

CRN

93 17

DAILY LOG

INSTITUTE OF OCEAN SCIENCES
OCEAN PHYSICS

DATE

JUNE 18 - JULY 8, 1993

VESSEL

J.P. Tully

PROJECT

LA PEROUSE / VENTS

BOOK 2

LEGS

~~2 & 3~~

Physics

1 of 2

Book 1 belongs to
Ocean Ecology

Captain: _____ First Officer: _____

Second Officer: _____ Third Officer: _____

Cruise Participants/Agencies: _____

Scientific Personnel: Party Chief: D Mackas 16:00 20:00
04:00
12:00 A
Name Watch Cabin Name Watch Cabin

<u>D. Yelland</u>	<u>Port fwd</u>	<u>R. Bigham</u>	<u>16:00 20:00</u>	<u>H</u>
<u>Romaine</u>	<u>Stb fwd</u>	<u>D. Forbes</u>	<u>04:00</u>	<u>D</u>
<u>B. Bornhold</u>	<u>B</u>	<u>B. Waddell</u>	<u>12:00 16:00</u>	<u>C</u>
<u>I Perry</u>	<u>E</u>			
<u>J Love</u>	<u>F</u>			
<u>D Moore</u>	<u>G</u>			

Second leg of cruise: Party Chief: R Thomson A

<u>I Perry</u>	<u>E</u>	<u>Reg Bigham</u>	<u>H</u>
<u>J Love</u>	<u>F</u>	<u>Les Sparring</u>	<u>D</u>
<u>R Bigham</u>	<u>H</u>	<u>Darren Tuele</u>	<u>C</u>
<u>D Moore</u>	<u>G</u>		
<u>ARNOLD</u>	<u>B</u>		

Third leg of cruise: Party Chief: R Thomson A

<u>J Love</u>		<u>Reg</u>	<u>H</u>
<u>R Bigham</u>		<u>Les</u>	<u>D</u>
<u>B Bond</u>		<u>Darren</u>	<u>C</u>
<u>G Chase</u>			
<u>S MIHALY</u>	<u>G</u>		

Data logging system: Unit number: 2 Program version: 1.25
CTD deck unit make: GUILDLINE model: 87107 serial no.: 57160
Computer make: HP VECTRA Q5/20 model: DI430A serial no.: 2938A05390
Monitor make: NEC MULTISYNC 2A model: serial no.:
Printer make: RAVEN model: PR-9102 serial no.:

1st CTD make: model: serial no.:
Temperature sensor model: serial no.:
coefficients: slope: offset:
Conductivity sensor model: serial no.:
coefficients: slope: offset:
Pressure sensor range: psi serial no.:
coefficients: FSP: dB offset:
Transmissometer model: serial no.:
coefficients: slope: offset:

Comments: _____

2nd CTD make: Guilford model: 8705 serial no.: 58483
 Temperature sensor model: serial no.: 57,915
 coefficients: slope: offset:
 Conductivity sensor model: serial no.: 58,814
 coefficients: slope: offset:
 Pressure sensor range: 3000 Db. psi serial no.:
 coefficients: FSP: dB offset:
 Transmissometer model: serial no.:
 coefficients: slope: serial no.:

WINCHES:

CTD make: SWANN model: 329 serial no.: 1307
 counter make: REVLIS model: 8750 serial no.: EDR 8763
 HYDRO make: model: serial no.:
 counter make: model: serial no.:
 Spooling make: model: serial no.:
 Drag make: SWANN model: 331 serial no.: 1231
 Other make: model: serial no.:

Salinometer make: model: serial no.:

SAIL System:

Program version: Time zone:
 Sampling interval: sec.
 CTF module no.: serial no.:
 Remote temperature model: serial no.:
 Flow sensor model: serial no.:
 Other sensors: (special for this cruise)
 Name: module I.D.: serial no.:
 Name: module I.D.: serial no.:

Comments:

ADCP Setup:

Program version: number of depth bins:
 Time zone: bin length (2'):
 Sampling interval: sec. pulse length:
 Blank beyond transmit: pings per ensemble:
 Pulse cycle time:
 Percent pings good threshold:

Comments:

LEG # 2

JUNE 27/93

ARRIVE Bamfield @ 1115. PDT

MACKIN & Company Depart [Doug Moore, Jan Perry remain]

Depart Bamfield @ 1300 For STATION LCØ1
(Fire & Boat Drill in Barkley Sound).

STATION LCØ1 [CTD + Rosette Samples]

CONS#100 Sunny @ 1508 PDT

Bottle at 92 m Bottom (

Bottles 92, 75, 50, 30, 20, 10, 0

Wind from NW (light).

T = 5.397°C

WATER Depth = 95.3 m.

LA PEROUSE HYDROS

BOTTLE # DEPTH (m)

1

2

3

4

5

6

7

8

9

10

STATION LCØ2 @ 1542 PDT

CONS# 102

Depth = 112 m.

BOTTLES @ 108, 75, 50, 30, 20, 10, 0

Forgot to ALTS; Re DO CAST.

Bring to surface. Re do cast from surface.

2 x Deep bottles. at Depth = 108 m

- FORGOT to END Fill for a few

minutes. LONG TIME AT SURFACE

CONS# 101 - ABORTED CAST at
LCØ2.

Temp. bottles #2 T446 5.397

#8 T451 14.986

5.399

14.990

STATION LCØ9

Shift change at MIDNIGHT near surface of hydro upcast PART A.

Hydro cast Split: Part A 600 → 75m
PART B 50 → 0m

Thomson: Did not log on Downcast Part B
log on Upcast of Part B (50 → 0m)
No Downcast(?) PART B.

NOTE Still confusion on how to assign Rosette bottle # to Flask.

Some start with low flask number and deeper bottles,

others place Flask # in decreasing order with depth (Shallow = smaller Flask #)

LC02	Bottle #2	5.397	#T446
	Bottle #8	14.986	#T451

LC07	#2	8.192	T446
	#6	12.125	T572
	#8	14.372	T451

LC08	#2	6.971	T446
	#6	8.576	T572
	#8	10.984	T451

CART LC09 Split into two casts.

① 75-600m Hydro

② 0-50m Hydro.

LC09	#2	5.454	400m	T446	.002
(A)	#6	7.262	175m	T572	.011
	#8	7.768	125m	T451	.003

LC09 #2 ————— 30m

(B)

FORGOT TO Reset Thermometer on Part B CAST

INSTITUTE OF OCEAN SCIENCES

YEAR	93	MONTH	June	TIME ZONE	UTC	SHIP	Tully	CRUISE	9317	PAGE	OF		
DAY	STATION IDENTIFICATION	DEPTH SOUNDING (m)	SHIP STOP/START TIME	LATITUDE LONGITUDE	STD CONSEC. #	STD TIME	HYDRO CONSEC. #	MESSENGER TIME	HYDRO SALINITY #	OXYGEN #	SURFACE TEMPERATURE/ SALINITY	LOOP SALINITY #	NOTES
27	LC01		485037 12527.71	100	2208	100	✓		3039 3046				3039 is 92 m 3046 is 0 m
27	LC02		4848.45 125306.4	102	2250	102	✓		3049 3056				Neuston tow. O ₂ by rosette. 3047 is 108 m 3056 is 0 m
27	LC03	144	2341 4846.90 0007 12534.18	103	2340	/							Bongo. net haul 0007: start Neuston tow toward LC04.
28	LC04	169	0100 4843.45 12540.39	104	0104	/							
28	LC04		4843.44 0126 12540.53	105	0112	105	✓		3057 3067				UPCAST w/tdl O ₂ Rosette 3057 is 150 m 3067 is 0 m
28	LC05	68	0203 4839.92 0212 12547.39	106	0205	/							Neuston tow
28	LC06	93	0220 4836.28 12553.74	107	0309	/							CTD ONLY.
28	LC07	130	0350 4832.784 0410 12600.507	108	0354	108	✓		3001 3073				Rosette / CTD FLASK 3071 CRACKED: SAMPLE NOT VALID.
28	LC08	203	0442 4829.363 0501 12607.050	109	0445	109	✓		3004 3016				Rosette / CTD Neuston / Bongo
28	LC09	611	0625 4825.913 12613.499	110	0627	110	✓		3022 3034				1 east Bottle 75-600 m
28	LC09	611	0721 4824.851 12612.350	111	0722	111	✓						2 nd east Bottle 0-50 m
28	LC09	611	0723 4824.78 12612.31	112	0725	112	✓		3017 3021				UPCAST Logging

93/6/27 pdt

1641 - an LC 03.

- CTD # 103 to 140 m.
- bearings not hand
- 15 min. Newton tower. towered LC 04: 1707-1722

1800 - an LC 04

- CTD #104 to 163 m
- Upcast CTD #105 with ROSETTE O_2 at 150, 125, 100, 75, 50, 30, 20, 10, 0 m

1826 - 1w LC04. → 125m: T446: 8.798C
10m: T451: 13.544C

Note : UP TO 93/6/27/1853 pdt the manganous chloride dispenser has been set at 0.6 ml. It should be 1.0 ml, and was changed to 1.0 ml. (This is a problem with Hirschmann EM TECHCOLOR dispenser s.n. 2110636 — it must be calibrated with the liquid being dispensed : the scale of volumes showing is NOT accurate).

1903 - an LCOS

- CTD # 106 to 64 m

912 - maneuvering to start Newton town: 1915 - 1930

- CTD data logging computer clock:

At 02:18:00 GPS time,
Vetra reads 02:15:45.45
Connected Vetra at 02:19:20

See Note on Lcpg on Previous pages

$\frac{1}{\sqrt{2}} \begin{pmatrix} 1 & i \\ 0 & 1 \end{pmatrix}$

LC10: CTD only, No Bottles.

Large wire angle on downcast
Max CTD depth = 1255m
Water Depth 1285m

WIND: TO EAST (105°) @ 9.5 knots

Wire wrap screw up on way up! Re lay reps on next
cast. Worn't tracking

LC11: Light Rain falling.
Split cast.

Deep: 1400 → 175m

Shallow: 150 → 0m

Temperatures:	#2	1200m: 3.200	125m: 7.760	T 446
	#6	400m: 13.230*	30m: 13.450	T 572
	#8	250m: 6.759	10m: 15.375	T 481

*longard caught on conduit tie.

Remove overwraps at >1100m

Triggered Bottle # @ 1390m @ 1051 GMT
Had ship steam ahead to increase wire angle.
Overlapping wraps —

Many Volvella at surface

9/6/28

0450 PDT — start CTD #115 (shallow O₂ cast).
0509 — for LC11.

0658 — over LB15
— CTD #116 to 1586m
— lots of Volvella around.

0800 — for LB15

LB14

CTD / ROSETTE.

To

1200 m

Cast in two parts

Deep cast

150 - 1200 m or bottom

Shallow cast

0 - 125 m

Deep Cast Temperatures

#2 446

3.561,002

#6 572

5.763,011

#8 451

6.578,003

Shallow Cast Temperatures

#2

8.487,002

#6

14.637,012

#8

15.332,004

1 extra tag on deep cast

Transmissometer signal wiring at 300 m

Found that bottle #9 lower trip wire was in transmissometer light path.

This would also mean that the bottle would not flush as the bottom was closed.

O₂ will be suspect.Sunfish on surface - many jellyfish.
Possibly a (brown) shark also.

Load CTD2 / DATA into DIAS computer

LC' line. This took about 25 minutes while we were waiting on station.

LB12 - Depth gradually shoaling during the cast. Overcast; Wind True = 4.300 at 15.7 knots.

DAILY LOG

OCEAN PHYSICS

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YEAR 93		MONTH 06		TIME ZONE UTC		SHIP TULLY		CRUISE 9317		PAGE OF			
DAY	STATION IDENTIFICATION	DEPTH SOUNDING (m)	SHIP STOP/START TIME	LATITUDE/ LONGITUDE	STD CONSEC. #	STD TIME	HYDRO CONSEC. #	MESSENGER TIME	HYDRO SALINITY #	OXYGEN #	SURFACE TEMPERATURE/ SALINITY	LOOP SALINITY #	NOTES
28	LC10	1273	0816 4822.65 12620.20	113	0830	/							NO BOTTLES. MAX Depth 1255 m
28	LC11	1497	1012 4818.84 12626.69	114	1014	114			3035 3081			1390m 175m	2X BOTTLES. SPIT CAST.
28	LC11		4818.91 1209 12626.79	115	1150	115			3082 3094			150m 0m	SHALLOW O ₂ CAST
28	LB15	1589	1353 4804.26 1500 12608.63	116	1402	/					1		
28	LB14	1165	1547 4808.584 12600.278	117	1550	117			3099 3112		31031 2	159m 1200	Deep O ₂ Cast.
28	LB14	1160	4808.56 12600.317	118	1655	118			1028 3098			0m 125	Shallow O ₂ Cast.
28	LB13	921	1737 4810.655 1810 12556.107	119	1738	/							CTD ONLY Sunfish on surface
28	LB12 #1	485	1825 4813.065 1933 12551.972	120	1856	120			1010 1058				Deep O ₂ Depth Shoaling as US/2000m
28	LB12 #2	475	4813.557 2010 12552.316	121	1950	121			1003 1009				Shallow CAST. 0 to 50m only on CTD
28	LB11	207	2037 4815.236 12547.785	123 ^{NE}	2039	122			1060 1108			0m 200m	Bottles 0-200m Const. CHARGE 1
28	LB10	155	2153 4818.50 2210 12541.342	124	2156	/							NOTE: THIS IS CONT. 124 When is CTD 122? No bottles
28	LB09	157	2307 4822.01 2326 12534.922	125	2310	125			1014 1040			0m 145m	108

LB12 — Had wrong water depth on sounder
Hit bottom at 485m — laid wire out!

Bottle #1 at 475m about 10-15m above bottom

Spit Cast: 475 — 75m

Shallow: 50 — 0m

Water depth: 485m Wind @ 349° @ 19.5 knots

LB12 (B) Shallow Cast. 7 cables off station.
0 to 50m only

Forgot to open ~~not~~-used bottles (lost cap)

Forgot to close cocks —

RE DO CAST BOTTLES ONLY NO CTD!

Run to 50m
2nd try at shallow BOTTLE CAST. NO CTD This time

LB11

@ 2039 UTC

@ 205m water

Cast #

Go to bottom @ 207m on CTD

First bottle @ 200m, about 7m above bottom

APPROX. WATER DEPTH
= 200m.

Wind @ 21 kts.

LB10 Cast # 124 @ 2157

Depth 155m

Wind NW from 2° @ 21.7 kt

NOTE: Cast # 123? Was this AT LB11?

No Bottles.

Bottom 'ctd' 156m Hit Bottom! Gently

93/6/28 PDT

1607 - on LB09

- CTD #125 to 148 m.

- O₂: 0, 10, 20, 30, 50, 75, 100, 125, 145 m.

↳ #2: 8.853 C (T446)

↳ #6: 10.728 (T572)

↳ #8: 13.432 (T451)

- bottle #3 didn't close (100 m)

1626 - on LB09

1700 - on LB08

- CTD #126 to 146 m.

- O₂: 0, 10, 20, 30, 50, 75, 100, 125, 140 m

↳ #2: (T446) 7.043 C

↳ #6: (T572) 11.120 C

↳ #8: (T451) 14.456 C

- On bottle not sealed: lanyard caught in lower stopper

1719 - on LB08

1845 - on LB06

- CTD #128 to 108 m.

- O₂: 0, 10, 20, 30, 50, 75, 100

↳ #2: (T446) 8.075 C

↳ #6 (T572) 14.004 C

1900 - on LB06

1925 - on LB05

- CTD #129 to 102 m

1936 - on LB05

LBØ4	#6	T572	13.324
	#2	T446	8.237

LBØ2	#2	T446	9.900
------	----	------	-------

LBØ1	#2	T446	9.900	? **
------	----	------	-------	------

Note LBØ1 looks like it was left on hold
from station LBØ2

LAØ1 — very sharp feature in LAC signal
at 75m depth.

Light winds. Strong Estuarine flow in the
ADCP record. Out at surface.

Touched bottom with weight hanging from the end
of Rosette.

LAØ2: Pushed "logging" button accidentally.
No cast Cons # 135. LAØ2 is cast # 136.

Touched bottom at 295m.
Deepest bottle = 290m

WIND: 11 kts at 21°

DAILY LOG

OCEAN PHYSICS

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YEAR	93		MONTH	06		TIME ZONE	UTC		SHIP	TULLY		CRUISE	9317		PAGE	OF
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29	LB08	147	0000 48 25.27 0019 125 28.68	126	0003	126	✓		1042 1068 + 1069			0m 140m	1069 REPLACED 1042. 146 0m			
29	LB07	159	0045 48 28.729 0106 125 21.983	127	0048		✓						CTD ONLY			
29	LB06	119	0145 48 32.22 0200 125 15.59	128	0147	128	✓		1090 1101			0m 100m	CTD + O2 ROSETTE 108 102			
29	LB05	105	0225 48 33.97 0236 125 12.22	129	0228		✓									
29	LB04	115	0257 48 35.76 125 08.89	130	0259	130	✓		1112 1120			0m 100m				
29	LB03	97	48 37.32 0349 125 05.71	131	0338								CTD + Nueston			
29	LB02	57	0427 48 38.904 0510 125 02.482	132	0432	132	✓		1121 1128				CTD, O2 + Nueston			
29	LB01	42	48 40.10 0535 124 59.01	133	0537	133	✓		1130 1051				T ^{H2} 9.900? see note O ₂ - 33m			
29	LA01	282	0603 48 29.240 0642 124 45.794	134	0605	134	✓		1048 1136				10x Bottles. Sharp features in stratification			
29	LA02	295	0758 48 26.306 0830 124 51.440	136	0802	136	✓		3062 3073				10x Bottles Missed can # 135			
29	LA03	113	0900 48 22.673 124 58.076	137	0902								No Bottles.			
29	LA04	189	0935 48 19.282 0959 125 04.274	138	0940	138	✓		3061 3051				10 Bottles. very Soupy at surface. See NOTE Damaged bottles			

LAØ3: Just touched bottom around 105m.
Seas are sloppy, wind light.

LAØ4: Hit bottom at 175m on CTD.
Very uniform deep layer.
Const #138, Bottom shading on us!

Rosette SMASHED AGAINST STERN OF SHIP
during recovery. 2 bottles broken [CRACKED,
the other lost spigette].

The thermometer on bottle #6 was lost.
BOTTLES #9 and 10 broke free of their mounts.
Sample from 10 was lost. Also #8.
Re-attached remaining bottles.

LAØ5: Const #139

Max. depth of probe = 120m! About 2 to 3m
above bottom [from pinger X-over]

Reorganized bottles. Moved #8 to hole at
#6. Moved #10 to #8 and #9 to #6.

#2 Removed: top clamp block loose on
bottle. Removed thermometer to avoid loss.

93/6/29 PDT.

0416 An LAØ6

CTD #140 to 112m.

O₂ from rosette on upcast: 0, 10, 20, 30, 50, 75, 100m

0435 Lw LAØ6.

→ TA51 = 12.19,
C

Mounted bottle from #2 in #9 spot.

Mounted spare "CTD over" bottle in #2 spot
with T 446 in frame.

93/6/29 pdt

0510 - Arr LA07
- CTD # 141 to 113 m
0524 - LV LA07.

0556 - Arr LA08
- CTD # 142 to 139 m
- Rosette upcast O_2 : 0, 10, 20, 30, 50, 75, 100, 125 m
↳ T446: 8.194C
↳ T451: 9.241C

0617 - LV LA08

0654 - Arr LA09
- CTD # 143 to 348 m
- LV LA09

PROCEED TO START OF ADCP LINE AT LYB1

Arrive station B11C 48°13.0', 125 49.0

@
Ship Speed 5 knots

END @ 48°19.6', 125 45.2

LA 10

CTD

Loop Sample #3

Salinity #

4

Calibration bottle at 900 m Salinity
34.359

(T446)

5

Calibration bottle at 800 Salinity and Temp
34.285

6

Calibration bottle @ 400 Salinity
33.984

(T451)

7

Calibration bottle @ 10 Salinity & Temp
31.013

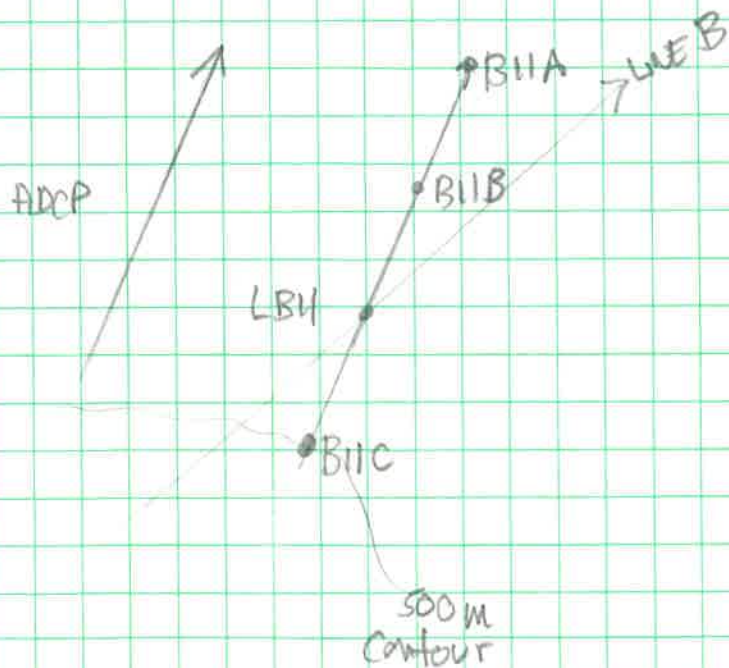
Temp reading T446

4.002 = 4.004

Temp reading T451

15.471 = 15.475

Proceed to ADCP line (SW end) near LB11



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29	LA05	123	1027	48 16.126	139	1032	/						Max Depth of Probe = 120m.			
29	LA06	113	1116	48 12.60	140	1119	140		3041			Om	112			
			1135	125 17.38					3048			100				
29	LA07	114	1210	48 09.18	141	1216	/						113			
			1224	125 23.93												
29	LA08	141	1256	48 05.73	142	1259	142		3001			Om	159			
			1317	125 30.39					3010			125m				
29	LA09	357	1354	48 02.37	143	1355	/						348			
			1416	125 36.35												
29	LA10	910	1452	47 58.93	144	14:58	/		4 34.359		31.016		Calibration at 800m for T _{sw}			
			1538	125 43.33					5 34.285		3					
29	ADCP Line	1717		48 13.047	NO CTD / JUST ADCP								START ADCP line at B11C Ship @ 5 knots			
				125 48.974									NEWS/FILE			
29	B11A	155	1845	48 19.591	145	1848	/									
				125 45.093												
29	B11B	174	1939	48 17.300	146	1939	/						NEWS/FILE			
			1949	125 46.197												
29	B11A	154	2315	48 17.69	149	2317	/						(there was an LB11 B11C)			
			2326	125 43.03									CTD to 150m.			
30	B11B	175	0000	48 17.41	150	0001	/									
			0011	125 46.50												
30	LB11	209	0042	48 15.27	151	0044	/						CTD to 173m. sunfish.			
			0057	125 47.50									CTD to 211m.			

ADCP / CTD TIME SERIES

JUNE 29/93

START @ 1717 UTC STATION

BLIC

ADCP = 2.00 MIN

48°13.0' 125 49.0

ENSEMBLES ABOUT

Depth at start = 505 m

30-35 PINGS/ENS.

WAY POINTS FOR PASS #1

TIME Deck UNIT	Position GPS	DEPTH (m)	
1717	48°13.0 125°49.0	505	Steaming toward BLIA 48 19.6 (END) 125 45.2
1729	48 14.074 125 48.348	330	Fix. White float off to starboard.
1734	48 14.487 125 48.123 Ship Speed = 5.0 km	285	Fix. Calm.
1740	48 14.948 125 47.884 ADCP EN # 7191 PING DATA 049	215	Calm Seas. Just over shelf break

APP ADCP EN.

Depth

EN. #

1744	48 15.260 125 47.726	207	7192	
1749	48 15.657 125 47.612	200	7195	
1755	48 16.103 125 47.246	190	7198	EVENT MARK ON SOUNDER
1802	48 16.632 125 46.909	183	7201	
1807	48 17.061 125 46.655	175	7204	
1809	48 17.259 125 46.543	175	7205	
1815	48 17.733 125 46.302	173	7208	
1820	48 18.078 125 46.063	163	7210	
1825	48 18.545 125 45.803	170	7213	

TIME

POSITION

DEPTH

ADCP EUS.

1830

48 18.927 125 45.600 169 # 7215

1835

48 19.307 125 45.349 163 # 7218

1840

48 19.655 125 45.159 155 # 7220

CTD STATION B11A

1905

48 19.330 125 45.265 163 # 7233

1910

48 19.073 125 45.425 164 # 7235

1915

48 18.665 125 45.679 169 # 7238

1920

48 18.211 125 45.972 173 # 7240

1925

48 18.776 125 45.252 173 # 7243

1930

48 18.385 125 45.484 174 # 7245

CTD STATION B 11 B.

1939

48 17.285 125 46.157 174 # 7251

1949

48 17.185 125 46.001 174 # 7255

END STATION

1955

48 17.030 125 46.492 175 7257

20.00

48 16.840 125 46.776 180 7260

20.05

48 16.479 125 47.019 185 7263

20.10

48 16.125 125 47.298 190 7265

20.15

48 15.697 125 47.483 199 7268

20.20

48 15.258 125 47.791 207 7270

20.25

48 15.014 125 47.714 214 7273

20.30

48 14.979 125 47.673 217 7275

CTD STATION LB11

20.32

48 14.930 125 47.670 217 7276

20.37

48 14.925 125 47.729 217 7279

END STATION

20.50

48 14.416 125 48.112 217 7285

20.55

48 14.019 125 48.497 217 7288

21.00

48 14.585 125 48.730 217 7291

21.05

48 13.939 125 48.985 217 7293

21.10

48 13.056 125 48.980 217 7295

CTD STATION B11 C

21.11

48 13.017 125 48.913 217 7297

21.29

48 13.641 125 48.506 217 7305

END STATION

TIME	POSITION		DEPTH	ADCP ENS
22 ^h 04	48° 13.951	195° 48.430	335	73 23
22 ^h 10	48° 14.466	195° 48.168	287	73 25
22 ^h 15	48° 14.875	195° 47.933	290	73 28
22 ^h 20	48° 15.383	195° 47.597	203	73 31
22 ^h 25	48° 15.719	195° 47.452	199	73 33
22 ^h 30	48° 16.084	195° 47.179	191	73 35
22 ^h 35	48° 16.495	195° 47.014	182	73 38
22 ^h 40	48° 16.896	195° 46.750	175	73 40
22 ^h 45	48° 17.390	195° 46.534	174	73 43
22 ^h 50	48° 17.695	195° 46.273	173	73 45
22 ^h 55	48° 18.123	195° 46.098	173	73 48
22 ^h 59	48° 18.423	195° 45.884	170	73 50
23 ^h 05	48° 18.923	195° 45.658	167	73 53
23 ^h 10	48° 19.320	195° 45.447	161	73 55
23 ^h 15	48° 19.653	195° 45.084	155	73 58

CTD STATION		B11A	
23 18	48° 19.665	195° 45.046	154 73 59
23 22	48° 19.765	195° 44.985	154 73 62

2330	48 19.639	125 45.141	155	7365
2335	48 19.263	125 45.351	163	7368
2340	48 18.890	125 45.567	168	7370
2345	48 18.485	125 45.806	169	7373
2350	48 18.068	125 46.057	173	7375
2355	48 17.690	125 46.303	173	7378
0000	48 17.434	125 46.481	175	7380

93/6/29 UTC

93/6/30 UTC

STN B11B

0015	48 17.368	125 46.661	176	7388
0020	48 16.928	125 46.845	179	7390
0025	48 16.543	125 47.097	184	7393
0030	48 16.115	125 47.313	192	7395
0035	48 15.681	125 47.490	199	7398
0040	48 15.277	125 47.676	207	7401

STN LB11

YEAR	MONTH	TIME ZONE	SHIP	CRUISE	PAGE	OF							
93	06	UTC	TULLY	9317									
DAY	STATION IDENTIFICATION	DEPTH SOUNDING (m)	SHIP STOP/START TIME	LATITUDE/ LONGITUDE	STD CONSEC. #	STD TIME	HYDRO CONSEC. #	MESSENGER TIME	HYDRO SALINITY #	OXYGEN #	SURFACE TEMPERATURE/ SALINITY	LOOP SALINITY #	NOTES
30	B11C	469	0126 48 13.07 0155 125 48.72	152	0126	/							
30	B11A	157	0320 48 19 45.3 125 44 84.4	153	0328	/							CTD to 511 m. CTD to 150 m
30	B11B	175	0417 48 17 43 125 46 52	154	0420	/							CTD to 175 m
30	LB11	213	0455 48 15 15.8 125 47 65.4	155	0458	/							CTD to 213
30	B11C	513	0538 48 12 47.3 125 48 93.1	156	0541	/							CTD to 520
30	B11A	157	0743 48 19 52.8 125 45 17.3	157	0747	/							CTD to 155 m
30	B11B	174	0830 48 17 43.4 125 46 49.0	158	0831	/							CTD to Bottom
30	LB11	214	09.11 48 15.121 125 47.689	159	0914	/							CTD to Bottom
30	B11C	497	09.51 48 12.980 125 49.021	160	0954	/							CTD to Bottom
30	B11A	155	1153 48 19 73.0 1209 125 45 47.7	161	1158	/							CTD to 150 m.
See end of Notes													

UTC TIME	GPS POSITION				PDD DEPTH m	RDT ENS. No.	
	N		W				
0100	48 14.897	125	47.231	259	7410	93/6/30 UTC	
0105	48 14.485	125	47.642	299	7413	30693 UTC	
0110	48 14.176	125	47.931	336	7415		
0115	48 13.764	125	48.295	374	7418		
0120	48 13.413	125	48.713	447	7420		
STN B11C CTD							
0200	48 13.033	125	47.882	503	7440	93/6/30 UTC	
0205	48 12.686	125	48.680	535	7443		
0210	48 12.994	125	49.053	509	7445		
0211	- call from bridge "start a line".						
0215	48 13.406	125	48.704	441	7448		
0220	48 13.778	125	48.473	374	7450		
0225	48 14.169	125	48.321	319	7453		
0230	48 14.549	125	48.126	279	7455		
0235	48 14.893	125	47.958	219	7458		
0240	48 15.298	125	47.750	207	7460		
0245	48 15.638	125	47.520	200	7463		
0250	48 16.064	125	47.211	193	7465		
0255	48 16.463	125	46.952	186	7468		
0300	48 16.900	125	46.778	179	7470		
0305	48 17.378	125	46.530	176	7473		
0310	48 17.730	125	46.364	174	7475		
0315	48 18.220	125	46.088	174	7478		
0320	48 18.675	125	45.809	170	7480		
0325	48 19.110	125	45.582	165	7483		
0330	48 19.546	125	45.266	159	7485		
STN B11A.							
0344	48 19.429	125	44.793	159	7493	END STATION	
0350	48 19.276	125	45.158	163	7496		
0355	48 19.072	125	45.420	165	7498		
0400	48 18.652	125	45.687	170	7500		
0405	48 18.275	125	45.968	174	7503		
0410	48 17.905	125	46.261	174	7505		
0415	48 17.525	125	46.491	175	7508		
STN B11B							
0420	48 17.348	125	46.393	175	7511	Start	
0427	48 17.206	125	46.281	177	7514	END	

STATION 1311C @ Con # 152

Pronounced Transmissometer + ADCP signal
at around 200-275 m!

% transmission is related to BS signal!

Station 1311A @ Con # 177

Large transmissometer signal change at 120 m.

UTC TIME	GPS POSITION		PDD M	RDI Snd #	
	°N	°W			
0430	48 17 133	125 46 224	177	7515	
0435	48 16 902	125 46.736	179	7518	
0440	48 16 476	125 46 975	185	7521	
0445	48 16 120	125 46 267	193	7523	
0450	48 15.738	125 47.453	200	7525	
0455	48 15.286	125 47.705	209	7528	
0459	48 15 158	125 47 654	213	7530	Start LB11
0510	48 14 933	125 47 393	244	7535	End of 8n LB11
	LOG 10 MIN INTERVALS.				
0520	48 14.593	125 48 105	275	7540	
0530	48 14 805	125 48 571	393	7545	
	B11C				
0541	48 12 973	125 48 931	503	7552	Start
0557	48 12 690	125 48 693	535	7559	Of Cast.
0600	48 12 641	125 48 661	543	7560	End of Cast.
0610	48 12 450	125 48 565	575	7565	Start Line
0620	48 13.104	125 48 944	490	7570	
0630	48 13.910	125 48.404	347	7575	
0640	48 14 641	125 47 929	267	7580	
0650	48 15 481	125 47 647	201	7585	
0700	48 16 245	125 47 188	190	7590	
0710	48 17 000	125 46 697	175	7596	
0720	48 17 760	125 46 173	173	7600	
0730	48 18 503	125 45 773	170	7605	
0740	48 19 239	125 45 349	163	7610	
0750	48	125	1	76	

STATION B11A / to 155m.

0800	48° 12 450	125° 45.203	157	7620
0810	48° 18 640	125° 45.603	170	7625
0820	48° 17 816	125° 46.141	171	7630
0830	48° 17 404	125° 46.447	170	7630

STATION B11B @ 0830 GMT

0837

END STN

UTC TIME	GPS POSITION		DEPTH M	ADCP ENS.
	°N	°W		
08:50	48° 16.869	125° 46.789	179	7645
09:00	48° 15.940	125° 47.207	193	7650
09:10	48° 15.205	125° 47.699	209	7655
	STATION LB11 @		09.14	
			09.18	
09:25	48° 14.900	125° 47.389	239	7663
09:30	48° 14.773	125° 47.859	243	7665
09:40	48° 13.976	125° 48.431	351	7670
09:50	48° 13.080	125° 49.004	503	7675
	STATION B11C @		09.54	
			10.03	
END STATION				
10:00	48° 12.711	125° 48.684		
10:16	48° 12.436	125° 48.590	583	7689
10:20	48° 12.617	125° 48.722	540	7690
10:30	48° 13.264	125° 48.839	464	7695
10:40	48° 13.064	125° 48.412	329	7700
10:50	48° 14.881	125° 47.956	219	7705
11:02	48° 15.883	125° 47.396	192	7712
11:10	48° 16.544	125° 47.016	181	7716
11:20	48 17.405	125 46.515	174	7720
11:30	48 18.220	125 46.025	171	7725
11:40	48 19.078	125 45.539	164	7730
11:50	48 19.682	125 45.309	155	7736
	STN B11A			
12:15	48 19.543	125 45.281	156	7748
12:20	48 19.108	125 45.547	164	7750
12:25	48 18.674	125 45.750	170	7753
12:30	48 18.275	125 45.972	172	7756
	BREAK OFF LINE			

93/6/30

93/6/30 PDT

0700 — stopped 48 32.080 N (LCB4)
125 35.497 W
80 m deep

0712 — for Bongor haul.
for LCB4.

0742 — stopped 48 34.464 N (PRESIDENT'S)
125 29.981 W (CHOICE)
130 m deep

for Bongor haul. (scattering layer @ 80-85m)

0758 — LCB4 PRESIDENT'S CHOICE.

Proceed to Bamfield.

Arrive Bamfield. 10:07 PDT
Overcast, Cool.

Pick up Brendo Bird, George Chase, Steve Mihaly
Jan Perry, Doug Moore got off.

Arrive Test Station in Imperial Eagle Channel
① 1211 PDT

Steamed to Kalamo test station.

Found ① 12 volt battery on ADCP was drained.

LED's were staying on. Diode was not turning them off. Replaced both Lithium batteries with Alkaline Battery Packs. This involved removing the ADCP from its case.

② Removed LEDs; appeared to be working. However couldn't get ADCP to log to disc. CTD was fine but not ADCP. Tried decreasing the baud rate to 2400, 1200, but no luck.

Scud

NOSE UP = Positive Tilt

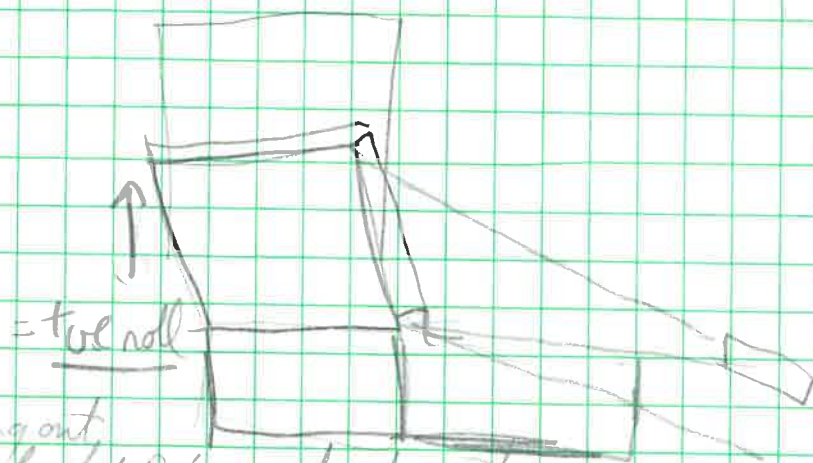
STARBOARD UP (facing net opening) $\Rightarrow$
Positive Roll.

1610 PDT: CANCELLED TEST. Depart for Event
region. Jun 30/93

Fix up ADCP at sea — on route.

@ 4:20 local time did nose test $\text{true} = \text{nose up!}$

running at 1200 Band - true roll - port side down



looking out
back of ship towards beam

About to do ballast test - will deploy to a few m
@ 5 PM -

5m Pitch = 3.2
roll = 4.0 head 60°

10m pitch = 0.2
roll = 1.7
head = 55.4

no bottom tracking

15m pitch = 5.5
roll = 1.7
head = 41

Squid test complete - need some near buoyancy

Depart for 46° 30' N 129 38' W @ 1630.

Ship @ 14+ knots

July 1/93 George is removing files in ADCP
in sequence in case of problems: E93A, B, ...
Remember to change before each deployment.

Check GPS on CTD

Arrive at latest Seismic Source ($46^{\circ}30'$; $129^{\circ}38'W$)
@ 1719 UTC

STATION IDS RZ (Rift zone) RZ01

NO Hint of Plume! Went to within 25m of
bottom. Many Goose-neck barnacles in clumps.
Shallower transmissometer to 2200m+. No problem
Wind Moderate from west.

RZ03 1905 GMT ship stops - Check GPS on CTD

transmissometer looks very stable - no spiking on CTD
250m - no sign of anything

Is this any darker?

Thomson - 1600

Burd - 1800

George - bottom 50m

Michel - 2000

1500m - no signal

We want to 2347m
max depth

no bottom boundary layer
evident

NO HINT OF PLUME

On Deck @ 1:20 PM
local

DAILY LOG

OCEAN PHYSICS

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YEAR 93		MONTH 06		TIME ZONE UTC		SHIP TULLY		CRUISE 9317		PAGE		OF	
DAY	STATION IDENTIFICATION	DEPTH SOUNDING (m)	SHIP STOP/START TIME	LATITUDE/ LONGITUDE	STD CONSEC #	STD TIME	HYDRO CONSEC #	MESSENGER TIME	HYDRO SALINITY #	OXYGEN #	SURFACE TEMPERATURE/ SALINITY	LOOP SALINITY #	NOTES
01	RZ01	1265	17:15	46°30.015 129°38.248	162	17:19	/	/	/	/	/	/	No plume signal.
01	RZ03	2350	19:11	46°28.745 129°42.279	163	19:12							
01	RZ04	2340	20:51	46°24.68 129°40.68	164	20:53							
01	RZ06	2470	22:22	46°23.34 129°44.87	165	22:21							
01/02	RZ07	2225	23:57	46°20.41 129°43.89	166	0000							CTD to 2241 m.
02	RZ09	2180	01:30	46°19.19 129°48.24	167	01:33							CTD to 2291 m.
02	RZ11	2190	02:58	46°15.958 129°47.941	168	03:04	/						No Plume.
02	RZ12	2100	04:25	46°14.92 129°49.92	169	04:32							CTD to 2100. End 05:34. No Plume.
02	RZ13	2130	05:48	46°15.944 129°48.971	170	05:50	/						CTD to 2130 m. No Plume
02	RZ00	2125	07:21	46°15.63 129°47.42	171	07:22							CTD @ ground zero
02	RZ14	2125	08:15	46°16.7 129°47.89	172	08:50							Bounced off bottom @ 2138 m
02	RZ15	2085	10:03	46°17.96 129°46.97	173	10:03							

Cast 4 CTD

* Check GPS positions on CTD Files

Geog - 50 m
Brenda - 1700
Rick - 1600

760m - T, S feature - some decline in light attenuation - steady from 600m

- some activity continuing @ 900m

- some temporary scattering @ 1570m on transmissometer

- no plume anomalies down to

- went down to 2376 m - @ 5 mab heading up
on deck 21:57

Station RZ06 - south of station 4 + west of Ridge

Small feature in T + S at 360m

Redo Temperature Scale

Bottom Depth
= 2467m.

Heading up at 2448m

Stn RZ07

91.316
28.7

365

- very definite bottom on sounder

- small discontinuity in %T at 1100 m

- CTD #166 to 2241 m

- bottom 500 m T% 91.316, 91.267, 91.365, 91.218
+ steps of digitizer.

Stn RZ09

- much less definite bottom on sounder.

- CTD #167 to 2291 m

- same T% values as RZ07 in bottom 500 m.

- touched bottom with probe.

168 CTD to 2170 m

CTD on bottom, noted sediment in transducer trace

Note RZ 11 station not RZ 10

170 - back on deck 07:03:20

RZ 00 - off at 07:21

Very strange sinuous temperature structure near 500 m depth. Transducer signal was fine.

Max depth 2212 m. - coming up

Touched bottom !!

On surface 08:33 July 2/93.

RZ 14 - hit bottom at 2138 m - going up
on deck at 09:47

* RZ 15 - found a phone signal @ 1920 m to 1980 m.
File # 173. we are leaning on CTD for upcast
down to 2085 ~ 5 mab, heading up
we are starting to tow up the valley slowly

New CTD file @ 1870m towing up axial valley - RZAA file #174

Lowered and raised probe ~ 150 m twice during tow. Differences of 50-100 m between sounder depth and (CTD + pinger) depth during tow. Bottom echo not very sharp.

STN RZ16: CTD #175:

Downcast ~ 100 m to near bottom, upcast to surface. Mid-column %T values 91.414 or 91.463 typically. From 650 m up to 460 m opt as high as 91.512. Small local minimum at 400 m.

- Bottles 4 & 5 are hanging from the rosette by their lanyards only. Positions 4 and 5 are on the leading edge (because of position of line suspending weights).
- Digital therm. on bottle 2 is in HOLD mode.
- Bottles re-attached both thermus in STMP mode.
* PLUS the syts line Reg + Darren put on.

STN RZ17: CTD #176: many barnacle spotticks at surface.

- 1100 to 1350 m: 91.365, 91.414 %T.
- 1350 to 1950 m: 91.365, 91.316 %T.
(1860 - a few 91.267's).
- 1950 to 2078 : 91.316, 91.267
- there were quite a few 1-2% spikes between 1800 and 1600 m coming up. Stopped and went down to 1800 to see if they are consistent - no spikes going down. Spikes of 1-2% for first 100 coming up.
- "windrows" of small (1cm) velata on surface.

CF02 - just west of last night's venting
File #180 1800m - strong but brief transmitter
blip - Michel also said Echo sonar saw a "false"
bottom at 1800m.

Went down to 2116 m - start new file for
upcast

CF02
File #181 - start 2116 m
46°18.129048.16
- saw some noise at 1700 going up.
- thick section - will go back down through
went up to 1420 m

File #182 recast of CF02 - transmitter failure
1732 m it went back to normal
46°18.036
129°48.341 Time = 20.03

File #183 upcast again - no noise this time -
no real signal but bits of noise this time
on deck at 20:33
- no obvious equipment clogging - no lanyard.

File #185 - RE15 some small noise on Transducer
at 550 m & a little noise after that

(No File 184 — Someone must have reset
twice).

Down to 2103 m, smab - motta!

CF02 - just west of last night's venting
File #180 1800m - strong but brief transmitter

Ship - Michel also said Echo sensor saw a "false"
bottom at 1800m.

Went down to 2116 m - start new file for
upcast

CF02
File #181 - start 2116 m
46°18. 129°48.16

Saw some noise at 1700 going up.
- thick section - will go back down through
went up to 1420 m

File #182 recast of CF02 - transmitter failure
1732 m it went back to normal
46°18.036
129°48.341 Time = 20.03

File #183 upcast again - no noise this time -
no real signal but bits of noise this time
on deck at 20:33
- no obvious equipment clogging - no lanyard.

File #185 - RE15 some small noise on Transducer
at 550 m & a little noise after that

(No File 184 — Someone must have reset
twice).

Down to 2103 m, smab - motta!

DAILY LOG

OCEAN PHYSICS

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OCEAN PHYSICS														INSTITUTE OF OCEAN SCIENCES	
YEAR	MONTH		TIME ZONE		SHIP				CRUISE		PAGE	OF			
DAY	STATION IDENTIFICATION	DEPTH SOUNDING (m)	SHIP STOP/START TIME	LATITUDE/ LONGITUDE	STD CONSEC. #	STD TIME	HYDRO CONSEC. #	MESSENGER TIME	HYDRO SALINITY #	OXYGEN #	SURFACE TEMPERATURE/ SALINITY	LOOP SALINITY #	NOTES		
	RZA	2030 +		46°18.11 129°46.92	174	10147							Tow @ 1870m from RZ15 to RZ16		
02	RZ16	2065	1215 1307	46 18.97 129 46.06	175	1216							Short downcast to near bottom; upcast to sfc.		
02	RZ17	2080	1328 1437	46 19.97 129 46.00	176	1333							Downcast to 2078m		
02	RZ18	2055	1449	46 20.99 129 44.99	177	1454							Downcast to 2100m		
02	RZ19	2105	1612 1716	46 22.12 129 44.106	178	1614							Downcast to 2150 No Plume		
02	CFØ1	2099	1754 1853	46 18.046 129 48.992	179	1758									
02	CFØ2	2109 2116	1905	46 17.95 129 47.95	180	1908							downcast		
02	CFØ2			46 17.95 129 47.97	181	1945							upcast		
02	CFØ2	1112 6		46 18.02 129 48.26	182	1956							going down again - 1062m - problem with transducer		
02	CFØ2			46 18.03 129 48.32	183	20'05							going up again to check noise		
02	RZ15	2105	2058	46 17.883 129 46.840	185	2104	one number missing						redoing site with small		

July 2/93

530 - CF05 on stn. SLED being readied
bottom of cast @ 23:03 UTC 2098 metres
up & onboard @ 23:33 UTC

- CF06: Cast 187 started without CTD
probe on. Restarted on 188.
Cast to 2123 m. No evidence of plume.
Many brachiole colony sputniks drifting by.
Photographed a few sputniks - one had
several *schella* carapaces caught in it as
though it had been eating *schella*.

- CF07: CTD # 189 to 2055 m.
Much lower density of sputniks. Light rain.
Very clean featureless transmission trace.
CTD winch (329 #1307) spooling wire very
poorly, especially at drive gear end.

CF08 Slight signal at 1800 m
only on the down trace could
not repeat.

changed Bernoulli disk in E drive
First file # 93170192.CTD Stn CF09

CF09 Small signal %T at 1950 m
to 2050 m $\approx .2\%$

Also temperature rise of 20 mK

CF02 - back on deck at 09:04. no plume
File #193

#194 trash. Trying to make comment section
work.

DAILY LOG

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OCEAN PHYSICS														INSTITUTE OF OCEAN SCIENCES	
YEAR	93	MONTH	July	TIME ZONE	UTC	SHIP	Tully	CRUISE	9317	PAGE	OF				
DAY		STATION IDENTIFICATION	DEPTH SOUNDING (m)	SHIP STOP/START TIME	LATITUDE/ LONGITUDE	STD CONSEC. #	STD TIME	HYDRO CONSEC. #	MESSENGER TIME	HYDRO SALINITY #	OXYGEN #	SURFACE TEMPERATURE/ SALINITY	LOOP SALINITY #	NOTES	
July															
2	CF05	2100	2226 46 18.93 2335 129 45.98	180 2228	/	/	/	/	/	14.435 32.299	/	/	/	CTD 2098m NO FISH	
3	CF06	2119	0026 46 13.05 0143 129 56.06	188 0035										187 no good: probe off.	
3	CF07	2055	0158 46 14.02 0313 129 54.03	189 0201											
3	CF08	2195	0350 46 13.509 ↑ 129 46.346	190 0354										1800 noisy T% trace. See print out.	
3	CF08	2195	↓ 46 13.439 0535 129 46.979	191 0447										Small file to check T% at 1750 - 1850m	
3	CF09	2270	0610 46 19.514 129 41.899	192 0610					Plum sand depth as R215					New BERNOULLI DISK #2	
3	CF02	2160	0811 46 18.116 129 47.958	193 0811					max depth = 2100m then up - no transmission signal						
3	CF09	2340	9:42 46 19.5 129 41.89	195 0942											
3	CF09		46 19.45 129 42.01	196 1019	196	✓				1003 1005				UPCAST. Hb, Mn, Si, O ₂ Samples	
3	CF10	2410	1202 46 29.91 129 35.73	197 1206										Downcast.	
3	CF10		46 30.08 1400 129 35.18	198 1257	198	✓				1008 1052				UPCAST. Hb, Mn, Si, O ₂ Samples	
3	CF12	2425	1500 46 29.93 129 37.39	199 1500										No plume signal.	

June 3/93

CFØ9: Return to this site. Last shift did not take bottle (Helium / Manganese / Silicate) samples in plume. Plume was weak but it appears that the broad ~~var~~ ridge crest in this region is a source field. Can see plume signal down but not up.

File # 195

Transmissometer spiking slightly @ 1600m

Signal ~ 2000 m. ended @ 2200m - very slight

CFØ9 upcast - file # 196 from 2270m up.

Bottle #1 @ 2088 m on upcast - in small plume

Bottle #2 @ 2000m on upcast - in small plume

Bottle #3 @ 1895 above small plume.

Bottle #4 @ 1497 for background.

	1	Flask # —	@ 2088m NOT enough water
Oxygen	2	Flask # 1004	@ 2000 m
	3	Flask # 1003	@ 1895 m
	4	Flask # 1005	@ 1497 m

HELIUM (✓) Manganese (✓) Silicate (✓)
NO phosphates.

BOTTLE	2	T446	1.957 C	= 1.959
	4	T451	11.613 C	11.617

9/3/6/3 RDT

Stn. CF10 : CTD #197 to 2409 m.

Very definite bottom showing on sonar.

Spotty population of large sponges.

Major plume activity starting at 1780 m
(sharp upper boundary) and continuing
to bottom.

Upcast CTD #198.

Rosette samples #1, 2 @ 2197 m in ^{plume}
(91.120, 91.071)

#3 @ 2120 m ^{not}
^{plume}
(background).

#4 @ 1904 m ^{not}
^{plume}
(backgd 91.316)

SAMPLES

#1+2: He, Mn, Si, O₂ #1052

#3: Mn, Si, O₂ #1035

#4: Mn, Si, O₂ #1033

#5+6: He, Mn, Si, O₂ #1011

#7+8: He, Mn, Si, O₂ #1010

#9: Mn, Si, O₂ #1009

#10: Mn, Si, O₂ #1008

#5, #6 @ 1808 m in plume
(071 021)
- GREAT TEMP.
ANOMALY AT THIS PLUME -

#7, #8 @ 1799 m in plume
(021 071)

#9 @ 1755 m (not in ^{plume})
(-316 -365)

#10 @ 1700 m (not in ^{plume})
(-414, -465)

#2 T446 1.944 C = 1.946

#4 T451 1.975 C = 1.978

CF13 File # 200

2600 m depth

No plume signal Terminated cast
at 2400 due to the depth limitation of trans
pressure case.

Proceed to North End of Endeavour Ridge

Arrive @ 0041 July 4/93

In water - stop at 36 m File 93171001

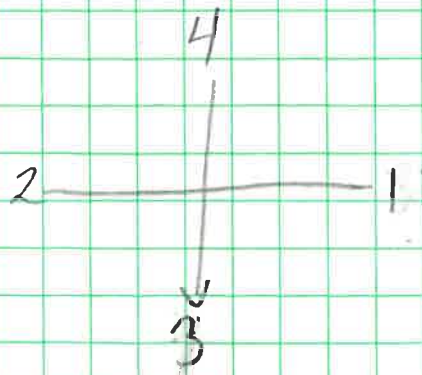
Time: 01:05 in water

48 02.513

129 02.869

George is fiddling with GPS integration

File 93171002 48 02.16 continuing
129 02.93



Total bin range
= 280 m

Surface scattering layer evident

38 min = 70

- 334 m 01:34 48 01.595 129 03.248
changed display scale 50-110

env # 48 9 32340 CTD

- Saw Surface SL

Depth = 480m CTD # 40188 end. 54
48 01.35 129 03.36
lots of transmissometer noise at 400m

Record Bat # if not 0

MD SL ~ 650m. from 560m
ends @ 660m

660m end 64 CTD 53940
48 01.095 129 03.42

** Intercalibrate transmissometers (this is new deep one)

730m end 71 CTD 62604 - below MD SL

can't be sure we're out

Multiply transmissometer $\times 1.3$ for true tension
770m still fairly high backscatter

818m still at MD SL max depth = 1200m
bottom of this definitely @ 965m

837m 48:00.63
129:03.73

MD SL declined ~ 700m

now in uniform water

920m end #91 CTD 89988

48:00.4 129:03.91

bottom depth
(unknown)

acoustic intensity @ 1240 increased slightly

1050m end #101 CTD = 102480

48°00.15

GPS 02:27

129°04.02

no features yet

1264m

end 114

CTD 120996

4759.79

heading 222

129 04.17 our inst = 173

no features yet.

1350m 47.59.68 129.04.27 @ 2:43
 ens 120 CTD# 1285604 no features yet
 1480m ens 126 CTD# 136452 transmissometer working well
 47.59.52 129.04.37
 no features on ADCP

1570m wire out = 2360m 47.59.42 129.04.46
 pitch went up to 20° nose down - slowed down

1645m - some transmissometer noise - gone by 1650m.

Depth	Wire out	Position	ENS#	CTD#	Comment
1695	2600	47 59.22 129 04.615	138	154140	still noise on trans. no acoustic feature

* Problem with bottom depth scal reading.

1752	2765	47 59.03 129 04.7	143	162390	no acoustic feature transmissometer still fluctuating
------	------	----------------------	-----	--------	---

1800	2900	transm. just way off axis - very large 47 59.86 129 04.82	Strong temp. change ens 149	some indication of SL @ 1980m 16km N	
------	------	--	--------------------------------	---	--

* No depth display
 no bottom vis on ADCP yet

1874m	3110	47 59.03 129 04.91	ens 157 CTD 179954	bottom visible @ 2160m depletion layer @ 2000m	
1940m	3250	47 59.52 129 05.00	ens 162 18852	Small SL visible in Beam 3 @	

down to 2000m - tow-yoing along axis valley

2000	3566m			depletion layer not evident absorption	Trans. signal losing intensity
1948m					

Station BB

2650 m

Con # 203

Changed transducer on rosette
to 1820 due to depth limitation of #254

Did not turn GPS on for down cast
Separate cast made for upcast and bottle O₂
Con # 204

Position

47 42 580
127 47 260

→ for 2550 bottle

Started GPS / File 205

Tag #1 2550 bottle.

Tag #2

Tag #3 2400

Please Note. The depth range for down
cast #203 was set for 2500 FSP.

It should be 3000 FSP for 58,483 probe.

I discovered my error when printer trace
did not match CTD depth scale on
computer screen. It was changed for
204 upcast.

DAILY LOG

OCEAN PHYSICS

INSTITUTE OF OCEAN SCIENCES

OCEAN PHYSICS														INSTITUTE OF OCEAN SCIENCES	
YEAR	MONTH		TIME ZONE		SHIP					CRUISE 9317		PAGE	OF		
DAY	STATION IDENTIFICATION	DEPTH SOUNDING (m)	SHIP STOP/START TIME	LATITUDE/ LONGITUDE	STD CONSEC. #	STD TIME	HYDRO CONSEC. #	MESSENGER TIME	HYDRO SALINITY #	OXYGEN #	SURFACE TEMPERATURE/ SALINITY	LOOP SALINITY #	NOTES		
03	CF13	2625	1615	46 32.459	200	1628							No plume		
			17.40	129 39.268											
04	ER #1	2160	1059	47 57.01	201	1100	201	✓	1052		5‰		CTD to 2400m see note		
			/	129 05.52					1064	2000 m	Endeavour Ridge				
04	#1	2160		47 56.98	202	1314	202	✓	1003			5‰		CTD #1 - deep CAST	
				129 05.53					1039	surf.	#				
05	BB	2659	0845	47 42.54	203	0956		No GPS FIXES TURNED ON						CTD 1 - Shallow cast.	
				127 47.317							204				1050
05	BB	2659		47 42.662	205	1055	206	✓	3033				CTD/ROSETTE See T		
				127 47.245	206	1223								3001 ✓	3012
05	BB	2659	1220	47 42.609	206	1223	206	✓					CTD/ROSETTE		
				127 47.100										207	1711
05	BB00	2690	1700	47 42.61	207	1711	207	✓	1008				CTD to 2635.		
			1805	127 46.91										208	2228
05	BB01	2693	2225	47 41.96	208	2228							CTD to 2697 m.		
			0009	127 47.94										209	0023
06	BB02	2600	0023	47 42.45	209	0023									
				127 47.85										210	2106
07	E93F	2333	2100	48 00.043	210	2106									
				126 29.93										211	2152
07	E93F	2350		48 00.014	211	2152	211	✓	1064				Temp bottle #2 1.903		
				126 29.966										212	2309
07	E93F	2350	2309	48 00.138	212	2309	212	✓	1039						
				126 30.326											

Depth	Wireout	Position	En S#	CTb#	Comment
1852	322	47 58.18	174	202800	Still some plume signal
1800					transmission signal just jinged back down 1770m - back to normal.
1772	3050	47 57.99 129 05.3	182	213840	
1700	3023	going along	184	216096	flying along here
1688 m		flying along level			plume signal again transmission. all over map
1677	3023	47 57.68 129 05.44	no 193	230000	still some transmission noise - plume?
1665 m		Leading up again in search of SL's & transmission heat			
1592		47 57.45 129 05.58	end 201	217800	trans. still noisy
1536	2870	47 57.33 129 05.59	no 205	246760	trans still silly, going back down again
1536			en 211		dragging upper scale to 90 from 50 back to 70-120
			ens 213		
1711 m			ens 216		Scale redone to 60-120
1830 m	3450	47 56.77 129 06.00	no 223	273144	going down a bit then stopping
1872	3534	* stopped going out & drilling DSL finally evident at 1980 m up to ~1930 especially beam 2			

slowing ship speed to one
down

toing along, going down
slowly

up, then down

no more SL sign

going to depletion layer
than will trip nets

ens 265

heading

transmission delay

05.15

back up to 1900 m

went back to
2016

one false trigger

29, 355628⁰⁰
[1900 to 1700 m]

Time $\sim 05:27$

$t_{\text{ave}} = 05.143$

58000 and 309

train pulled out at
~ 1900 in on way up

Seems to have been a SD
@ 1850-1900m

Depth	Wire				
1583	2490 m	4754.97 129 07.02	end 36	967692	Transducer on background
1480 m		4754.82 129 07.13	end 321		looks like another feature at 1500 m - not really! transducer stable
1351	2156	4754.63 129 07.317	06:05 CTD end 331	90840	

NET 6 [1200 to 800 m]

1200	1930 wire out	4754.40 129 07.431	06:14	341	UP to Bottle 8 on tag
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1098	1783	4754.209 129 07.569	06:22	350	
------	------	------------------------	-------	-----	--

891	1470	4753.86 129 07.74	6:35	364	
-----	------	----------------------	------	-----	--

Net 7

808	~1420	4753.814 129 07.81	6:38	365	beginning to see MDSL
-----	-------	-----------------------	------	-----	-----------------------

SYSTEM CRASHED AROUND 600 m
CTD ERROR !!

Data error light on at CTD deck unit. But power to CTD was about normal. System stopped by pressing Reset on Deck unit.

on deck?

200-1000

93-07-04

Rosette cast @ Stn #1.

deep cast to 2145 m.
1000-2145

O₂, Nut (#5 @ 2000 m) 34.609
deep bottle, (2145) valve open
#6 leaked, No nut. - MT.

(2) T°C 2000 m # T446 1.888 = 1.890

(4) T°C 1900 m # T451 1.945 = 1.948

Shallow cast 0-1000 - O₂, Nut #5 @
at surface 32.304

(2) T°C # T446 3.707 = 3.709

(4) T°C # T451 5.898 5.901

~~E92A + E92B mixed up in Showson still Gauge~~

93-07-04 - 1000 hrs

CTD Ser# 41226 (THE ONE ASSOCIATED WITH SLUID)
REPAIRED AT 1000

WATER WAS FOUND WITHIN THE PRESSURE CASING.

THE SOURCE OF THE LEAK WAS NOT FOUND BUT UPON
THOROUGH DRYING THE UNIT RESUMED NORMAL OPERATION.

- A SMALL FLECK A SOLIDZ WAS ALSO CAUSING A SHORT
AND REMOVED

1045 PDT: Steam to start of Tow #2.

Duplicate samples run for Tow 1, North-to-south
along ER Tow line starting near $48^{\circ}02'N$.
John Love found problem with CTD, self coated problem
with small piece of solder across two pins.

Tow #2 E93B File 93171004 on CTD

2 breaks in CTD power - 48 02.477 18:30:30
129 02.75

ADCP range 60-120

60 18:38:52 end 42 48 02.28 CTD 18000 updating way 56 sec.
129 03.02

190 wire 48 02.11 end 49 CTD 21900 SL @ 380 m
129 03.08

345 48 01.94 end 56 CTD
129 03.17

Ship speed 1.9 kts 224° @ 1918 GMT
Wind 17 kts @ 28.7° (From west)

450 48 01.865 60 CTD 366700
129 03.250

502 680 48 01.81
129 03.32 63

620 m

S

scattering layer comes
9000s
coming out of SL

* Sonlighty all night long, use CTD data from Post last night

777	1036	48 01.55 129 03.488	ens 75		no SL at present
844	1200	48 01.28 129 03.58	ens 82	1.1 km @ 1900	no SL no transmissometer Signal
909	1412	48 01.03 129 03.615	@ 19.24 ens 91		no SL - clear water no acoustics & transmissometer
1058	1776	48 00.65 129 03.75	ens 101 time: 19:25	2.2 km @ 179°	Some indication of ↑ intensity @ 1200 m no real activity

WS 14 km
from 100°

No Heading variation on ADCP
- changed Stoupout configuration - pitch is better

1152m we stopped way or ship

1207	1970	48 00.34 129 03.882	ens 112 time	2.5 km @ 203°	No activity
1339	2121	48 00.24 129 03.96	ens 118		no activity small SL's in 1300 - 1700 m range
1522	2344	48 00.03 129	ens 127	1.8 km @ 203°	No SL
1708	2565	47 59.77 129 01.7	ens 137 20.09	wind from W @ 15 km	no SL or change in transmissometer

B22 2740 47.59.62 end 115
129.04.35 20:16

SL showing ~1950m
- very faint yet - seems
to be a SL just above
bottom

1941 2900 47.59.42 20:23
129.04.42 end 153

bottom @ 2200m
no plane @ 1900m

1960m - slight plane
slight signal/stutter
on transmitter

2000m still some slight plane, not much

2038 3046 47.59.314 end 159 to 20:29
129.04.483

bottom & 100m below
~ 2158

Sped up ship at 2045 we went up slowly again
still fairly far north of plane

W. W. H. stopped / speed up ship to 2.0 knots

1958 3066 47.58.99 end 173
129 to 20:42

no SL evident

Chief Sci word of the day Fannification

1870 3066 47.58.78 / 129.04.181 2049

at 1970m - can see scattering layer coming
into view

Pitch is around 12.7°

1920 -
SL still there @ 1960m
no real transmiss signal
at 1800

1715m 3066 47.58.24 21.04.50 end 198
129.05.113

still bearing up & heading
south - well off axis
SL still visible at 1900m

1640 @ 2116 Start down again.
Ship over vent site 210

1808 3380 47.57.60 2125 219
129.05.50

still seeing heavy
scattering at 50 to 100
m below us - to 2000
A GROSS by B13

1878m 3534 slowed ship
4757.391 ens 226
12905.55 time 21.31

going down slowly.
Scattering at 2000m

1976 3534 4757.230 EN 235
12905.544

2012 3472 - 57.131 EN 241
05.485

Fast up on winch. Too
much wire tension

1990 4756.993 ens 251
129.05.514 21:54

Stronger plane signal
vented off - like - freighter
going slowly down again
plane signal still present
strong plane signal

1998 down to 2000, coming up again

Going down preparatory to sampling to 2036
ens. 12613

2036 Net 2 4756.71
12905.78

ens 264
22:06:40

coming up

plane
signal

* Strong plane signal
Some scattering near bottom
~ 2150m
coming out of plane @ 2015m
going back down to 2036
then up again

2000 Net 3 4756.49 ens 279 time
12906.05

up to Bottle 5 on CTD 22:20

small plane signal

Net 4 4756.19 ens 282 time 22:32
12906.32

still some plane signal at
1920m

coming up - still slight
plane signal

1900 wire 3050

1850m

out of plane - coming up
~ 1+ miles W of vent field
some minor scattering layers - high pitch

NO GPS in SCUD Files:

1700

ens.

still sporadic plume
noise at 1826 m

1802

2990

—

4755.773

end 309

NO GPS ON SCUD
GOND !!

12906.556

Pitch up to 19.8° !! Staying high

#5L showing up at
1775 m
especially 344

widet from 1775 up to
- also definitely not
plume now
- really strong scattering
still at 1751, 1721,
1720 - starting to come out
of it.
still some at 1708

will go up until we're
out of the DSL

1675. NET5

4755.223

end 329

Time

- false trigger
- out of beam

12906.983

23.08

up to 1200

1639

still a lot of scattering in water column
- readjust handle a notch

- pitch high + positive

1613 m

still higher than background acoustic intensity

at 1571

beam 4 still showing fairly high intensity.

1527

2772

4754.68

time: 23:27

ens. 348

pitch still high

12907.34

1488

2729

4754.507

end 352

back to fairly uniform
intensity levels.

12907.430

1471

2574

4754.15

Time 23:47

end 368

coming up very slowly

12907.30

1365m 2135 47 53.784 382 @ 23:59 UNIFORM Acoustic
129 07.098 INTENSITY LAYER

NOTE: 2283m - ONE DAMAGED STRAND OF WIRE
ON OTD wire (LCS S.)

1400 1924 47 53.090 423
129 07.182

1286 1765 47 52.834 ens# @ 00:
129 08.866 436
Wind 17 knots @ 93.65

NET 6

1200 1711 47 52.671 @ 00:55 EN# 441
129 06.816 5 July

854 1482m 47 52.060 0113 ENS# 463
129 06.571

depth NET 7
800m 1439m 47 51.923 En# time
129 06.496 465 @ 01:17:00

233 456m 47 50.391 513 @ 02:01 GMT
129 05.882

Seas getting rough
pronounced SLITS
400m to surface.

Surface 47 ens# @
129

First 30m of cable shows sign of outer armor
being unlaidd. Considerable twist removed from first
60m of cable. Looked at 2 "unlaying" kinks - no damage
visible.

93/7/5 PDT

WINDS 25-30 kts
NW

0930

- repaired ground fault in Rawl's center.
- Daren, remounted transducer which was on rosette (1820) on rosette.
- changed config. to 58403182.

1000

- an. BB00
- CTD # 207 to 2635 m.
- wind 24 kts N
- 1541 m tension 1.7 @ 94° → 1240 lb.
- bungee goes onto safety line ~ 2500 lb.
- background T₉₀: 90.641
90.591
90.542

At 2545 a few 90.492 flicks

At 2620 a patch of steady 90.492

At 2630 some 89, 88's.

- Rosette #1 @ 2630 in feature.
- #2 @ 2635 in feature.
- #3 @ 2620 out of feature.
- #4 @ 2611 out of feature.

- samples down: He from 2630,
Mn, Si #3, O₂ from all 4.

- temps: #2, 2635 m, T446, 1.748 c = 1.750
- #4, 2611 m, T451, 1.754 c = 1.757

1250

- just before arrival at BB01, found LSR on sounder system not working (stylus belt not moving). 30V at motor. Pulled motor - one brush wire broken. No spares on board (looked through silver spares box). Filled down a large brush from electrical ship's spares, refilled brush end.

1500

- sounder LSR working.

93/7/5 pot

- 1515 - Au BBO1 - 24 kt NNW, fairly big sea.
- CTD #208 to 2697 m.
 - during cast central (blue-ended) buoy has gone slack compared to the 2 red ended ones.
 - a bit of transmissometer stuff from 2550 - 2580 m.
 - 2635 on to bottom: transmissometer stuff.
 - no ROSETTES.
- 1709 - LA BBO1.

STATION BBO2 @ 0017 UTC
NW winds 25 knots / large seas

CTD #209 file 93170209 @ 4742.47 @ 0025.56
12747.898

@ Baby Bare

going down to 2693 m plane starts 2450

recording down & up CTD file

on deck 47.42.835 @ 02:00.34
127.48.812

VERY BAD Kink in wire near termination.
wire splayed - needs to be cut and
reterminated.

Cut 107m off end of wire / heavily damaged
and weakened wire.

[Seas - 10m waves + 25 knot wind from 320°]

John Love - ReDO Termination (02:25
July 6 1993 UTC) cut off 32m
then found more kinks, cut off 75m for a total
of 107m

1000 m CAST

10, 30, 50, 75, 100, 150, 200, 500, 800, 1000

500 m CAST

0, 10, 30, 50, 75, 100, 150, 200, 300, 500

93/7/5 pdt.

2050 : SC ADCP 462 $V_1 = 8.21$ Connected
 $V_2 = 36.07$ Connected
(George's alkaline packs).

2230 : ADCP has been converted back to one piece.

Barbas 12 kHz stainless pinger
27 kHz 1/2 watt 2yr pinger
Gullone 8785 SN 41,226
Underwater junction box
Transducer Seatech 182D
RPT SC ADCP SN 462, #3 FLD.

2355 - Above all mounted on JTHASE mounting rod with

July 6 (AM).

Wind 30 knots⁺ @ 320°T all night. Same forecast as July 5.

Change ADCP Set-up — To 128 cells from 70
2 m bins from 4m

tau = 20 seconds (from 30s)
and 10 pings/avg. (from 15)

July 6 CONT'D

E93C @ Baby Base

47 42.5 127 47.255 time 16:22

ens. 60 File 93/7/1005

ensemble ping every 23 sec
10 pings/ensemble, 12 m bins

range 60-120 m on colour palette

step SSL declining @ 100 m - can see other SL's
appearing at 150 m

Transmissometer shifted due to misalignment
down to 43% @ 1200 m
Trans # 1820 down to ~44%

Conductivity is stepping again

400 m @ 16:44 47.42.556 ens 114 CTD 31900
127:47.25 scattering layers still
thick

transmissometer still down at 44%

600 m' ens 139 coming out of MDSL

700 m - out of MDSL

809 m - background acoustic intensity

1056 m ens 187 @ 17:13 - still no scattering

1245 m @ 1200 m of wind

Bottom depth = 2671 m 27 km from NW

1609 m no scattering layers.

CRN

93 17

DAILY LOG

INSTITUTE OF OCEAN SCIENCES
OCEAN PHYSICS

DATE JUNE 18-JULY 8, 1993

VESSEL J. P. TULLY

PROJECT LA PEROUSE/VENTS

BOOK 3

LEG 3
Physics 2 of 2

CAST E93 C CONTINUED

1722 UTC Pitch / Roll remain constant.
Probe going straight down.

Uniform scattering layer below probe at 1800 m depth.

BS intensity continues to decrease with depth.
1724. View low BS intensity relative to ER.
Wind Speed 32 knots / 320°T.

1731 Bottom in sight at 2600 m
and 242 down to 2596 m - no plane signal
leading back up - no DSL
Approximately 20 m. A.B. at end of cast.

Logarithmic decline from MOSL to bottom in acoustic intensity - like previous deep - see studies of biomass

1056 m coming up - no features - transmissometer is garbage

670 m no real sign of MOSL

550 m - SL now evident coming up

on deck 18:27 @ 47.43.05
127.047.55

NONE OF
THE TRANSMIS-
SION DATA DURING
THIS CAST IS
OF ANY USE.
FOUND LOOSE
CONNECTION ON
CTD BOARD

STATION Mamma Bare @ 2000 UTC July 4
Transmissometer wet-lane circuit to the CTD
failed on last cast. Remove CTD; service Transmissometer
circuit. 4750.326 / 127 43.940

FIXED CTD-TRANS system

EQ2D

Mama Bar

4750.25 12743.869

@ 21:21

Bottom depth 2505m

Clor scale 50-120 this time

File 93171006

SSL, then depletion below

MDSL appearing @ 500m - actually at ~ 330m

517m another SL starting to appear
conductivity still bad

Heading varying considerably due to wave
tossing. Still blowing 30 knots / sunny.

736m coming out of MDSL no other features

907 - out of SL's - in low intensity "background" scatter

1190 and 155 there is a marginal increase in BS intensity
+250 in water column. - or else a depletion above
it - right below MDSL

1397 - still some BS activity - no changes in water properties

1547 no change.

1865 - No features

2000m - some $\uparrow$ in background intensity

2200 - Backscatter increasing - bottom showing at 2500m
near bottom on 1, 3, 4

- no transducer change
went down to 2480m (10m abt) & headed up again
Some really clear signal near-bottom in way up
bbl aggregation?

1750

small drop in σ_t

Scattering layer near 1750 m depth
coincides with transmission decrease —
very small.

still some sign of it @ 1300 m

- generally more animals on way up than on way down

- 1700 m layer also slightly visible on downcast

750 m - start of MDS - really getting dense at 600 m
on deck 00:02

47.50.24

127.44.601

E92E Papa Bird 47°51.41 @ 1:17

- system crashed 27°37.19 #93171008

Scale 50-120 again

slight depletion layer below surface S.L.

93171007 - Garbage File.

MDS $\Delta 30^+$ m

- more distinct separation between surface & MDSL
than the daytime tow

Bottom depth 2489 m

800 m out of MDSL

2383m (10-12 mab) heading up - end 229

@ 900 m 0325 UTC
4751.467 / 127 37.854

UPCAST

Note: There is higher intensity on higher bins (end bins) on up-cast versus downcast. Not true to of middle and near bins.

ONBOARD at 0845 UTC.

4751.716 / 127 38.257

Steer toward E 93 F 4800.0
for 0800 PDS Start 12700.0

E 92 F - off continental shelf slope Depth 2334 m
4759.934 time 17:35
12629.801

Less scattering on surface - more down deep (day side)

Considerable TRANS structure in upper zone near 200 m and extending to 350 m depth
Uniform structure in % starts near 390 m.

673 m - coming out of MDSL - ~850 m into low intensity
- small depletion below MDSL

1269 m - no features

2280 - bottom - no scattering layers

DAILY LOG

OCEAN PHYSICS

INSTITUTE OF OCEAN SCIENCES

YEAR 93

MONTH 07

TIME ZONE

SHIP

CRUISE 9317

PAGE OF

[illegible]

@ 000 m 0325 UTC
4751.467 / 127 37854

UPCAST

Note: There is higher intensity on higher
bins (end bins) on up-cast versus downcast.
Not true to of middle and rear bins.

ONBOARD at 0845 UTC.

4751.716 / 127 38257

Steer toward E 93° 48 00.0
for 0800 PDS Start
127 00.0

E 92° - off continental shelf slope Depth 2334 m
47° 59.934 time 17:35
126° 29.801

Less scattering on surface - more down deep (day side)

Considerable TRANS structure in upper zone near
200 m and extending to 350 m depth
Uniform structure in % starts near 390 m.

673 m coming out of MDSL - ~850 m into low
intensity
- small depletion below MDSL

1269 m - no features

2280 - bottom - no scattering layers

DAILY LOG

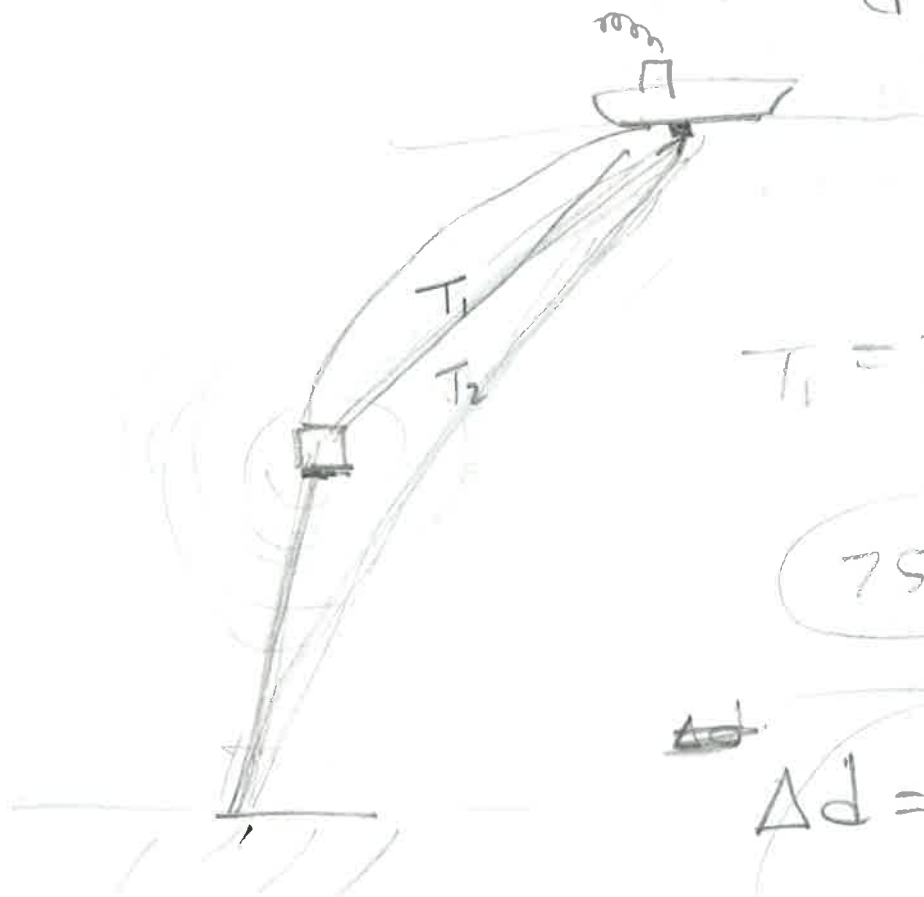
OCEAN PHYSICS

INSTITUTE OF OCEAN SCIENCES

[illegible]

149 cm/s

$$d = c \tau$$



$$T_1 = T_2 !$$

750 m

~~Ad~~

$$\Delta d = c \Delta t$$

2260m - transverse $\downarrow$ - 75mab

turbulent bbl - different from offshore
- definite layer

- no scattering layers on way up

1175m - some $\uparrow$ BS intensity on all beams

1000m - coming back out of it
- saw some of this 500m way down as well

MDSL $\approx$ 600m - peak @ 382m - out @ 230m

Big transmissometer jump @ 220m

On deck @

48.00.755 @ 19:48
126.30.067

Helium samples, Mn samples

CF 9 - Rift Zone

Depth

- * 2088 - He, Si, Mn
- * 2000 - He, Si, Mn
- * 1895 - He, Si, Mn
- * 1497 - He, Si, Mn

CF 10 - Rift Zone

- * 2197 - He, Mn, Si, O₂
- 2120 - Mn, Si, O₂
- 1904 - Mn, Si, O₂
- * 1808 - He, Mn, Si, O₂
- * 1799 - He, Mn, Si, O₂
- 1755 - Mn, Si, O₂
- 1700 - Mn, Si, O₂

BB 11 - Cascadia Basin

- * 2630 - He, Si, O₂
- 2635 - Mn, Si, O₂
- 2620 - Mn, Si, O₂
- 2611 - Mn, Si, O₂

E93 F - base of continental shelf

0 - O ₂	300 - O ₂ , Si
10 - "	500 - " , Si
20 - "	600 - " , Si
30 - "	800 - " , Si
50 - "	1000 - " , Si
75 - "	1150 - " , Si
100 - "	1500 - " , Si
200 - "	2000 - " , Si
250 - "	2200 - " , Si

CALL FROM 054
RECEIVING MESSAGE
TERMINATION
MESSAGE RECEIVED

MESSAGE TEXT:

JP TULLY
ATTN: RICK THOMSON
FROM: JOHN GARRETT
STEVE HAMMOND THINKS WE SHOULD HOLD OFF ON PUBLICITY UNTIL THE STORY IS MORE
COMPLETE. ALSO NEEDS SOME TIME TO PREPARE NAVY, WHO OWN THE HYDROPHONES.
SO RELAX ONE LESS THING TO WORRY ABOUT. CHEERS
XMH59 1530 06JULY93

REC MODE

Proceed to Esquimaux.

Arrive CRD stations

CRD2 — @ 0600 AM PNT. Clear Sunny day. Calm seas.

in area Depth varying 60-65m Many fish boats

CRD3