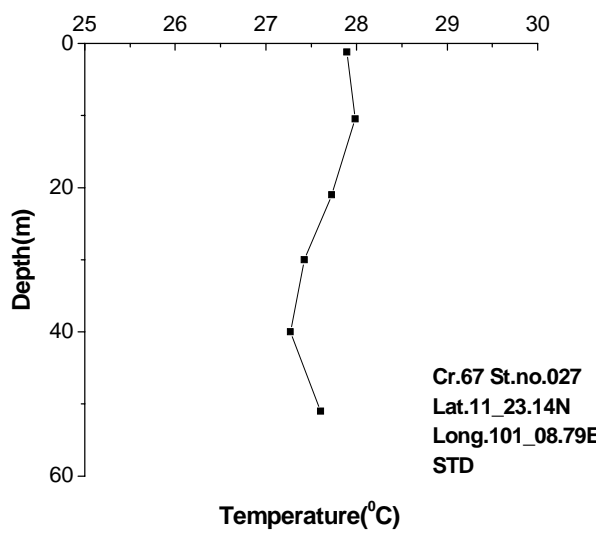
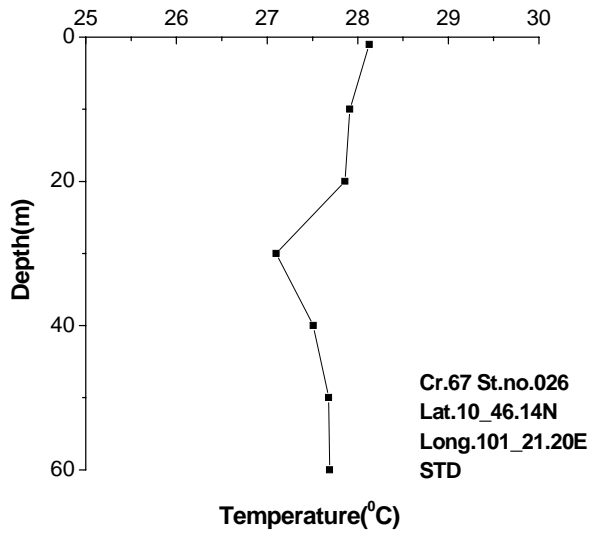
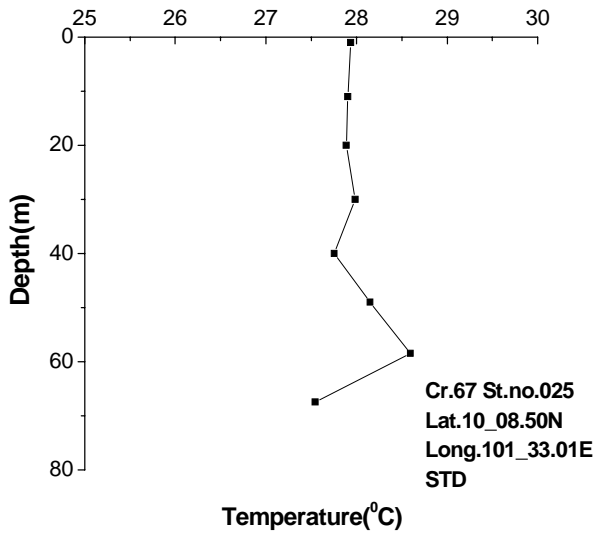




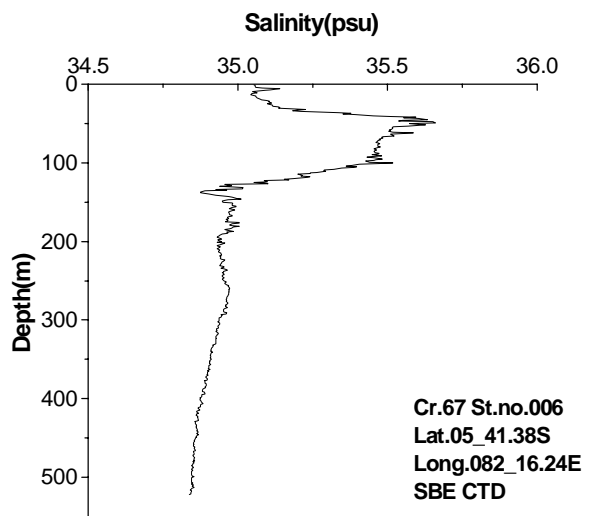
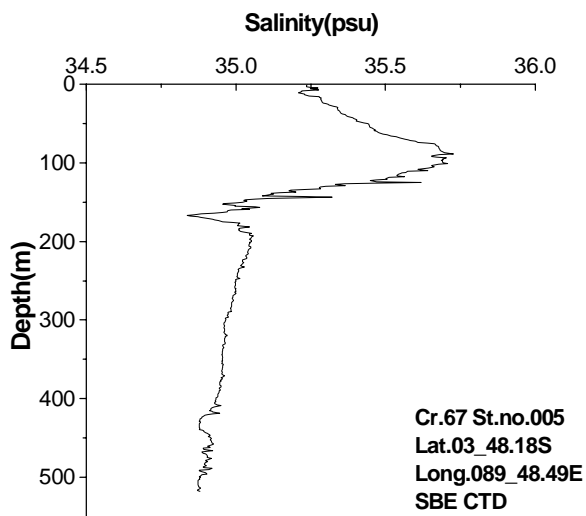
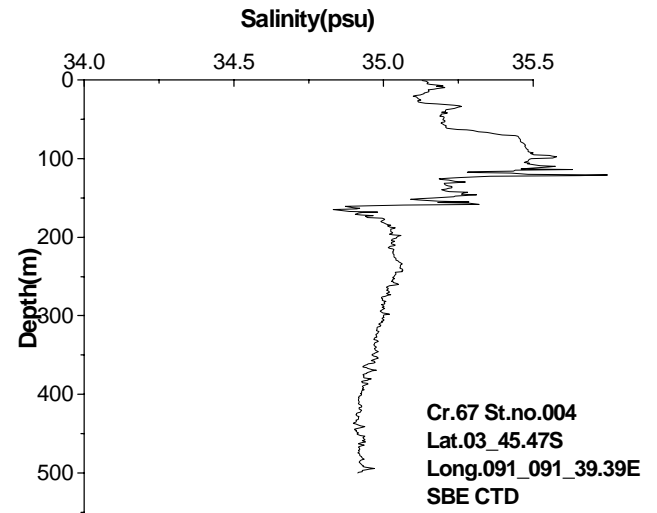
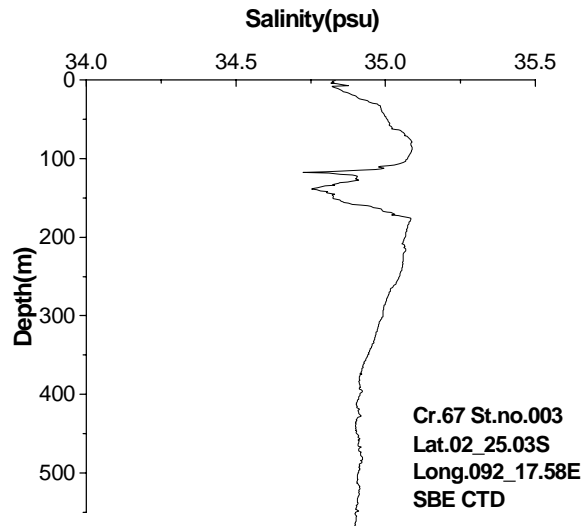
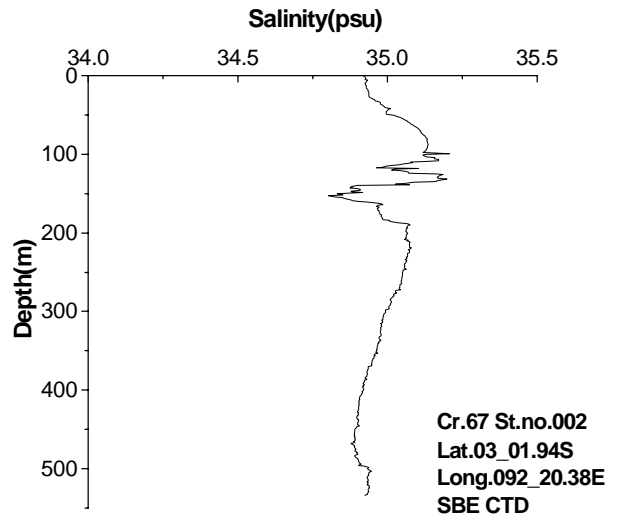
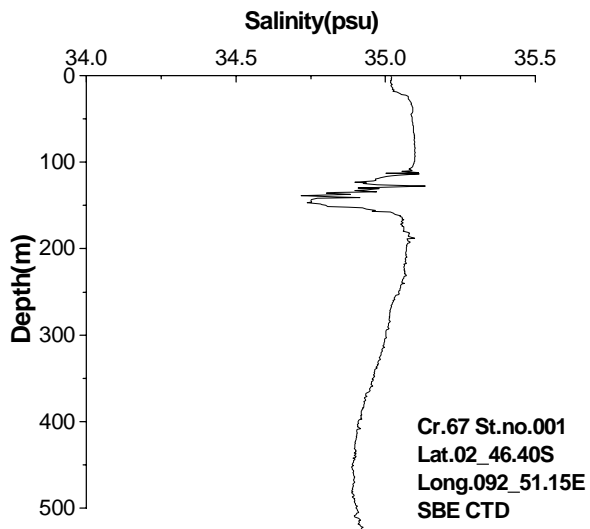


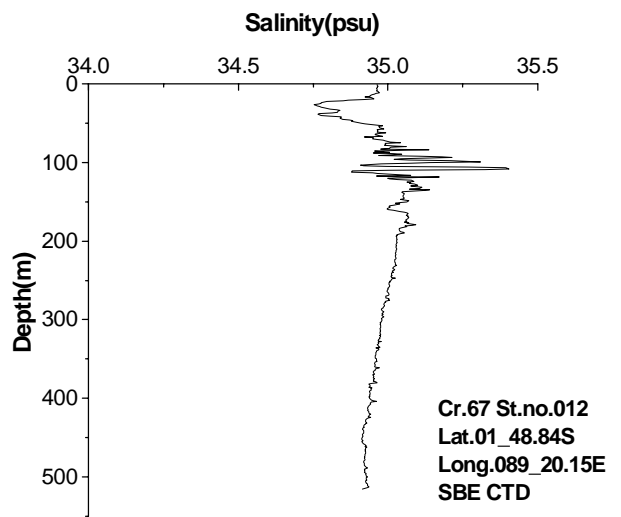
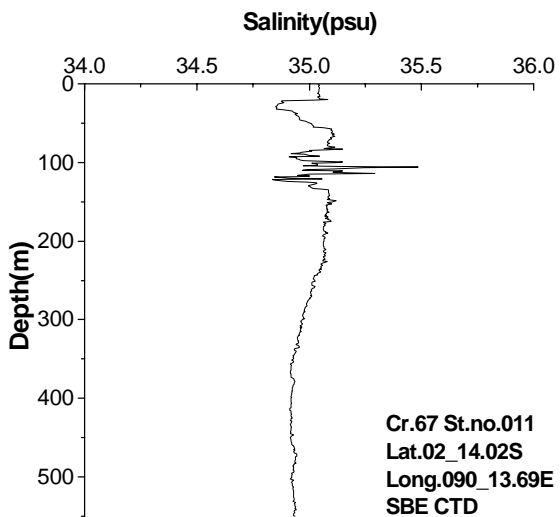
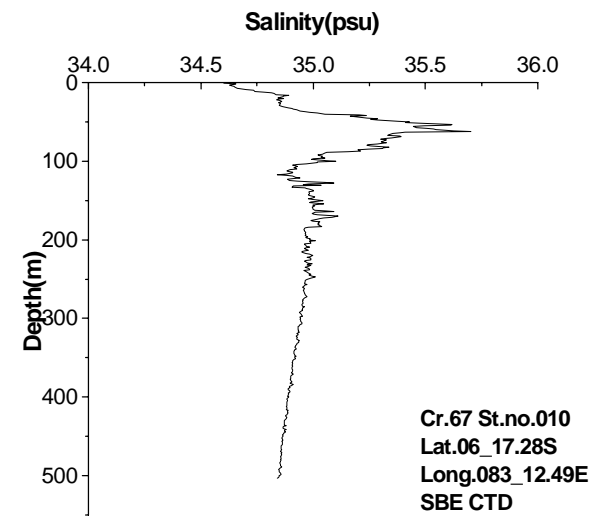
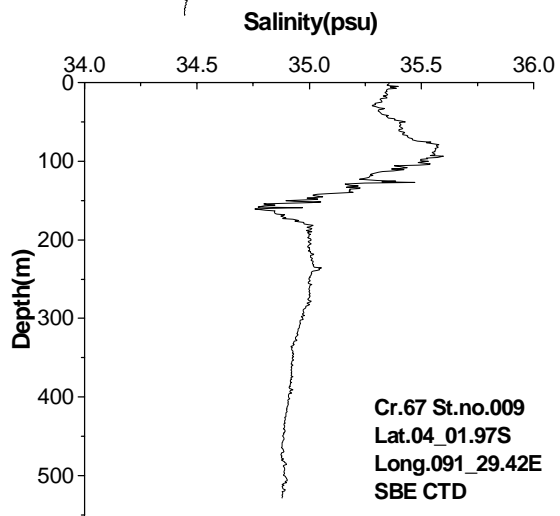
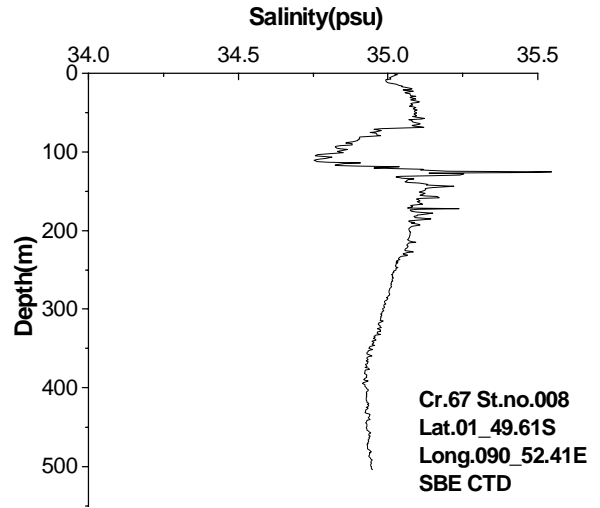
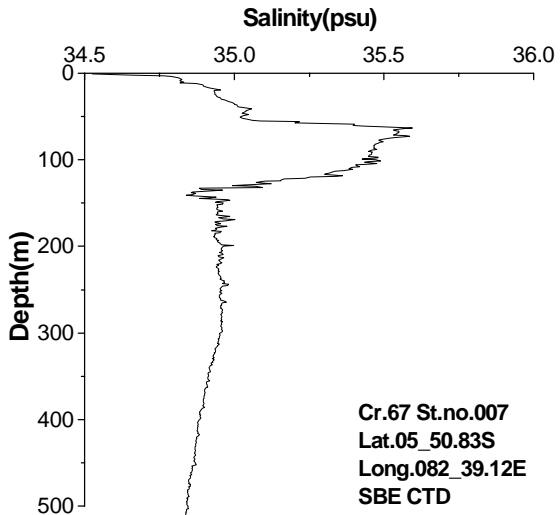


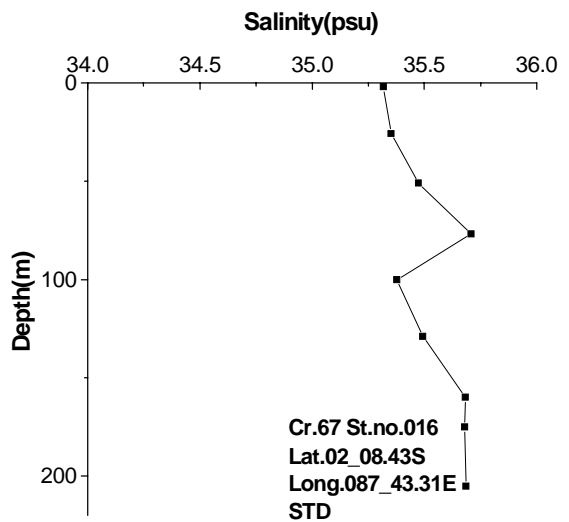
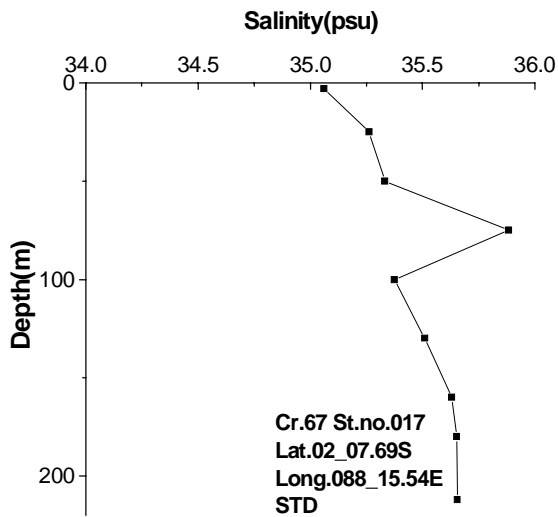
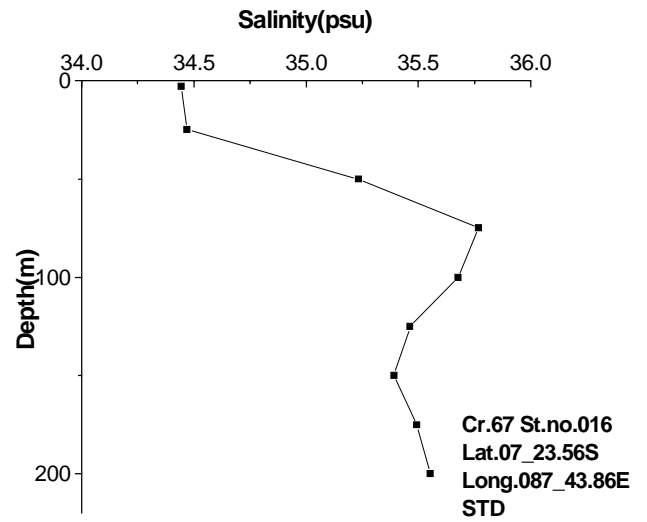
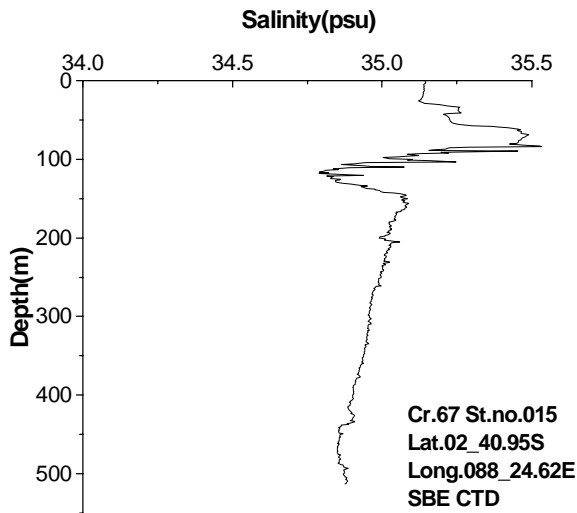
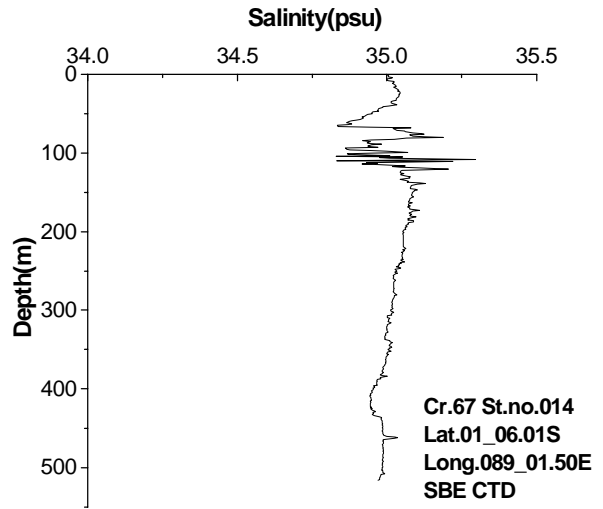
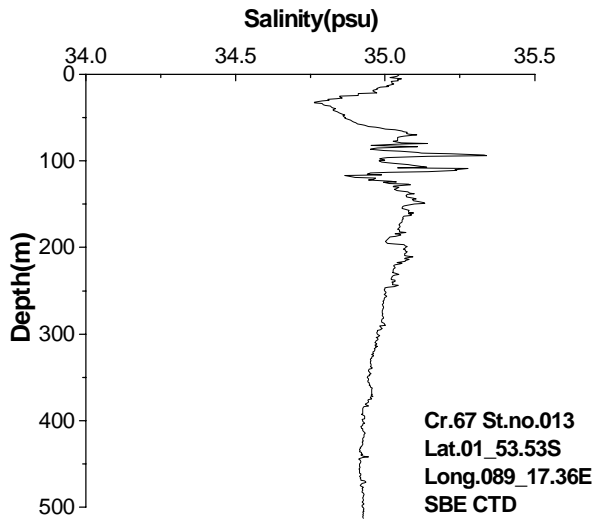


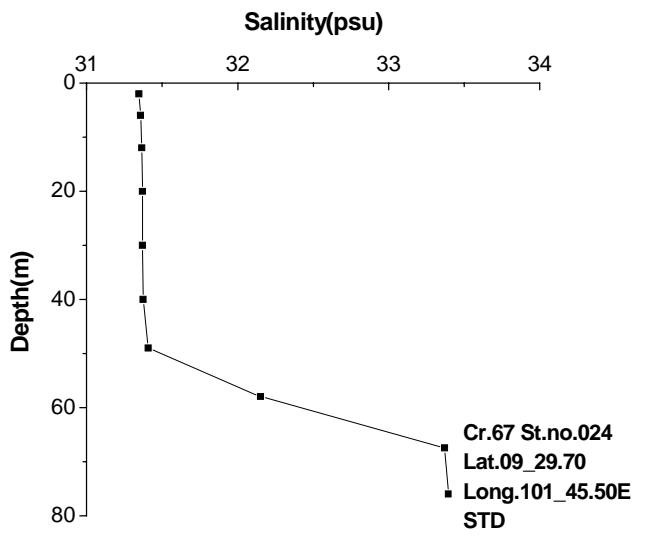
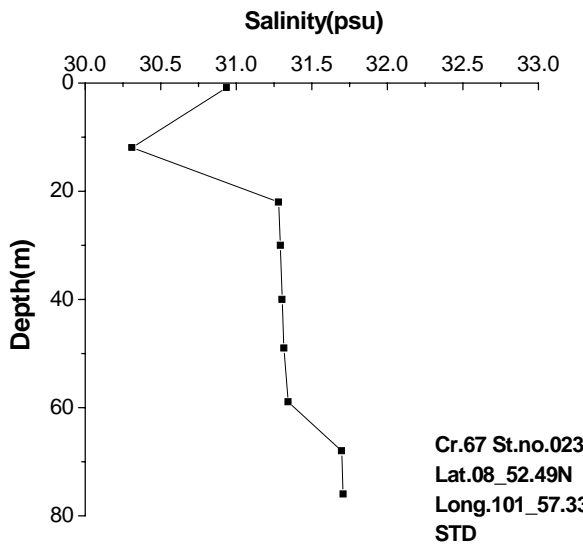
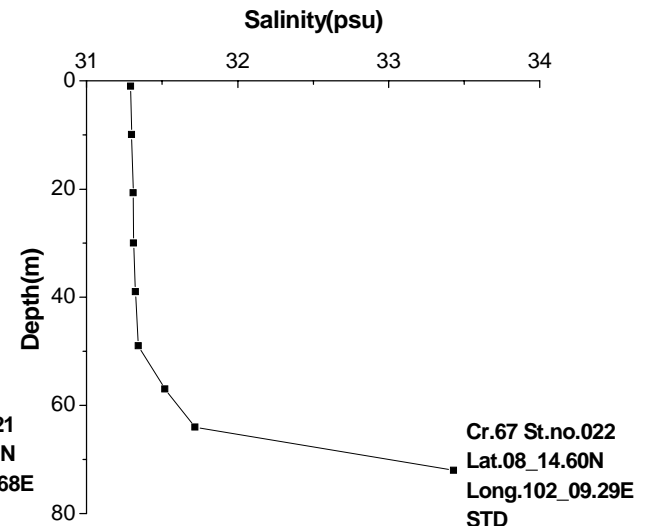
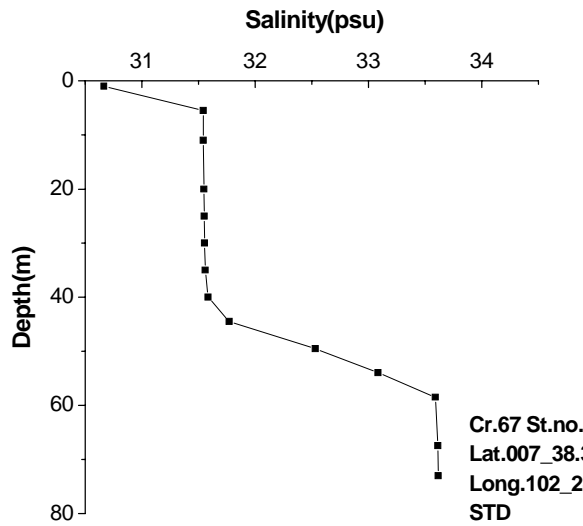
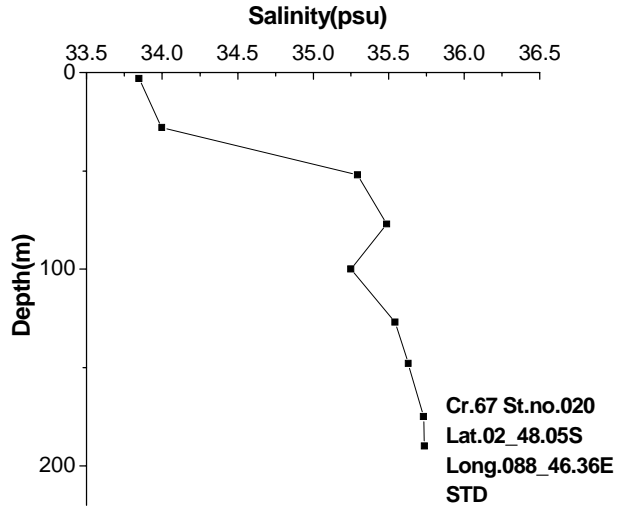
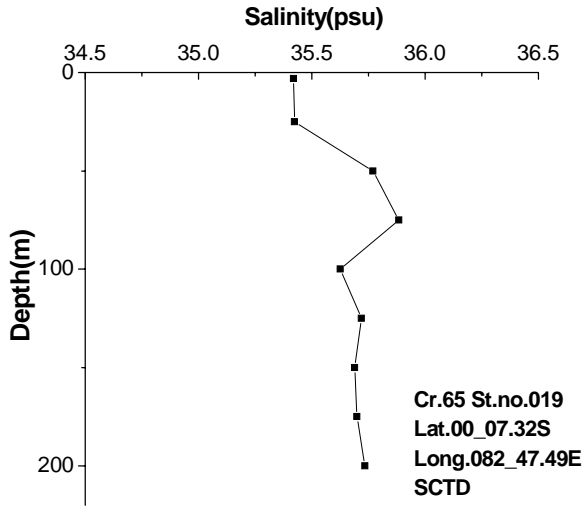


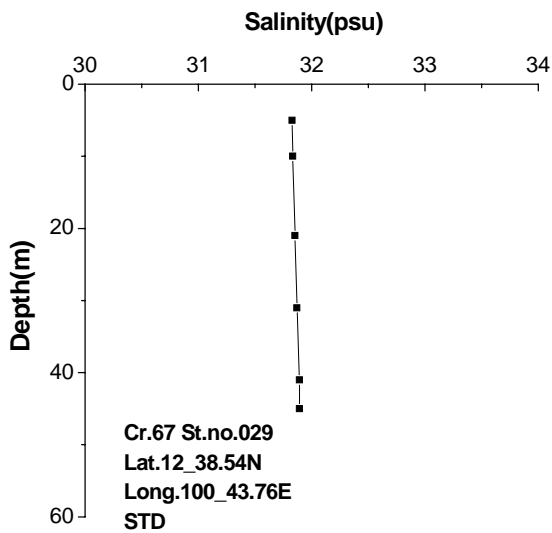
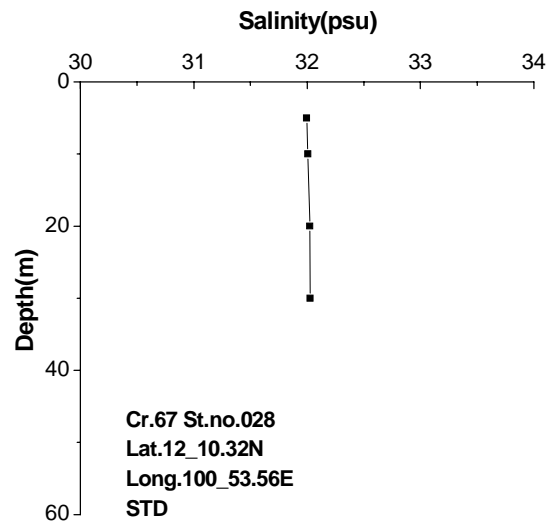
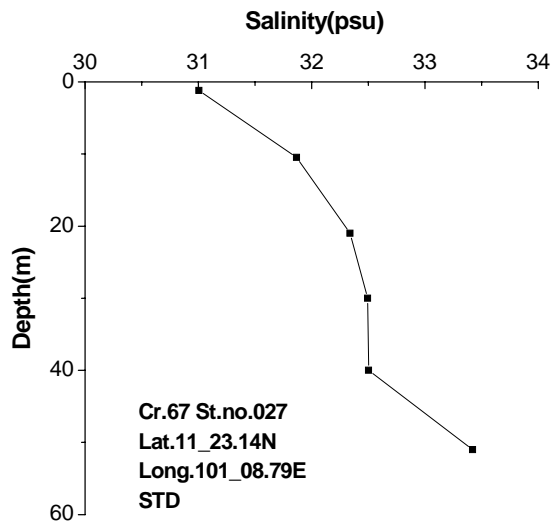
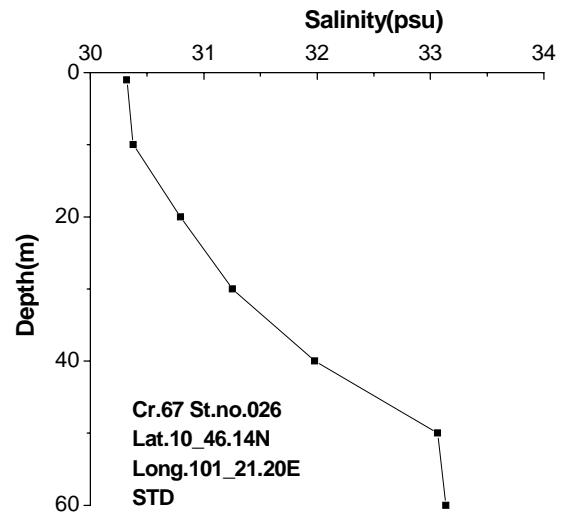
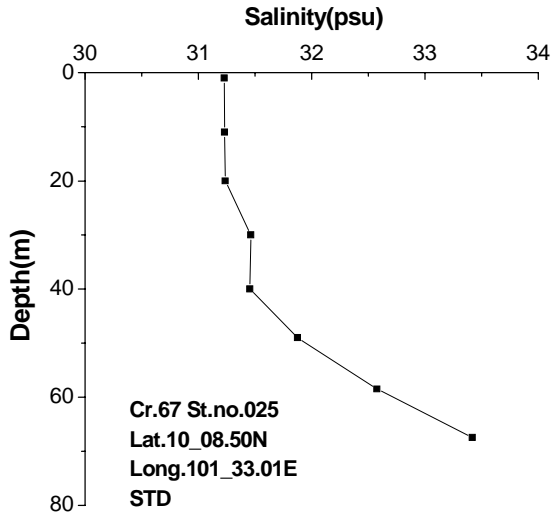
## Profiles of Salinity



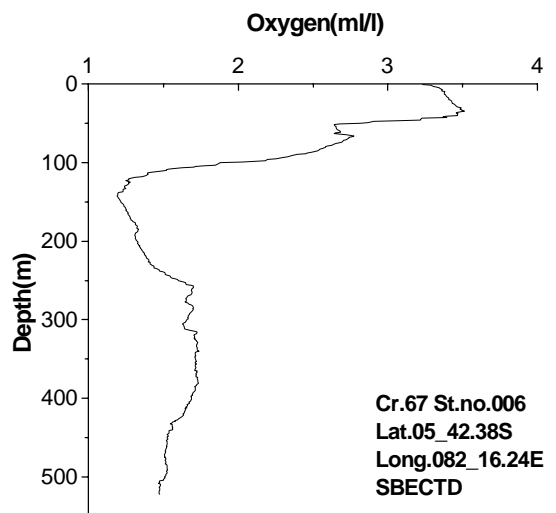
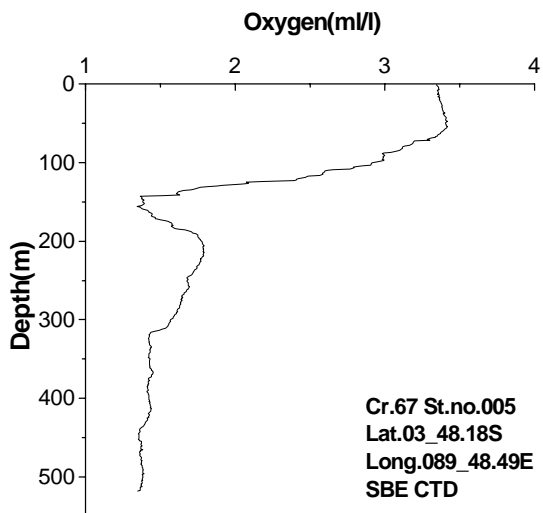
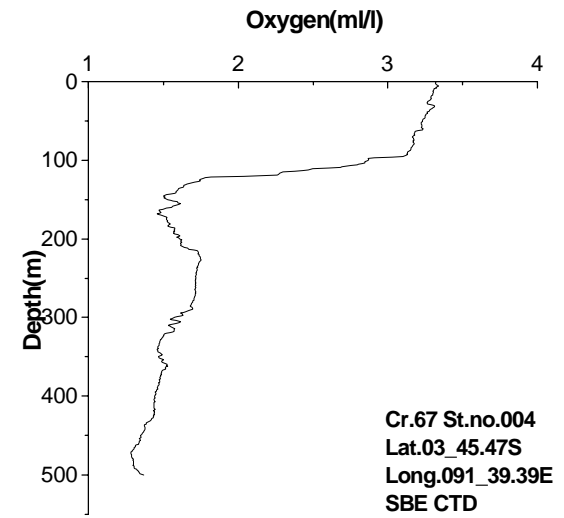
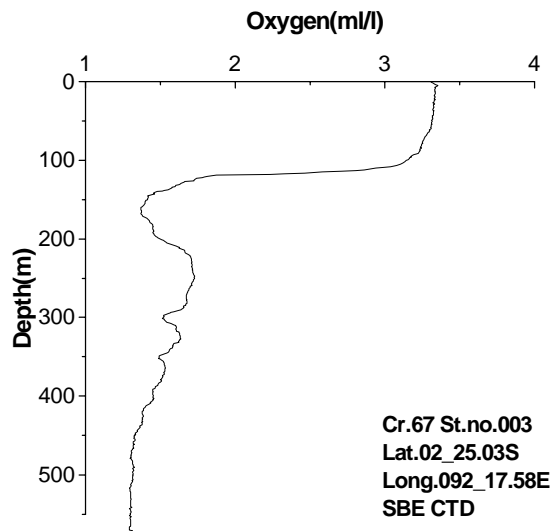
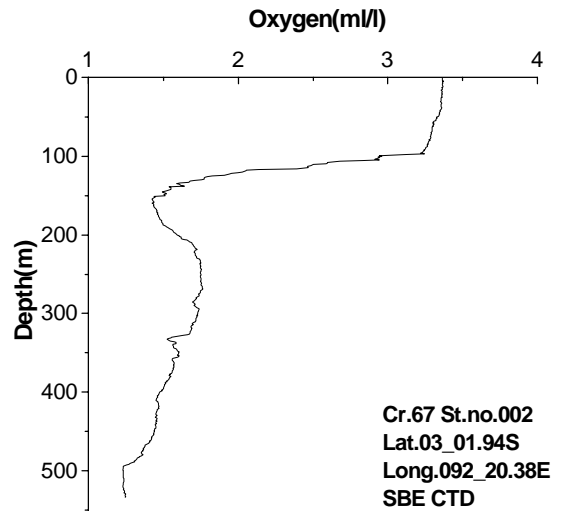
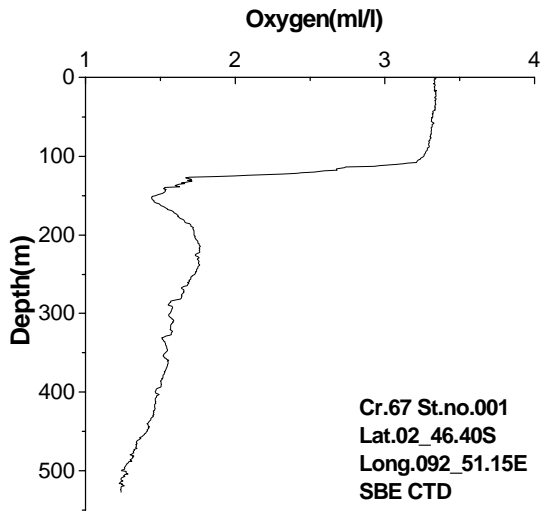


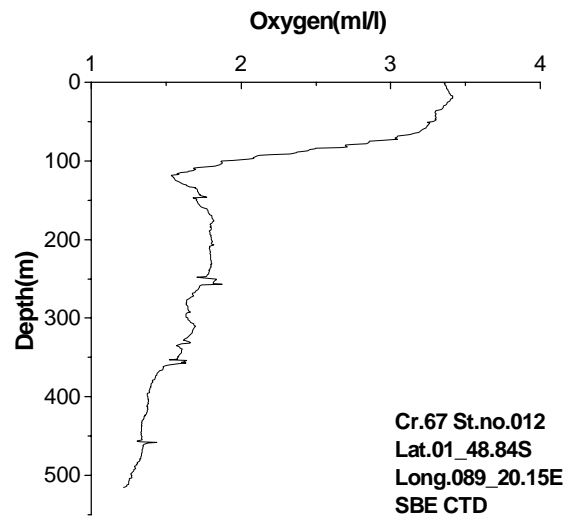
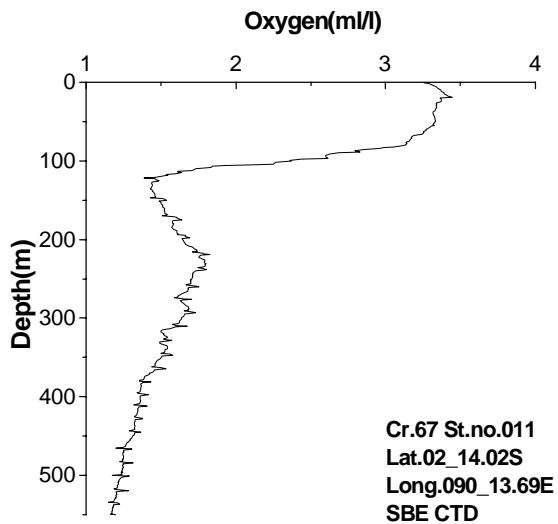
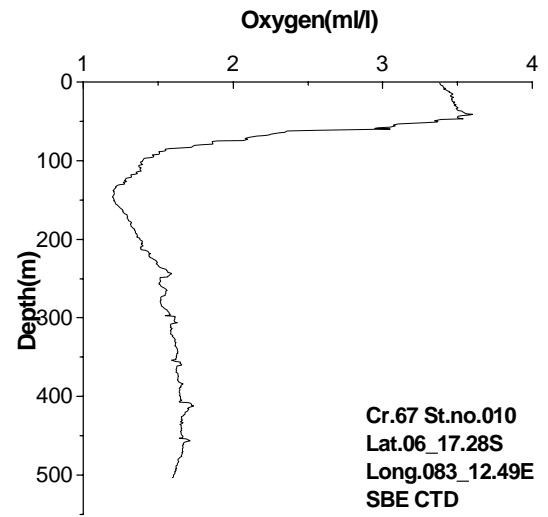
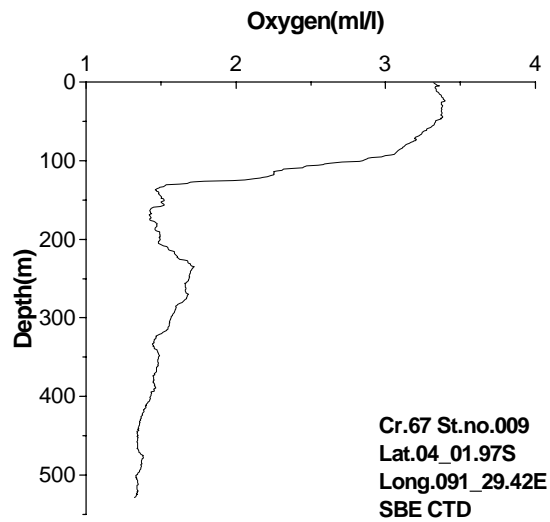
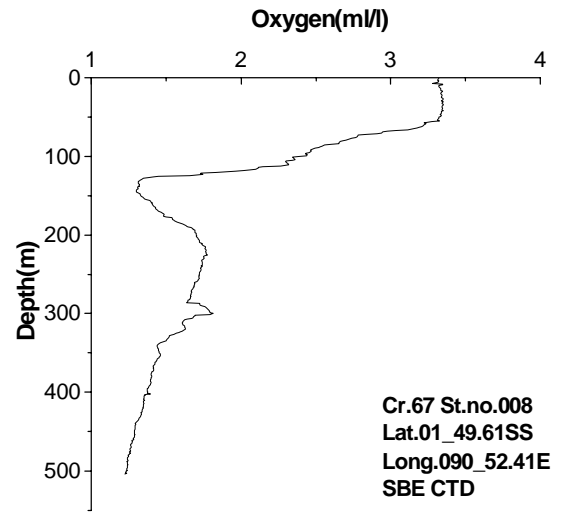
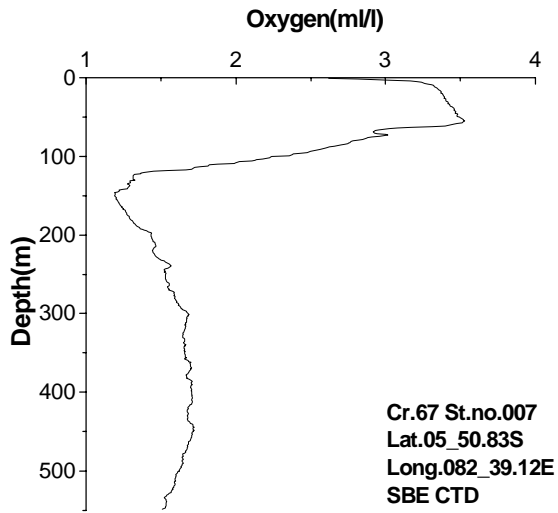




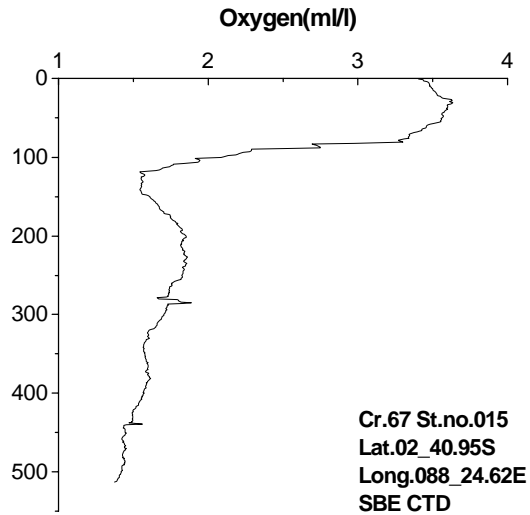
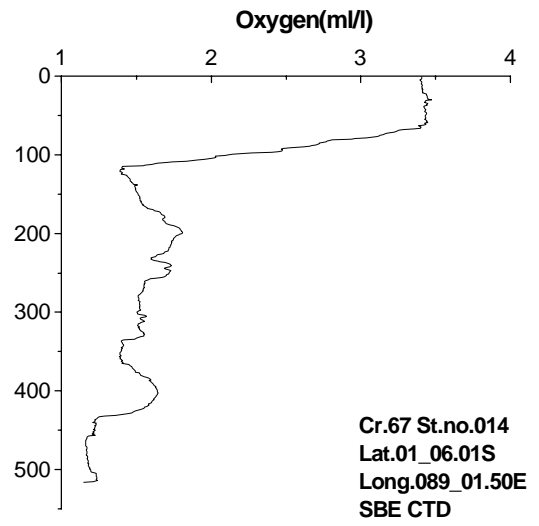
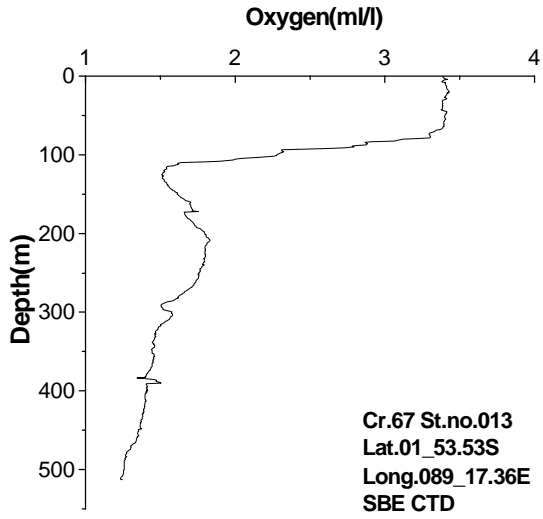


### Profiles of oxygen

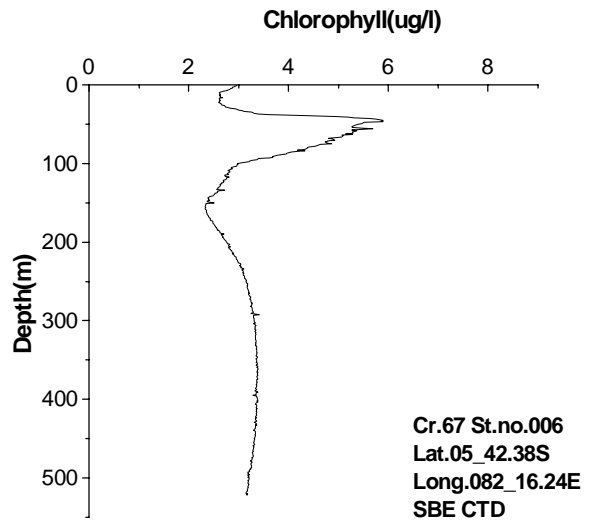
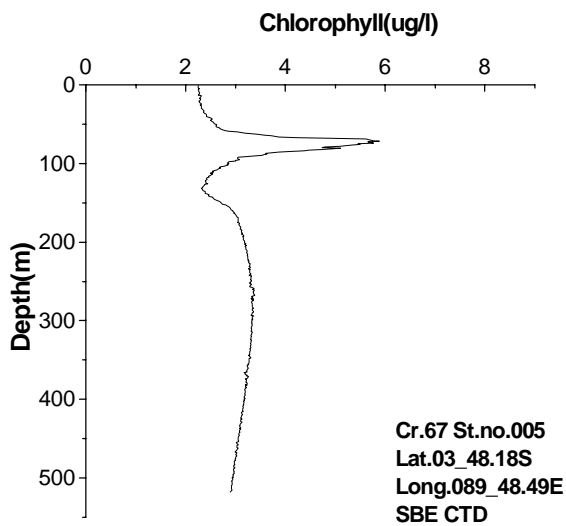
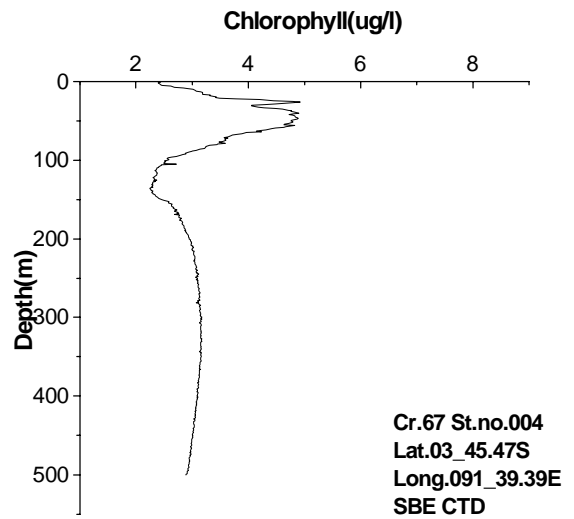
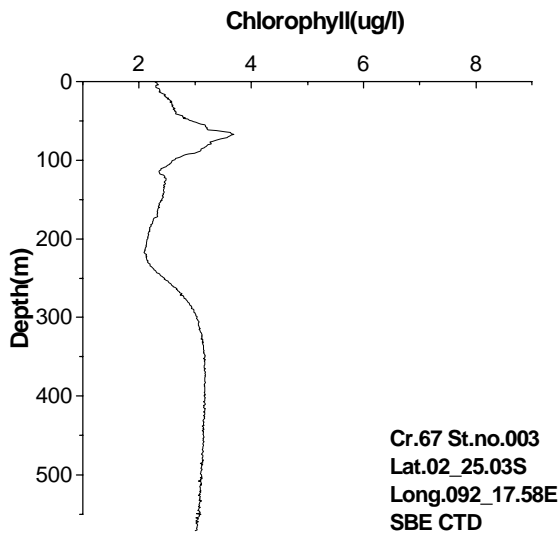
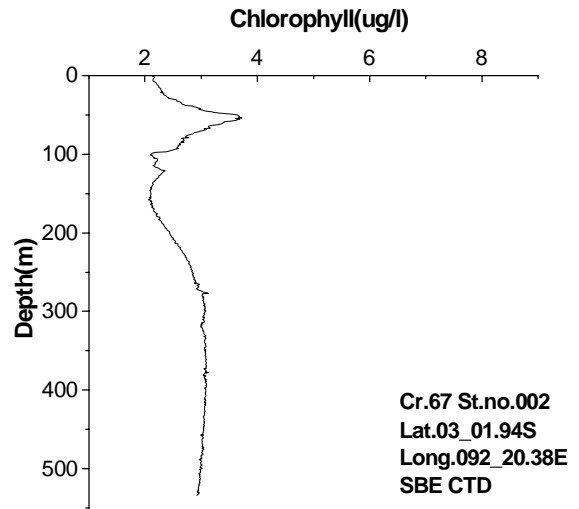
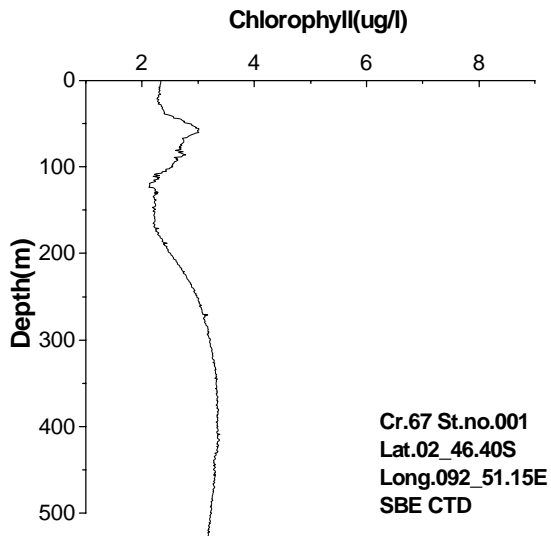


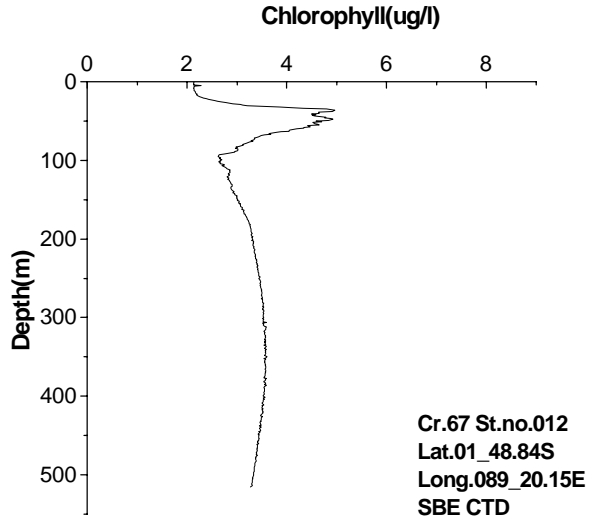
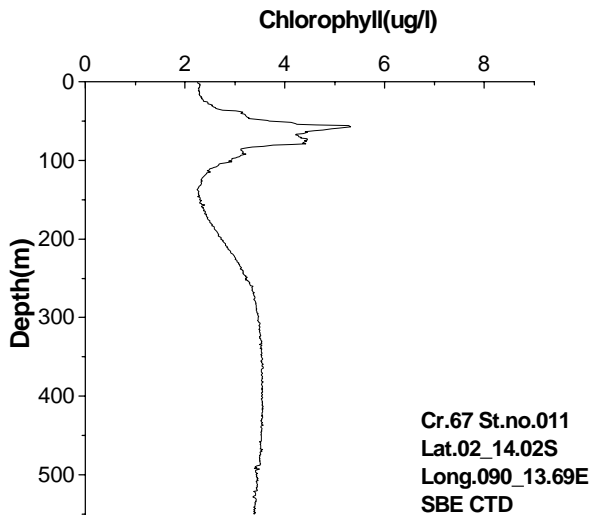
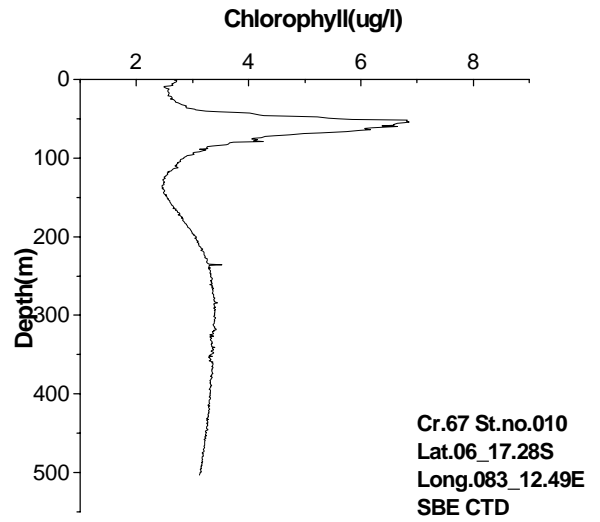
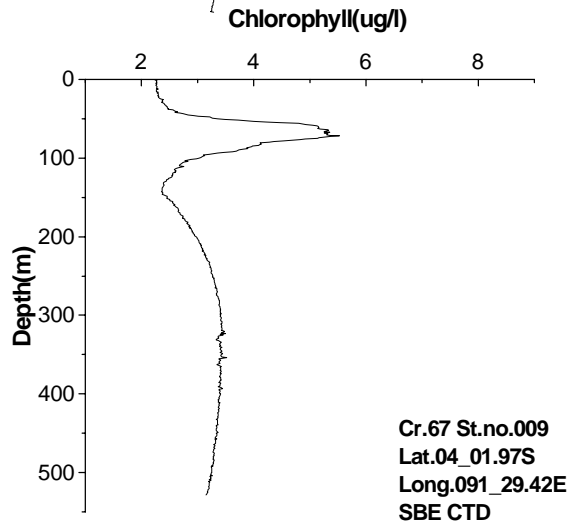
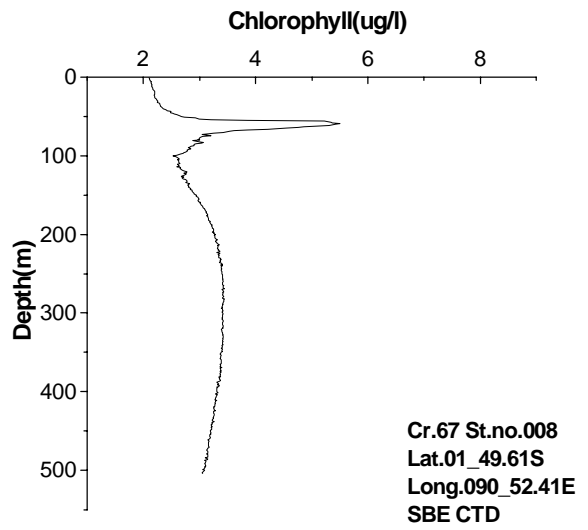
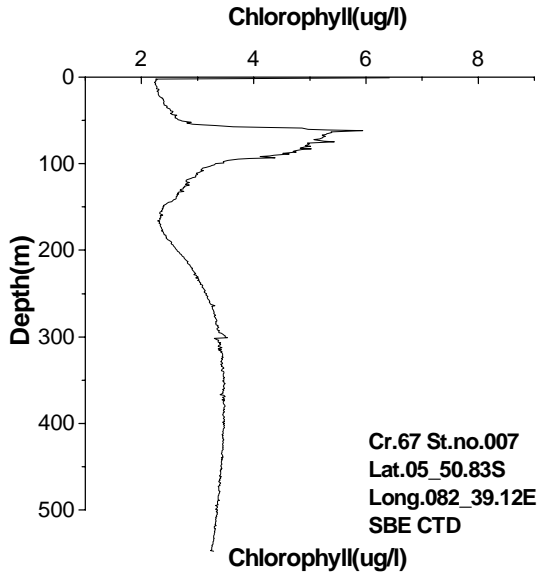


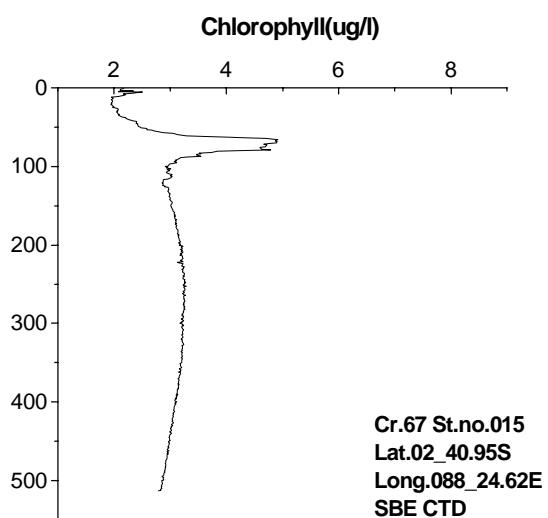
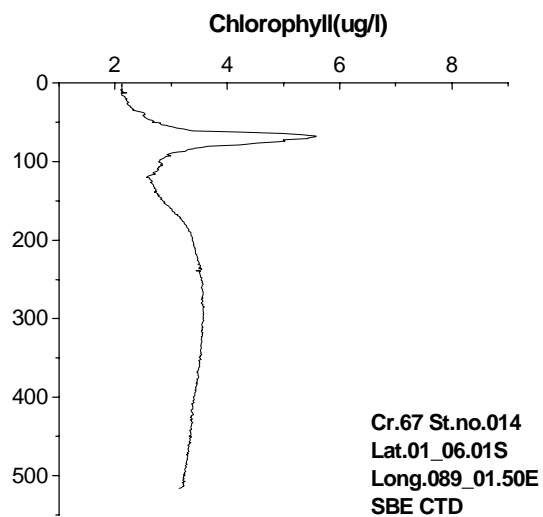
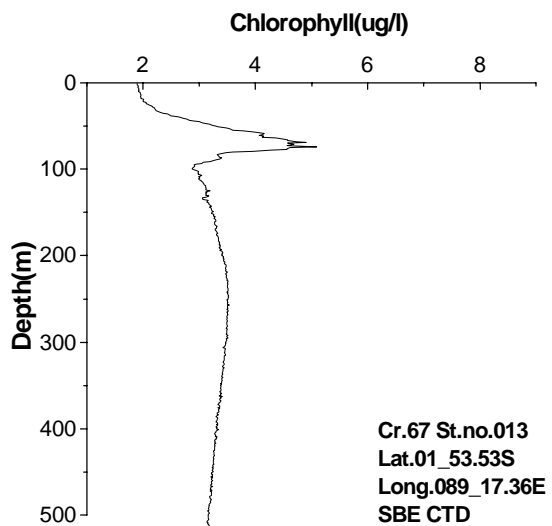




### Profiles of Chlorophyll







## SEAFDEC Fishing Logsheet



Recorder: Anurak

Operation Information							
Vessel Name MV.SEAFDEC		Gear	Type of Gear: Tuna purse seine			Number of Gear -	
Cruise no. 67-5/2001			Operation no.: 1				
Station no. 1			Operation distance : - NM			Memo: Broken payaw	
Date (dd/mm/yyyy) 18/12/2001		Position	Start	Latitude: 02° 37.6 N / S	Time (local)	Hauling/ Shooting	Start: 05:47
Depth of Capture - m				Longitude: 092° 22.4 E / W			Finish: 05:54
Vessel Speed 9 kt			Finish	Latitude: - N / S			Start: 05:56
Engine Speed 500 rpm				Longitude: - E / W			Finish: 11:50
Environmental Information							
Air	Temperature 27.0 °C		Water				
	Pressure: 1010.8 mbar		Color (Forel or Ule scale) -	Transparency - m	Current (ground / water / true tra)	Surface	Speed : 0.1 kt
	Humidity: 88.1 %					50 m	Direction : 021 deg
	Wind Speed : 1.6 kt						Speed : 0.4 kt
Direction : 200 deg		Direction : 200 deg					
Weather condition Rain		Sea Depth - m	Stage of sea calm		100 m	Speed : 0.5 kt	
Bottom					Direction : 192 deg		
Bottom Temp. : - C		Oceanographic stations					
Type of bottom: -		Type of instrument : SBE CTD			Memo :		
		File no.: SE67m002					
Catch Information							
No.	Species	Weight (kg)	No.	Species	Weight (kg)	Remarks	
1	<i>Kasuwonus pelamis</i>	792	14			Skipjack <1.8 kg. = 1.5%	
2	<i>Thunnus sp.</i>	1150	15			1.8-2.5 = 28.9%	
3	Other species	58	16			2.5 = 9.2%	
4			17			Average w./l.	
5			18			= 2.6 kg/46.5 cm.	
6			19			Tuna < 3 kg. = 30.7 %	
7			20			3 - 5 kg. = 13.1 %	
8			21			>5 kg. = 13.7 %	
9			22			Average w./l.	
10			23			= 3.1 kg/52.5 cm.	
11			24				
12			25				
13			Total		2000		

## SEAFDEC Fishing Logsheet



Recorder: Siriporn

Operation Information						
Vessel Name MV.SEAFDEC		Gear	Type of Gear: Tuna purse seine		Number of Gear -	
Cruise no. 67-5/2001			Operation no.: 02		Memo:	
Station no. 002			Operation distance : - NM		Nippon maru's Broken payao	
Date (dd/mm/yyyy) 19/12/2001		Position	Start	Latitude: 02_12.1 N / S	Time (local)	Start: 05:52
Depth of Capture 000-160 m				Longitude: 092_17.6 E / W		
Vessel Speed 9 kt			Finish	Latitude: - N / S	Hauling/Shooting	Start: 06:56
Engine Speed 500 rpm				Longitude: - E / W		
Environmental Information						
Air	Temperature 27.6 °C		Water			
	Pressure: 1010.2 mbar		Color (Forel or Ule scale) -	Current (ground / water / true track)	Surface	Speed : 00 kt
	Humidity: 79.5 %		Transparency - m			Direction : 274 deg
	Wind Speed : 3.2 kt		Surface Temp. 29.4 °C		50 m	Speed : 03 kt
	Direction : 230 deg		Sea Depth - m			Direction : 189 deg
Weather condition b.c.		Stage of sea calm	100 m		Speed : 06 kt	
Bottom					Direction : 173 deg	
Bottom Temp. : - C		Oceanographic stations				
Type of bottom: -		Type of instrument : SBE CTD		Memo :		
		File no.: SE67m003				
Catch Information						
No.	Species	Weight (kg)	No.	Species	Weight (kg)	Remarks
1	<i>Kasuwonus pelamis</i>	946.8	14			Skipjack <1.8 kg= 11.56%
2	<i>Thunnus obesus</i>	113.7	15			1.8-2.5 kg= 15%
3	<i>Thunnus albacares</i>	1721.1	16			>2.5 kg = 5%
4	Other species	218.7	17			Average w./l.
5			18			= 1.9 kg/45.1 cm
6			19			Tuna <3 kg = 36.06%
7			20			3-5 kg = 1.4%
8			21			>5 kg = 23.7%
9			22			Average w./l.
10			23			Yellowfin = 3.2kg / 52.8cm
11			24			Bigeye = 1.9 kg / 44.4 cm
12			25			
13			Total		3,000	

## SEAFDEC Fishing Logsheet



Recorder: Weerasak

Operation Information										
Vessel Name MV.SEAFDEC			Gear	Type of Gear: Tuna purse seine			Number of Gear -			
Cruise no. 67-5/2001				Operation no.: 03			Memo:			
Station no. 003				Operation distance : - NM			Seafdec's payao			
Date (dd/mm/yyyy) 20/12/2001			Position	Start	Latitude: 03_47.9	N / S	Time (local)	Shooting	Start: 05:50	
Depth of Capture 000-160 m					Longitude: 91_36.1	E / W			Finish: 05:56	
Vessel Speed 9 kt				Finish	Latitude: -	N / S			Start: 06:00	
Engine Speed 500 rpm					Longitude: -	E / W			Finish: 09:45	
Environmental Information										
Air	Temperature 27.5 °C			Water						
	Pressure: 1009.6 mbar			Current (ground / water / true track)	Color (Forel or Ule scale) -	Transparency - m	Surface	Speed : 0.1 kt		
	Humidity: 80.8 %							Direction : 254 deg		
	Wind Speed : 4 kt							50 m	Speed : 0.3 kt	
	Direction : 300 deg				Direction : 342 deg					
Weather condition -			100 m		Speed : 0.8 kt					
Bottom			Direction : 284 deg							
Bottom Temp. : - C			Oceanographic stations							
Type of bottom: -			Type of instrument : SBE CTD			Memo :				
			File no.: SE67m004							
Catch Information										
No.	Species	Weight (kg)	No.	Species	Weight (kg)	Remarks				
1	<i>Kasuwonus pelamis</i>	4657.5	14			Skipjack	<1.8 kg= 22.97%			
2	<i>Thunnus obesus</i>	417.6	15				1.8-2.5 kg= 20.8%			
3	<i>Thunnus albacares</i>	3553.2	16				>2.5 kg = 7.8%			
4	Other species	371.7	17			Average w./l.	= 1.9 kg/45.4 cm			
5			18				Tuna	<3 kg = 14.12%		
6			19					3-5 kg = 0%		
7			20			>5 kg = 30%				
8			21			Average w./l.				
9			22				Yellowfin = 5.5 kg / 62cm			
10			23				Bigeye = 1.9 kg / 45.6 cm			
11			24							
12			25							
13			<b>Total</b>		9,000					

## SEAFDEC Fishing Logsheet



Recorder: Jarumon

Operation Information							
Vessel Name MV.SEAFDEC		Gear	Type of Gear: Tuna purse seine		Number of Gear -		
Cruise no. 67-5/2001			Operation no.: 04		Memo:		
Station no. 4			Operation distance : - NM		Seafdec's payao no. 17 and log		
Date (dd/mm/yyyy) 21/12/2001		Position	Start	Latitude: 03_49.4 N / S	Time (local)	Hauling/Shooting	Start: 05:55
Depth of Capture 000-140 m				Longitude: 089_56.0 E / W			Finish: 06:04
Vessel Speed 9 kt			Finish	Latitude: - N / S			Start: 06:05
Engine Speed 380 rpm				Longitude: - E / W			Finish: 09:10
Environmental Information							
Air	Temperature 27.8 °C		Water				
	Pressure: 1010.3 mbar		Current (ground / water / true track)	Surface	Speed : 0.1 kt		
	Humidity: 74.6 %			Color (Forel or Ule scale) -		Direction : 011 deg	
	Wind Speed : 2.3 kt			Transparency - m		50 m	Speed : 0.5 kt
	Direction : 300 deg			Surface Temp. - °C		Direction : 149 deg	
Weather condition: b.c.		Sea Depth - m		100 m	Speed : 0.5 kt		
Bottom			Stage of sea calm		Direction : 261 deg		
Bottom Temp. : - C			Oceanographic stations				
Type of bottom: -			Type of instrument : SBE CTD		Memo :		
			File no.: SE67m005				
Catch Information							
No.	Species	Weight (kg)	No.	Species	Weight (kg)	Remarks	
1	<i>Kasuwonus pelamis</i>	2945	14			Skipjack <1.8 kg= 10.6%	
2	<i>Thunnus obesus</i>	95.5	15			1.8-2.5 kg= 17.6%	
3	<i>Thunnus albacares</i>	1843.5	16			>2.5 kg = 30.7%	
4	Other species	116	17			Average w./l.	
5			18			= 2.7 kg/49.3 cm	
6			19			Tuna <3 kg = 4.78%	
7			20			3-5 kg = 1%	
8			21			>5 kg = 33%	
9			22			Average w./l.	
10			23			Yellowfin = 6.5 kg / 64.8 cm	
11			24			Bigeye = 2.1 kg / 45.5 cm	
12			25				
13			Total		5,000		



## SEAFDEC Fishing Logsheet



Recorder: Siriporn

Operation Information									
Vessel Name MV.SEAFDEC			Gear	Type of Gear: Tuna purse seine			Number of Gear -		
Cruise no. 67-5/2001				Operation no.: 05			Memo:		
Station no. 5			Operation distance : - NM			Seafdec's payao no.7			
Date (dd/mm/yyyy) 23/12/2001			Position	Start	Latitude: 05_46.0	N / S	Time (local)	Hauling/Shooting	Start: 06:50
Depth of Capture 000-130 m					Longitude:082_19.5	E / W			Finish: 06:55
Vessel Speed 9 kt				Finish	Latitude: -	N / S		Start: 06:56	
Engine Speed 510 rpm					Longitude: -	E / W		Finish: 10:40	
Environmental Information									
Air	Temperature 27.1 °C			Water					
	Pressure: 1012.0 mbar			Color (Forel or Ule scale) -			Surface	Speed : 01 kt	
	Humidity: 83.9 %			Transparency - m				Direction : 230 deg	
	Wind Speed : 12.0 kt			Surface Temp. 30.0 °C			50 m	Speed : 03 kt	
	Direction :300 deg			Sea Depth - m				Direction : 049 deg	
Weather conditionc.			Stage of sea calm			100 m	Speed : 03 kt		
Bottom							Direction : 129 deg		
Bottom Temp. : - C			Oceanographic stations						
Type of bottom: -			Type of instrument : SBE CTD			Memo :			
			File no.: SE67m006						
Catch Information									
No.	Species	Weight (kg)	No.	Species	Weight (kg)	Remarks			
1	<i>Kasuwonus pelamis</i>	4576	14			Skipjack <1.8 kg= 2%			
2	<i>Thunnus albacares</i>	3388	15			1.8-2.5 kg= 8.3%			
3	Other species	36	16			>2.5 kg = 46.9%			
4			17			Average w./l.			
5			18			= 3.9 kg/51.7 cm			
6			19			Tuna <3 kg = 0.7%			
7			20			3-5 kg = 0.8%			
8			21			>5 kg = 38%			
9			22			Average w./l.			
10			23			Yellowfin = 8.1 kg / 71.4cm			
11			24						
12			25						
13			Total		8000				

## SEAFDEC Fishing Logsheet



Recorder: Weerasak

Operation Information									
Vessel Name MV.SEAFDEC			Gear	Type of Gear: Tuna purse seine			Number of Gear -		
Cruise no. 67-5/2001				Operation no.: 06			Memo:		
Station no. 6				Operation distance : - NM			Seafdec's payao no.18		
Date (dd/mm/yyyy) 24/12/2001			Position	Start	Latitude: 06_08.0	N / S	Time (local)	Hauling/Shooting	Start: 06:23
Depth of Capture 000-170 m					Longitude: 082_52.5	E / W			Finish: 06:31
Vessel Speed 09 kt				Finish	Latitude: -	N / S			Start: 06:31
Engine Speed 520 rpm					Longitude: -	E / W			Finish: 09:45
Environmental Information									
Air	Temperature 28.0 °C			Water					
	Pressure: 1011.1 mbar			Color (Forel or Ule scale) -			Surface	Speed : 0.1 kt	
	Humidity: 78.3 %			Transparency - m				Direction : 082 deg	
	Wind Speed : 6.4 kt			Surface Temp. 29.7 °C			50 m	Speed : 0.2 kt	
	Direction : 30 deg			Sea Depth - m				Direction : 128 deg	
Weather condition c.			Stage of sea slight			100 m	Speed : 0.3 kt		
Bottom							Direction : 079 deg		
Bottom Temp. : - C			Oceanographic stations						
Type of bottom: -			Type of instrument : SBE CTD			Memo :			
			File no.: SE67m007						
Catch Information									
No.	Species	Weight (kg)	No.	Species	Weight (kg)	Remarks			
1	<i>Kasuwonus pelamis</i>	132.4	14			Skipjack <1.8 kg= 0%			
2	<i>Thunnus albacares</i>	1716.4	15			1.8-2.5 kg= 0%			
3	Other species	151.2	16			>2.5 kg = 6.6%			
4			17			Average w./l.			
5			18			= 4.7 kg/57.7 cm			
6			19			Tuna <3 kg = 0%			
7			20			3-5 kg = 0%			
8			21			>5 kg = 85.8%			
9			22			Average w./l.			
10			23			Yellowfin = 11.2 kg / 82.9cm			
11			24						
12			25						
13			Total		2000				

## SEAFDEC Fishing Logsheet



Recorder: Weerasak

Operation Information											
Vessel Name MV.SEAFDEC			Gear	Type of Gear: Tuna purse seine			Number of Gear -				
Cruise no. 67-5/2001				Operation no.: 07			Memo:				
Station no. 7				Operation distance : - NM			Broken payao				
Date (dd/mm/yyyy) 01/01/2002			Position	Start	Latitude: 02_16.3	N / S	Time (local)	Hauling	Shooting	Start: 06:02	
Depth of Capture 000-170 m					Longitude: 090_18.1	E / W				Finish: 06:12	
Vessel Speed kt				Finish	Latitude: -	N / S				Start: 06:13	
Engine Speed rpm					Longitude: -	E / W				Finish: 09:20	
Environmental Information											
Air	Temperature 27.5 °C			Water							
	Pressure: 1011.2 mbar			Color (Forel or Ule scale) -	Transparency - m	Surface Temp. 29.8 °C	Sea Depth - m	Stage of sea -	Current (ground / water / true track)	Surface	Speed : 0.2 kt
	Humidity: 87.5 %									50 m	Speed : 0.2 kt
	Wind Speed : 9.7 kt									100 m	Speed : 0.6 kt
	Direction : 290 deg										Direction : 262 deg
Weather condition -			Direction : 299 deg								
Bottom											
Bottom Temp. : - C			Oceanographic stations								
Type of bottom: -			Type of instrument : SBE CTD			Memo :					
			File no.: SE67m011								
Catch Information											
No.	Species	Weight (kg)	No.	Species	Weight (kg)	Remarks					
1	<i>Thunnus albacares</i>	1427.4	14			Tuna <3 kg = 0.6% 3-5 kg = 0% >5 kg = 94.6% Average w./l. Yellowfin = 13.4kg / 86.7cm					
2	Other species	72.6	15								
3			16								
4			17								
5			18								
6			19								
7			20								
8			21								
9			22								
10			23								
11			24								
12			25								
13			<b>Total</b>		1500						

## SEAFDEC Fishing Logsheet



Recorder: Jarumon T.

Operation Information									
Vessel Name MV.SEAFDEC			Gear	Type of Gear: Tuna purse seine			Number of Gear -		
Cruise no. 67-5/2001				Operation no.: 08			Memo:		
Station no. 8				Operation distance : - NM			Nippon Maru's payao		
Date (dd/mm/yyyy) 02/01/2002			Position	Start	Latitude: 01_46.9	N / S	Time (local)	Shooting	Start: 06:08
Depth of Capture 000-135 m					Longitude: 089_19.1	E / W			Finish: 06:18
Vessel Speed 9 kt				Finish	Latitude: -	N / S			Start: 06:18
Engine Speed - rpm					Longitude: -	E / W			Finish: 10:35
Environmental Information									
Air	Temperature 28.0 °C			Water					
	Pressure: 1010.9 mbar			Color (Forel or Ule scale) -			Current (ground / water / true track)	Surface	Speed : 0.2 kt
	Humidity: 82.2 %			Transparency - m					Direction : 088 deg
	Wind Speed : 7.5 kt			Surface Temp. - °C				50 m	Speed : 0.4 kt
	Direction : 240 deg			Sea Depth - m				Direction : 254 deg	
Weather condition bc.			Stage of sea			100 m	Speed : 0.1 kt	Direction : 063 deg	
Bottom			Oceanographic stations						
Bottom Temp. : - C			Type of instrument : SBE CTD			Memo :			
Type of bottom: -			File no.: SE67m012						
Catch Information									
No.	Species	Weight (kg)	No.	Species	Weight (kg)	Remarks			
1	<i>Kasuwonus pelamis</i>	17100	14			Skipjack <1.8 kg= 19.6%			
2	<i>Thunnus obesus</i>	1304	15			1.8-2.5 kg= 30.6%			
3	<i>Thunnus albacares</i>	1520	16			>2.5 kg = 35.3%			
4	Other species	76	17			Average w./l.			
5			18			= 2.5 kg/47.5 cm			
6			19			Tuna <3 kg = 13.32%			
7			20			3-5 kg = 0.8%			
8			21			>5 kg = 0%			
9			22			Average w./l.			
10			23			Yellowfin = 2.3 kg / 49.3cm			
11			24			Bigeye = 2.1 kg / 46.3 cm			
12			25						
13			Total		20000				

## SEAFDEC Fishing Logsheet



Recorder: Anurak

Operation Information										
Vessel Name MV.SEAFDEC			Gear	Type of Gear: Tuna purse seine			Number of Gear -			
Cruise no. 67-5/2001				Operation no.: 09			Memo:			
Station no. 9				Operation distance : - NM			Broken payao			
Date (dd/mm/yyyy) 03/01/2002			Position	Start	Latitude: 01_48.8	N / S	Time (local)	Hauling/Shooting	Start: 06:06	
Depth of Capture 000-110 m					Longitude: 089_03.3	E / W			Finish: 06:16	
Vessel Speed 9 kt				Finish	Latitude: -	N / S			Start: 06:16	
Engine Speed 500 rpm					Longitude: -	E / W			Finish: 09:40	
Environmental Information										
Air	Temperature 28.1 °C			Water						
	Pressure: 1010.2 mbar			Current (ground / water / true track)	Color (Forel or Ule scale) -	Surface	Speed : 0.1 kt			
	Humidity: 79.4 %						Transparency - m	Direction : 048 deg		
	Wind Speed : 5.6 kt							Surface Temp. 29.5 °C	50 m	Speed : 0.2 kt
	Direction : 210 deg				Sea Depth - m	Direction : 265 deg				
Weather condition b.c.			Stage of sea		100 m	Speed : 0.4 kt				
Bottom			Direction : 002 deg							
Bottom Temp. : - C			Oceanographic stations							
Type of bottom: -			Type of instrument : SBE CTD			Memo :				
			File no.: SE67m013							
Catch Information										
No.	Species	Weight (kg)	No.	Species	Weight (kg)	Remarks				
1	<i>Kasuwonus pelamis</i>	7970	14			Skipjack <1.8 kg= 7.6%				
2	<i>Thunnus obesus</i>	930	15			1.8-2.5 kg= 4.7%				
3	<i>Thunnus albacares</i>	740	16			>2.5 kg = 67.4%				
4	Other species	360	17			Average w./l.				
5			18			= 4.1 kg/55.4 cm				
6			19			Tuna <3 kg = 15.8%				
7			20			3-5 kg = 0.9%				
8			21			>5 kg = 0%				
9			22			Average w./l.				
10			23			Yellowfin = 2.4kg / 39.3cm				
11			24			Bigeye = 2.2 kg / 34.9 cm				
12			25							
13			Total		10000					

## SEAFDEC Fishing Logsheet



Recorder: Siriporn

Operation Information										
Vessel Name MV.SEAFDEC			Gear	Type of Gear: Tuna purse seine			Number of Gear -			
Cruise no. 67-5/2001				Operation no.: 10			Memo:			
Station no. 10				Operation distance : - NM			Broken payao			
Date (dd/mm/yyyy) 04/01/2002			Position	Start	Latitude: 01_07.2	N / S	Time (local)	Hauling/Shooting	Start: 06:06	
Depth of Capture 000-145 m					Longitude: 088_57.3	E / W			Finish: 06:15	
Vessel Speed 9 kt				Finish	Latitude: -	N / S			Start: 06:16	
Engine Speed - rpm					Longitude: -	E / W			Finish: 10:05	
Environmental Information										
Air	Temperature 27.8 °C			Water						
	Pressure: 1009.6 mbar			Color (Forel or Ule scale) -			Current (ground / water / true track)	Surface	Speed : 0.1 kt	
	Humidity: 82.8 %			Transparency - m					Direction : 115 deg	
	Wind Speed : 0.5 kt			Surface Temp. 30.0 °C				50 m	Speed : 0.2 kt	
	Direction : 90 deg			Sea Depth - m				Direction : 299 deg		
Weather condition c.			Stage of sea calm			100 m	Speed : 0.4 kt		Direction : 015 deg	
Bottom										
Bottom Temp. : - C			Oceanographic stations							
Type of bottom: -			Type of instrument : SBE CTD			Memo :				
			File no.: SE67m014							
Catch Information										
No.	Species	Weight (kg)	No.	Species	Weight (kg)	Remarks				
1	<i>Kasuwonus pelamis</i>	3952	14			Skipjack <1.8 kg= 14.6%				
2	<i>Thunnus obesus</i>	1136	15			1.8-2.5 kg= 13.4%				
3	<i>Thunnus albacares</i>	2592	16			>2.5 kg = 22.1%				
4	Other species	320	17			Average w./l.				
5			18			= 2.4 kg/47.7 cm				
6			19			Tuna <3 kg = 29.4%				
7			20			3-5 kg = 2.6%				
8			21			>5 kg = 14.1%				
9			22			Average w./l.				
10			23			Yellowfin = 3.10kg / 51.6cm				
11			24			Bigeye = 2.9 kg / 29.9 cm				
12			25							
13			Total		8000					

## SEAFDEC Fishing Logsheet



Recorder: Pattarajit

Operation Information											
Vessel Name		MV. SEAFDEC		Gear	Type of Gear: Tuna purse seine			Number of Gear -			
Cruise no.		67-5/2001			Operation no.: 11			Memo:			
Station no.		11			Operation distance : - NM			Broken payao			
Date (dd/mm/yyyy)		18/01/2002		Position	Start	Latitude: 02_17.9	N / S	Time (local)	Shooting	Start: 05:48	
Depth of Capture		000-150 m				Longitude: 088_12.7	E / W				Finish: 05:59
Vessel Speed		8 kt			Finish	Latitude: -	N / S				Start:
Engine Speed		500 rpm				Longitude: -	E / W				Finish: 09:50
Environmental Information											
Air	Temperature		26.8 °C		Water						
	Pressure:		1007.8 mbar		Current (ground / water / true track)	Color (Forel or Ule scale) -		Surface	Speed : 0.1 kt		
	Humidity:		77.6 %			Transparency - m			Direction : 132 deg		
	Wind Speed :		4.2 kt			Surface Temp. 29.4 °C		50 m	Speed : 0.2 kt		
	Direction :		60 deg			Sea Depth - m			Direction : 025 deg		
Weather condition		Rain		Stage of sea -		100 m	Speed : 0.9 kt				
Bottom								Direction : 102 deg			
Bottom Temp. :		- C		Oceanographic stations							
Type of bottom:		-		Type of instrument : SBE CTD			Memo :				
				File no.:			Cannot uploade data from instrument				
Catch Information											
No.	Species	Weight (kg)	No.	Species	Weight (kg)	Remarks					
1	<i>Kasuwonus pelamis</i>		14			Skipjack <1.8 kg= 11.56%					
2	<i>Thunnus obesus</i>		15			1.8-2.5 kg= 15%					
3	<i>Thunnus albacares</i>		16			>2.5 kg = 5%					
4	Other species		17			Average w./l.					
5			18			= 1.9 kg/45.1 cm					
6			19			Tuna <3 kg = 36.06%					
7			20			3-5 kg = 1.4%					
8			21			>5 kg = 23.7%					
9			22			Average w./l.					
10			23			Yellowfin = 3.2kg / 52.8cm					
11			24			Bigeye = 1.9 kg / 44.4 cm					
12			25								
13			Total								