

WHP Cruise Summary Information

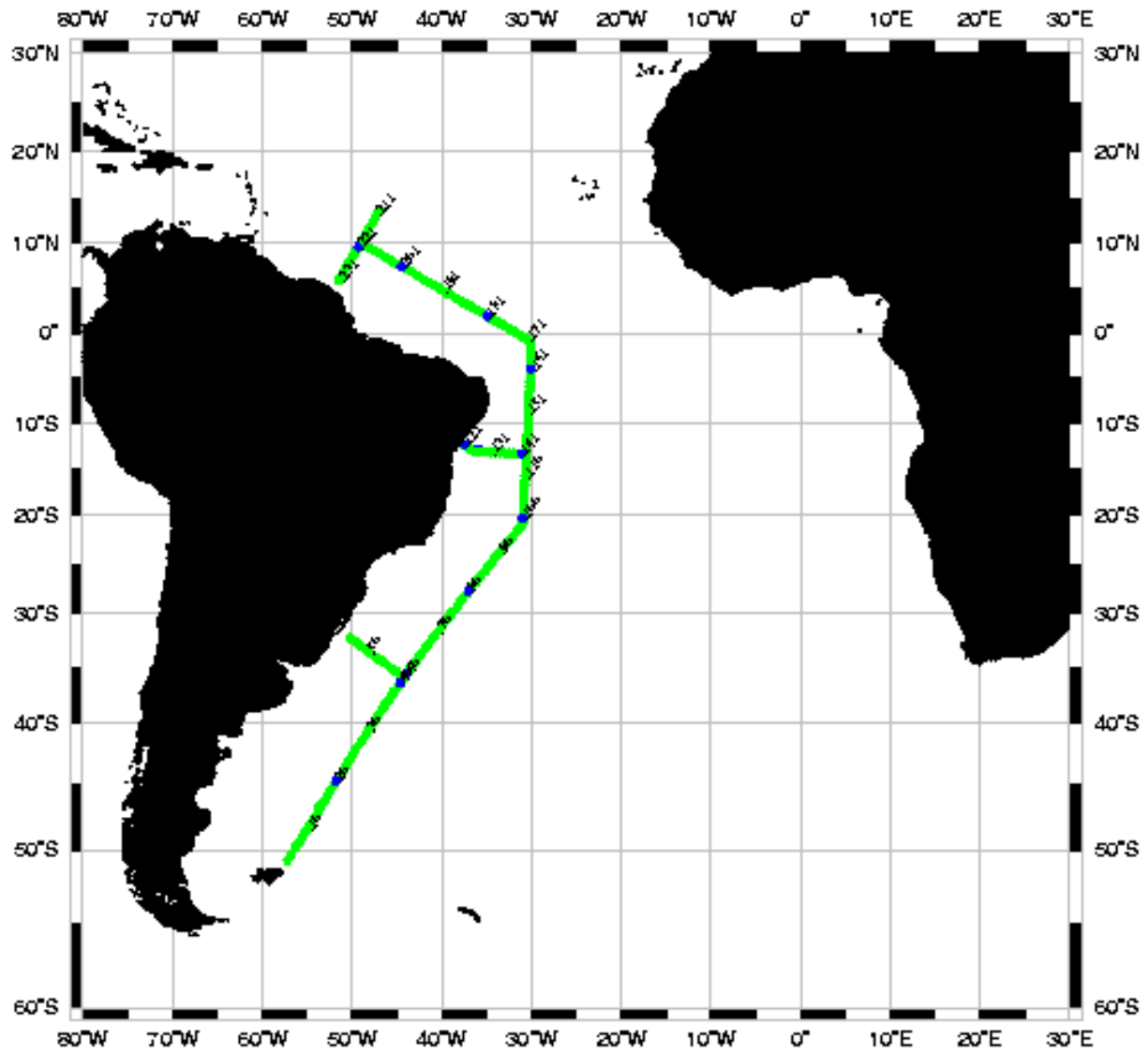
WOCE section designation	A17
Expedition designation (EXPOCODE)	3230CITHER2_1-2
Chief Scientist(s) and their affiliation	Laurent Mémery, LODYC
Dates	1994.01.04 – 1994.02.13 1994.02.17 – 1994.03.21
Ship	M. EWING
Ports of call	Montevideo, Uruguay to Falklands Islands to Salvador de Bahia, Brazil to Cayenne to Fort de France
Number of stations	117 (leg 1), 118 (leg 2)
Geographic boundaries of the stations	13°39.74''N 57°13.62''W 29°59.98''W 50°42.31''S
Floats and drifters deployed	none
Moorings deployed or recovered	none
Contributing Authors	none listed

WHP Cruise and Data Information

Instructions: Click on items below to locate primary reference(s) or use navigation tools above.

Cruise Summary Information	
Description of scientific program	
Cruise track (figure)	
Description of stations	
Description of parameters sampled	
Principal Investigators for all measurements	
Cruise Participants	
	Acknowledgments
	DQE Reports
	S/O ₂ /nutrients

Station locations for A17



(Produced from .SUM files by WHPO)

WFP Ref. No.: A17
Updated: 19 November 1996

CRUISE REPORT

A17 section (CITHER 2: Circulation THERmohaline)

Ship: Maurice Ewing

Chief Scientist: Laurent Mémery
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Leg 1

Ports: Montevideo (Uruguay) - Falklands Islands - Salvador de Bahia (Brazil)
Date: Jan. 4 - Feb. 13, 1994
117 small volume stations (no large volume)
Chief scientist: Laurent Mémery
CTDO2: Michel Arhan (LPO/Brest/France)
ADCP: Michel Arhan (LPO/Brest/France)
Nutrients, pH, alkalinity, phytoplankton, DOC: Aida Rios (IIM/Vigo/Spain)
Total carbon: Linda Bingler (MSL, Sequim, WA, USA)
CFCs: Laurent Mémery (LODYC/Paris, France)
Tritium - Helium: Philippe Jean Baptiste (LMCE/Gif/France)

Leg 2

Ports: Salvador de Bahia - Cayenne - Fort de France
Date: Feb. 17- Mar. 21, 1994
118 small volume stations (no large volume)
Chief Scientist: Laurent Mémery
CTDO2: Herlé Mercier (LPO/Brest/France)
ADCP: Herlé Mercier (LPO/Brest/France)
Nutrients, pH, alkalinity, phytoplankton, DOC: Aida Rios (IIM/Vigo/Spain)
Total carbon: Linda Bingler (MSL, Sequim, WA, USA)
CFCs: Laurent Mémery (LODYC/Paris, France)
Tritium - Helium: Philippe Jean Baptiste (LMCE/Gif/France)

CITHER 2 (A17) is part of the French component of WOCE focused on the South Atlantic Ocean (CITHER 1: WHP A6 - A7 in 1993 and CITHER 3: WHP A13 - A14 in 1995). The track has been elaborated taking into account several basic principles:

- optimal description of all the water masses and of their meridional evolution between 50°S and 10°N.
- definition of the western boundary conditions of the South Atlantic Ocean.
- resolution of the western boundary currents and definition of closed "boxes" in order to be able to use conservation constraints
- horizontal (30nm) and vertical (32 bottles) coverage in agreement with the WOCE recommendations, with increased horizontal resolution (down to several nm) on the western boundary sections.

During the cruise, 235 hydrographic stations with complete CTDO₂ profiles using a rosette of 32 bottles (8 liters) have been performed. Measurements of salinity, oxygen, nutrients, pH and CFCs have been made at every station. Alkalinity and total dissolved inorganic carbon have been measured one every third station along the main section, and one every other station for the 4 western boundary sections. At every station, at the surface, alkalinity has been measured, and a sample for phytoplankton measurements has been taken. The data set has been completed by 10 stations sampled in dissolved organic carbon (DOC) on the main section from the Falkland Islands to 10°N. Finally, 30 stations have been sampled in Tritium, with 20 stations in Helium 3 as well, with a strong emphasis on the western boundaries. Moreover, deep SF₆ samples on 7 stations have been taken in the Brazil Basin and sent to Woods Hole. These samples will give the background level of SF₆ before a tracer release experiment is done in the framework of Deep Basin Experiment. During most of the cruise, the Hydrosweep central beam has been used to get the bottom depth, and direct current profiles have been obtained with the ADCP. Figures 1a and 1b show the track of the two legs of the cruise and tables 1a, 1b the position of the stations (see text for more explanations).

First leg (fig. 1a).

- Jan. 4: departure from Montevideo (point A) towards East South East to get 50 liters of nutrient free surface waters needed for nutrient measurements, before going South (where there is no such nutrient free waters).
- Jan. 5: direction Argentina basin towards bottom depths larger than 6000m to test and wind the wire. Two test-stations in between.
- Jan. 8: direction Falklands Islands for the beginning of the main section.
- Jan. 10: beginning of the main South - North section by a "western" boundary sub section between the Falklands plateau (point B) and the abyssal plain of the Argentina basin. Closed station (down to 5nm) according to the topography.
- Jan. 12: end the Falklands western boundary section and beginning of the "regular" section (spacing between stations = 30nm).
- Jan. 14 -15: strong depression arriving during station 23. Work stopped during a day.
- Jan. 21: after station 41 (point C), direction towards Brazil (North - West: point D).
- Jan. 23: beginning of the Porto Alegre western boundary section towards East, with closed stations according to the bathymetry (line D-C).
- Jan. 26: end of the western boundary section (station 59) and new very strong depression. After major problems with the wire and the rosette, nothing done during almost two days.

- Jan. 31: station 72 at the Vema channel, between the Argentina basin and the Brazil basin. Because of the delay due to the two depressions, spacing between stations not decreased and kept at 30nm.
- Feb. 5 - 6: several "closed" stations (20nm) near the Martin Vaz islands (very variable topography: point E).
- Feb. 10: station 115 (point F), last point before transit to Salvador de Bahia. Test stations 116 (at 3000m for CFCs blanks) and 117 at the same position.
- Feb. 13: arrival at Salvador de Bahia (point G). End of the first leg.

Second leg (fig. 1b).

- Feb. 17: departure from Salvador de Bahia (after 4 days of Carnival!) and beginning of the Salvador western boundary section, with very closed stations (line H-I).
- Feb. 21: after many problems with the rosette, end of the western boundary section two days late on the schedule (point F). Because of the problems, decision to stop in Recife (point I) to pick up a colleague coming from France.
- Feb. 24: last station (149) before transit to Recife.
- Feb. 26: back to station 150 to continue the main North South section.
- Feb. 28: at sta. 153, the first 500m of the wire are cut, because of a bad reception of the CTD signal, which is getting worst and worst. After that operation, no more problems until the end of the cruise.
- March 14: end of the main North - South section at station 210 (point K).
- March 15: beginning of the last section between the Mid Atlantic Ridge and Cayenne (line L-K-M-N).
- March 20: last station in front of Cayenne (station 235: point N).
- March 21: end of the CITHER 2 cruise; beginning of the transit towards Fort de France (Martinique).

Acknowledgments

Despite some problems encountered during that cruise (weather, wire, ...), CITHER 2 has been a total success. All the objectives of the program have been reached in terms of spatial coverage, types of measurements and data quality. Obviously, those results should have not been obtained without the very efficient help and the availability of every member of the crew. The work has always been done in a very constructive and nice atmosphere. Moreover, some work on the ship was needed before the beginning of the cruise (concerning the CTD lab or the electrical alimentation). Everything was done when we arrived at Montevideo, and without those modifications, the cruise would have been much more difficult: we thank the technical team who has done that very useful work. During the first leg, the role of the captain Ian Young and of the first mate Louis Mello were crucial. Moreover, the science officer Bruce Francis (and his team) must be more specifically thanked. He has made a fantastic job during the whole cruise: with kindness and efficiency, he has always been present to help us as soon as we were facing a problem. Finally, that program could not have been possible without Michael Rawson, who has received us when the "Maurice Ewing" was in Florida

to understand our needs and make the modifications needed on the ship, and who has been obliged to deal with extremely difficult administrative problems.

CITHER 2 CRUISE SCIENTISTS

First and Second Leg

NAME	FUNCTION	AFFILIATION
J. ALVAREZ SALGADO	Nutrients	IIM, Vigo, Spain
L. ARLEN	TCO ₂	NOAA/NMFS, Highlands, NJ, USA
L. BINGLER	TCO ₂	Battelle, Sequim, Wash., USA
S. CHIHAOUI	CFCs	LODYC, Paris, France
A. FERNANDEZ RIOS	Alk, pH	IIM, Vigo, Spain
J. A. FONTAINHA	Brazilian Obs.	Rio, Brazil
C. GONZALES	Nutrients	IIM, Vigo, Spain
J. P. GOUILLOU	CTD	LPO, Brest, France
L. MÉMERY	Ch. Sci., CFCs	LODYC, Paris, France
M. J. MESSIAS	CFCs	LODYC, Paris, France
G. ROSON PORTO	Alk, pH	IIM, Vigo, Spain

First Leg

M. ARHAN	CTD	LPO, Brest, France
J. BALLE	CTD	LODYC, Paris, France
P. BRANELLEC	S, O ₂	LPO, Brest, France
P. CHANTRY	CTD	LODYC, Paris, France
E. CHARTIER	O ₂	LPO, Brest, France
N. DANIAULT	CTD	LPO, Brest, France
J. C. DUTAY	Tritium, S	LMCE, Gif/Yvette, France
M. FICHAUT	CTD	IFREMER, Brest, France
C. HEMON	CTD	LPO, Brest, France
P. LE BOT	S	LPO, Brest, France
H. LOUKOS	CTD	LODYC, Paris, France
G. MADEC	CTD	LODYC, Paris, France

Second Leg

A. BILLANT	S, O ₂	LPO, Brest, France
E. BRAGA	O ₂	USP, São Paulo, Brazil
S. DELEVILLE	CTD	LODYC, Paris, France
J. P. GIRARDOT	CTD	LPO, Brest, France
Y. GOURIOU	CTD	ORSTOM, Brest, France
A. LAZAR	CTD	LODYC, Paris, France
C. LEVY	CTD	LODYC, Paris, France
M. LEVY	CTD, CFCs	LODYC, Paris, France
O. MARTI	Tritium, S	LMCE, Gif/Yvette, France
G. MAUDIRE	CTD	IFREMER, Brest, France
H. MERCIER	CTD	LPO, Brest, France
O. PEDEN	CTD	LPO, Brest, France
J. PEDREIRA	S	LPO, Brest, France

Table 1a:
CITHER II – Leg 1 ALL STATIONS

Stat. No.	Date	Time (GMT)	Latitude	Longitude	Depth	No. of bottles
001	08/01/1994	19:58:08	S 46 49	W 053 42	6041	32
002	09/01/1994	16:16:50	S 49 35	W 056 10	0702	32
003	10/01/1994	00:43:42	S 50 42	W 057 13	0235	32
004	10/01/1994	04:38:40	S 50 17	W 056 47	0449	32
005	10/01/1994	08:58:16	S 49 51	W 056 21	0589	12
006	10/01/1994	13:06:53	S 49 26	W 055 56	0770	32
007	10/01/1994	17:19:19	S 49 01	W 055 31	1082	16
008	10/01/1994	21:00:51	S 48 40	W 055 11	1737	18
009	11/01/1994	00:19:29	S 48 30	W 055 02	2883	24
010	11/01/1994	05:01:44	S 48 27	W 054 58	4205	29
011	11/01/1994	11:14:15	S 48 15	W 054 47	5007	31
012	11/01/1994	17:16:49	S 48 06	W 054 38	5575	32
013	12/01/1994	00:04:31	S 47 41	W 054 14	5817	32
014	12/01/1994	07:24:25	S 47 16	W 053 52	6014	32
015	12/01/1994	14:14:51	S 46 51	W 053 32	6068	32
016	12/01/1994	21:34:31	S 46 25	W 053 09	6088	32
017	13/01/1994	04:41:45	S 46 00	W 052 48	6072	32
018	13/01/1994	12:03:56	S 45 35	W 052 27	6031	32
019	13/01/1994	19:39:26	S 45 10	W 052 05	6012	32
020	14/01/1994	03:11:31	S 44 46	W 051 45	5889	32
021	14/01/1994	11:24:06	S 44 20	W 051 21	5752	32
022	14/01/1994	19:08:38	S 43 55	W 051 00	5568	32
023	15/01/1994	23:08:13	S 43 29	W 050 39	5397	32
024	16/01/1994	07:35:05	S 43 05	W 050 18	5525	32
025	16/01/1994	14:07:34	S 42 40	W 049 57	5683	32
026	16/01/1994	20:58:05	S 42 16	W 049 35	5809	32
027	17/01/1994	04:05:00	S 41 50	W 049 14	5749	32
028	17/01/1994	11:07:40	S 41 25	W 048 53	5574	32
029	17/01/1994	18:15:42	S 41 00	W 048 31	5443	32
030	18/01/1994	01:17:30	S 40 35	W 048 10	5340	32
031	18/01/1994	07:55:21	S 40 10	W 047 48	5293	32
032	18/01/1994	14:13:56	S 39 45	W 047 27	5269	32
033	18/01/1994	20:50:28	S 39 20	W 047 06	5238	32
034	19/01/1994	03:31:44	S 38 55	W 046 44	5207	32
035	19/01/1994	10:36:07	S 38 30	W 046 22	5190	32
036	19/01/1994	17:34:04	S 38 05	W 046 01	5172	32
037	20/01/1994	00:14:40	S 37 40	W 045 39	5156	32
038	20/01/1994	07:14:08	S 37 15	W 045 19	5114	32
039	20/01/1994	13:44:14	S 36 50	W 044 57	5057	32
040	20/01/1994	19:54:57	S 36 25	W 044 36	4984	32
041	21/01/1994	02:00:01	S 36 00	W 044 15	4905	32
042	21/01/1994	10:04:10	S 35 30	W 045 03	4841	32

Stat. No.	Date	Time (GMT)	Latitude	Longitude	Depth	No. of bottles
043	22/01/1994	17:13:50	S 32 21	W 050 13	0234	09
044	22/01/1994	18:38:32	S 32 25	W 050 06	0972	16
045	22/01/1994	21:43:16	S 32 36	W 049 46	1505	18
046	23/01/1994	01:07:21	S 32 48	W 049 27	1748	19
047	23/01/1994	04:52:06	S 33 00	W 049 07	2570	23
048	23/01/1994	09:00:58	S 33 12	W 048 48	3023	27
049	23/01/1994	13:02:18	S 33 24	W 048 28	3204	27
050	23/01/1994	17:57:48	S 33 36	W 048 09	3358	27
051	23/01/1994	22:20:34	S 33 48	W 047 51	3779	30
052	24/01/1994	03:50:28	S 34 04	W 047 23	4210	32
053	24/01/1994	10:22:58	S 34 21	W 046 56	4500	32
054	24/01/1994	18:59:24	S 34 37	W 046 29	4651	32
055	25/01/1994	00:46:47	S 34 53	W 046 02	4742	32
056	25/01/1994	06:44:13	S 35 10	W 045 35	4797	32
057	25/01/1994	12:52:45	S 35 26	W 045 08	4862	32
058	25/01/1994	19:25:29	S 35 43	W 044 42	4838	32
059	26/01/1994	14:14:16	S 36 00	W 044 14	4886	32
060	27/01/1994	23:05:27	S 35 35	W 043 53	4893	32
061	28/01/1994	05:29:16	S 35 12	W 043 33	4878	32
062	28/01/1994	11:55:11	S 34 49	W 043 12	4791	32
063	28/01/1994	18:04:30	S 34 25	W 042 51	4651	32
064	28/01/1994	23:52:54	S 34 01	W 042 30	4535	32
065	29/01/1994	05:47:46	S 33 37	W 042 09	4529	32
066	29/01/1994	11:33:33	S 33 14	W 041 48	4570	30
067	29/01/1994	18:06:06	S 32 50	W 041 27	4510	31
068	29/01/1994	23:55:25	S 32 27	W 041 06	4422	31
069	30/01/1994	06:13:28	S 32 03	W 040 46	4112	28
070	30/01/1994	12:03:37	S 31 40	W 040 25	3753	29
071	30/01/1994	17:41:14	S 31 16	W 040 04	3628	27
072	30/01/1994	23:03:25	S 30 53	W 039 44	4414	31
073	31/01/1994	05:06:23	S 30 29	W 039 22	4150	29
074	31/01/1994	10:24:56	S 30 05	W 039 02	4220	30
075	31/01/1994	15:51:03	S 29 42	W 038 41	4293	30
076	31/01/1994	21:14:56	S 29 18	W 038 20	4315	30
077	01/02/1994	03:06:15	S 28 54	W 037 59	4407	31
078	01/02/1994	08:57:27	S 28 31	W 037 38	4450	31
079	01/02/1994	14:40:43	S 28 07	W 037 18	4529	32
080	01/02/1994	20:15:02	S 27 44	W 036 57	4678	32
081	02/02/1994	01:58:07	S 27 21	W 036 36	5022	32
082	02/02/1994	07:52:06	S 26 58	W 036 16	4605	32
083	02/02/1994	13:55:17	S 26 34	W 035 55	4484	32
084	02/02/1994	19:49:22	S 26 11	W 035 34	4253	31
085	03/02/1994	01:26:41	S 25 47	W 035 14	4278	31
086	03/02/1994	07:18:26	S 25 24	W 034 53	4401	32
087	03/02/1994	13:02:39	S 25 01	W 034 32	4545	32

Stat. No.	Date	Time (GMT)	Latitude	Longitude	Depth	No. of bottles
088	03/02/1994	18:51:40	S 24 37	W 034 11	4625	32
089	04/02/1994	00:40:19	S 24 14	W 033 51	4583	32
090	04/02/1994	06:32:12	S 23 50	W 033 30	4627	32
091	04/02/1994	12:20:20	S 23 27	W 033 10	4754	32
092	04/02/1994	18:24:38	S 23 04	W 032 49	4783	32
093	05/02/1994	00:14:23	S 22 40	W 032 28	4598	32
094	05/02/1994	05:57:09	S 22 17	W 032 08	4559	32
095	05/02/1994	16:35:29	S 21 54	W 031 47	4550	32
096	05/02/1994	22:35:39	S 21 31	W 031 27	4614	32
097	06/02/1994	03:36:59	S 21 15	W 031 13	4632	32
098	06/02/1994	08:34:02	S 21 00	W 030 59	4651	32
099	06/02/1994	13:40:30	S 20 39	W 030 58	4545	32
100	06/02/1994	18:38:59	S 20 20	W 030 57	4499	32
101	06/02/1994	23:34:17	S 20 00	W 030 56	4552	32
102	07/02/1994	04:38:51	S 19 39	W 030 55	4548	32
103	07/02/1994	09:30:40	S 19 20	W 030 54	4530	32
104	07/02/1994	15:23:03	S 18 50	W 030 52	4507	32
105	07/02/1994	21:13:59	S 18 21	W 030 51	4582	32
106	08/02/1994	03:10:42	S 17 51	W 030 49	4763	32
107	08/02/1994	09:13:28	S 17 22	W 030 48	4874	32
108	08/02/1994	15:17:44	S 16 52	W 030 46	4933	32
109	08/02/1994	21:19:35	S 16 23	W 030 44	4930	32
110	09/02/1994	03:55:33	S 15 53	W 030 43	4927	32
111	09/02/1994	09:59:44	S 15 24	W 030 41	4825	32
112	09/02/1994	16:16:42	S 14 54	W 030 40	4871	32
113	09/02/1994	22:20:54	S 14 25	W 030 38	4904	32
114	10/02/1994	04:26:11	S 13 55	W 030 36	5312	32
115	10/02/1994	10:29:00	S 13 26	W 030 35	5199	32
116	10/02/1994	18:40:06	S 13 26	W 030 35	5205	32
117	11/02/1994	00:19:47	S 13 26	W 030 35	5205	32

Table 1b:
CITHER II – Leg 2 ALL STATIONS

Stat. No.	Date	Time (GMT)	Latitude	Longitude	Depth	No. of bottles
118	17/02/1994	23:24:32	S 12 21	W 037 37	0319	16
119	18/02/1994	01:54:33	S 12 23	W 037 35	1025	16
120	18/02/1994	04:49:47	S 12 24	W 037 34	1568	16
121	18/02/1994	17:46:50	S 12 25	W 037 32	1996	32
122	18/02/1994	12:21:48	S 12 29	W 037 27	2503	32
123	18/02/1994	18:17:37	S 12 34	W 037 20	3017	32
124	19/02/1994	00:15:56	S 12 42	W 037 07	3519	32
125	19/02/1994	05:40:49	S 12 57	W 036 47	3869	32
126	19/02/1994	11:47:13	S 13 12	W 036 27	4196	32
127	19/02/1994	17:49:25	S 13 13	W 035 57	4339	32
128	20/02/1994	00:02:01	S 13 14	W 035 28	4406	32
129	20/02/1994	07:20:50	S 13 15	W 034 59	4433	32
130	20/02/1994	14:17:39	S 13 16	W 034 30	4519	32
131	20/02/1994	18:35:47	S 13 16	W 034 29	4516	32
132	20/02/1994	23:17:00	S 13 18	W 034 00	3751	32
133	21/02/1994	04:57:18	S 13 19	W 033 31	4587	32
134	21/02/1994	10:24:42	S 13 19	W 033 31	4588	16
135	21/02/1994	14:35:01	S 13 20	W 033 01	4561	32
136	21/02/1994	20:47:39	S 13 21	W 032 32	4645	32
137	22/02/1994	01:08:58	S 13 21	W 032 32	4645	16
138	22/02/1994	05:40:41	S 13 22	W 032 03	4842	32
139	22/02/1994	10:30:05	S 13 22	W 032 03	4838	16
140	22/02/1994	16:38:32	S 13 24	W 031 34	4985	32
141	22/02/1994	23:08:08	S 13 25	W 031 04	5043	32
142	23/02/1994	05:42:40	S 13 26	W 030 35	5165	32
143	23/02/1994	12:10:25	S 12 56	W 030 33	5138	32
144	23/02/1994	18:29:53	S 12 26	W 030 32	5334	32
145	24/02/1994	01:04:00	S 11 56	W 030 30	5397	32
146	24/02/1994	07:37:49	S 11 26	W 030 29	5360	32
147	24/02/1994	14:06:14	S 10 57	W 030 27	5331	32
148	24/02/1994	20:40:34	S 10 27	W 030 25	5313	32
149	25/02/1994	03:35:19	S 09 57	W 030 24	5298	32
150	25/02/1994	10:04:25	S 09 27	W 030 22	5306	32
151	27/02/1994	22:33:50	S 08 57	W 030 21	5242	32
152	28/02/1994	04:46:52	S 08 28	W 030 19	5366	32
153	28/02/1994	10:58:54	S 07 58	W 030 17	5388	32
154	28/02/1994	17:58:10	S 07 28	W 030 16	5387	32
155	01/03/1994	00:25:03	S 06 58	W 030 14	5369	32
156	01/03/1994	06:44:06	S 06 28	W 030 13	5209	32
157	01/03/1994	12:56:25	S 05 59	W 030 11	5179	32
158	01/03/1994	19:18:22	S 05 29	W 030 09	5106	32
159	02/03/1994	01:34:05	S 04 59	W 030 08	4972	32

Stat. No.	Date	Time (GMT)	Latitude	Longitude	Depth	No. of bottles
160	02/03/1994	08:00:12	S 04 29	W 030 06	4680	32
161	02/03/1994	13:58:31	S 03 59	W 030 05	4883	32
162	02/03/1994	20:08:30	S 03 30	W 030 03	4828	32
163	03/03/1994	02:06:26	S 03 00	W 030 01	4888	32
164	03/03/1994	08:17:24	S 02 29	W 030 00	4878	32
165	03/03/1994	13:19:39	S 02 12	W 029 59	4883	32
166	03/03/1994	18:21:34	S 01 54	W 030 00	4914	32
167	03/03/1994	23:26:36	S 01 35	W 030 00	4964	32
168	04/03/1994	04:25:59	S 01 18	W 029 59	4224	32
169	04/03/1994	09:13:20	S 00 59	W 030 00	3858	32
170	04/03/1994	14:30:27	S 00 44	W 030 25	4492	32
171	04/03/1994	18:37:09	S 00 45	W 030 25	4496	32
172	04/03/1994	22:35:48	S 00 30	W 030 51	4107	32
173	05/03/1994	04:07:01	S 00 14	W 031 17	4289	32
174	05/03/1994	09:39:18	N 00 00	W 031 43	4224	32
175	05/03/1994	15:33:30	N 00 14	W 032 09	4555	32
176	05/03/1994	21:18:43	N 00 29	W 032 34	4566	32
177	06/03/1994	03:03:58	N 00 44	W 033 00	3524	32
178	06/03/1994	08:26:52	N 00 59	W 033 26	3717	32
179	06/03/1994	14:20:42	N 01 17	W 033 56	4028	32
180	06/03/1994	20:23:07	N 01 35	W 034 26	3904	32
181	07/03/1994	02:11:13	N 01 52	W 034 56	4000	32
182	07/03/1994	08:09:39	N 02 10	W 035 26	4303	32
183	07/03/1994	14:19:26	N 02 27	W 035 56	3690	32
184	07/03/1994	20:02:29	N 02 45	W 036 27	4324	32
185	08/03/1994	02:11:20	N 03 02	W 036 57	4146	32
186	08/03/1994	08:17:02	N 03 19	W 037 27	4546	32
187	08/03/1994	14:30:54	N 03 37	W 037 57	4372	32
188	08/03/1994	20:43:36	N 03 54	W 038 27	4349	32
189	09/03/1994	02:51:52	N 04 12	W 038 57	4593	32
190	09/03/1994	09:01:46	N 04 29	W 039 27	4433	32
191	09/03/1994	15:03:53	N 04 47	W 039 58	4466	32
192	09/03/1994	21:14:23	N 05 04	W 040 28	4666	32
193	10/03/1994	03:35:49	N 05 22	W 040 58	4663	32
194	10/03/1994	08:09:15	N 05 22	W 040 58	4655	32
195	10/03/1994	12:40:59	N 05 39	W 041 28	4696	32
196	10/03/1994	18:55:03	N 05 57	W 041 59	4707	32
197	11/03/1994	01:11:43	N 06 15	W 042 29	4707	32
198	11/03/1994	07:20:13	N 06 32	W 042 59	4633	32
199	11/03/1994	13:32:25	N 06 49	W 043 29	4661	32
200	11/03/1994	19:47:28	N 07 07	W 044 00	46S 6	32
201	12/03/1994	02:03:21	N 07 24	W 044 30	4566	32
202	12/03/1994	08:20:58	N 07 42	W 045 00	4542	32
203	12/03/1994	15:01:06	N 08 00	W 045 31	4537	32
204	12/03/1994	21:18:10	N 08 17	W 046 01	4571	32

Stat. No.	Date	Time (GMT)	Latitude	Longitude	Depth	No. of bottles
205	13/03/1994	03:58:14	N 08 35	W 046 31	4602	32
206	13/03/1994	10:21:06	N 08 52	W 047 02	4654	32
207	13/03/1994	16:33:32	N 09 09	W 047 33	4691	32
206	13/03/1994	22:36:27	N 09 27	W 048 03	4741	32
209	14/03/1994	04:48:07	N 09 45	W 048 34	4780	32
210	14/03/1994	10:51:06	N 10 02	W 049 04	4851	32
211	15/03/1994	11:19:10	N 13 12	W 047 13	4285	32
212	15/03/1994	16:37:03	N 13 39	W 046 57	3843	32
213	15/03/1994	22:09:02	N 13 12	W 047 13	4191	32
214	16/03/1994	03:59:18	N 12 45	W 047 29	4133	32
215	16/03/1994	09:35:39	N 12 18	W 047 45	4519	32
216	16/03/1994	15:28:10	N 11 51	W 048 01	4640	32
217	16/03/1994	21:13:10	N 11 24	W 048 17	4935	32
218	17/03/1994	03:25:31	N 10 56	W 048 32	4914	32
219	17/03/1994	09:25:15	N 10 29	W 048 49	4891	32
220	17/03/1994	15:16:02	N 10 02	W 049 04	4847	32
221	17/03/1994	21:10:29	N 09 36	W 049 19	4768	32
222	18/03/1994	03:06:39	N 09 10	W 049 35	4679	32
223	18/03/1994	08:58:30	N 08 44	W 049 50	4560	32
224	18/03/1994	14:35:21	N 08 18	W 050 05	4471	32
225	18/03/1994	20:24:50	N 07 52	W 050 20	4387	32
226	19/03/1994	02:40:02	N 07 26	W 050 34	4278	32
227	19/03/1994	08:37:21	N 07 00	W 050 50	4069	32
228	19/03/1994	14:31:41	N 06 34	W 051 05	3529	32
229	19/03/1994	18:54:35	N 06 19	W 051 14	2991	32
230	19/03/1994	23:22:48	N 06 09	W 051 21	2773	32
231	20/03/1994	04:03:04	N 06 01	W 051 24	2149	32
232	20/03/1994	07:21:47	N 05 57	W 051 26	1529	32
233	20/03/1994	10:16:53	N 05 55	W 051 28	0992	32
234	20/03/1994	12:42:36	N 05 53	W 051 28	0494	32
235	20/03/1994	16:13:03	N 05 53	W 051 30	0243	32

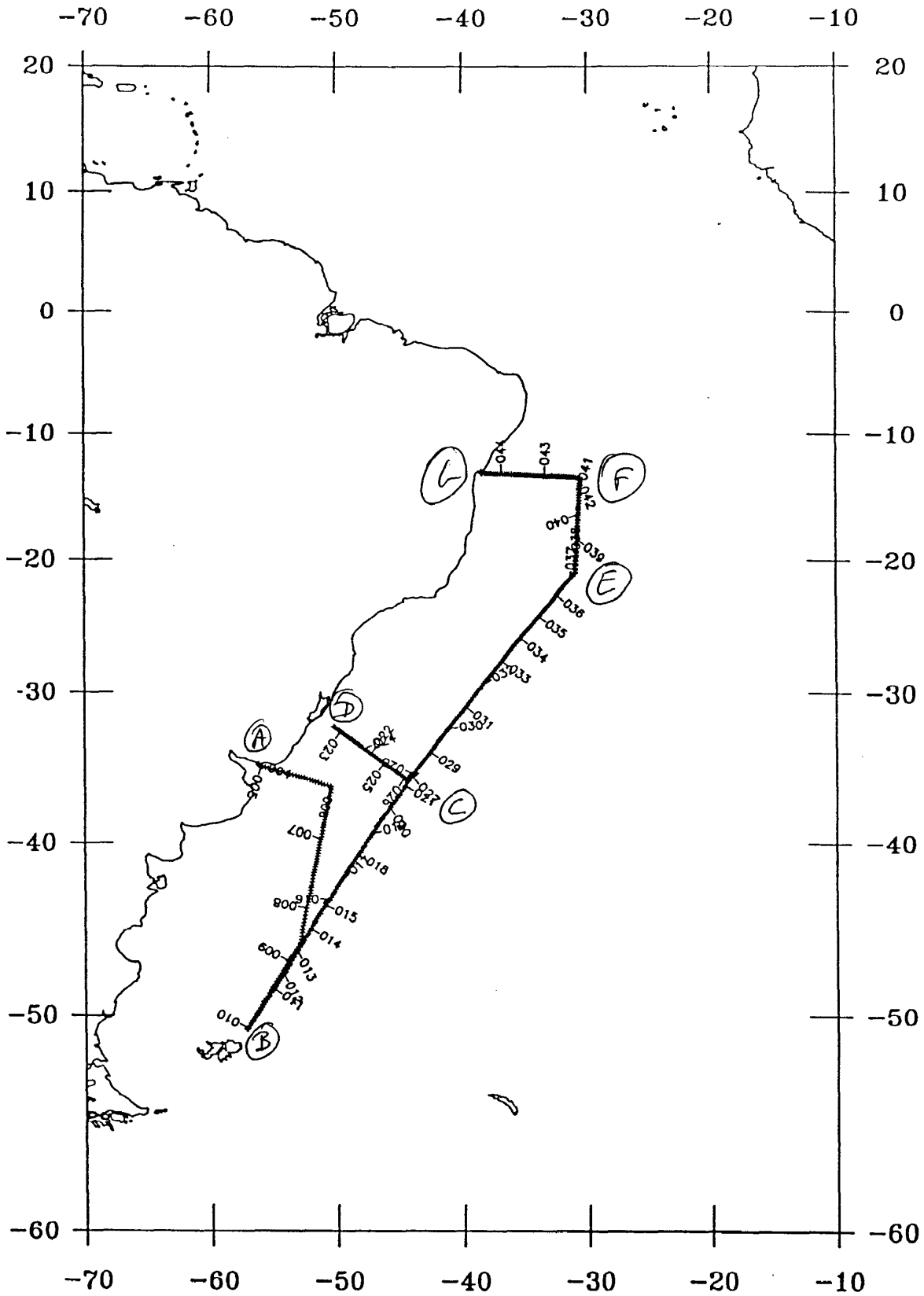


Fig.1a: EW9401 Montevideo – Salvador Jan 4 – Feb 13 1994

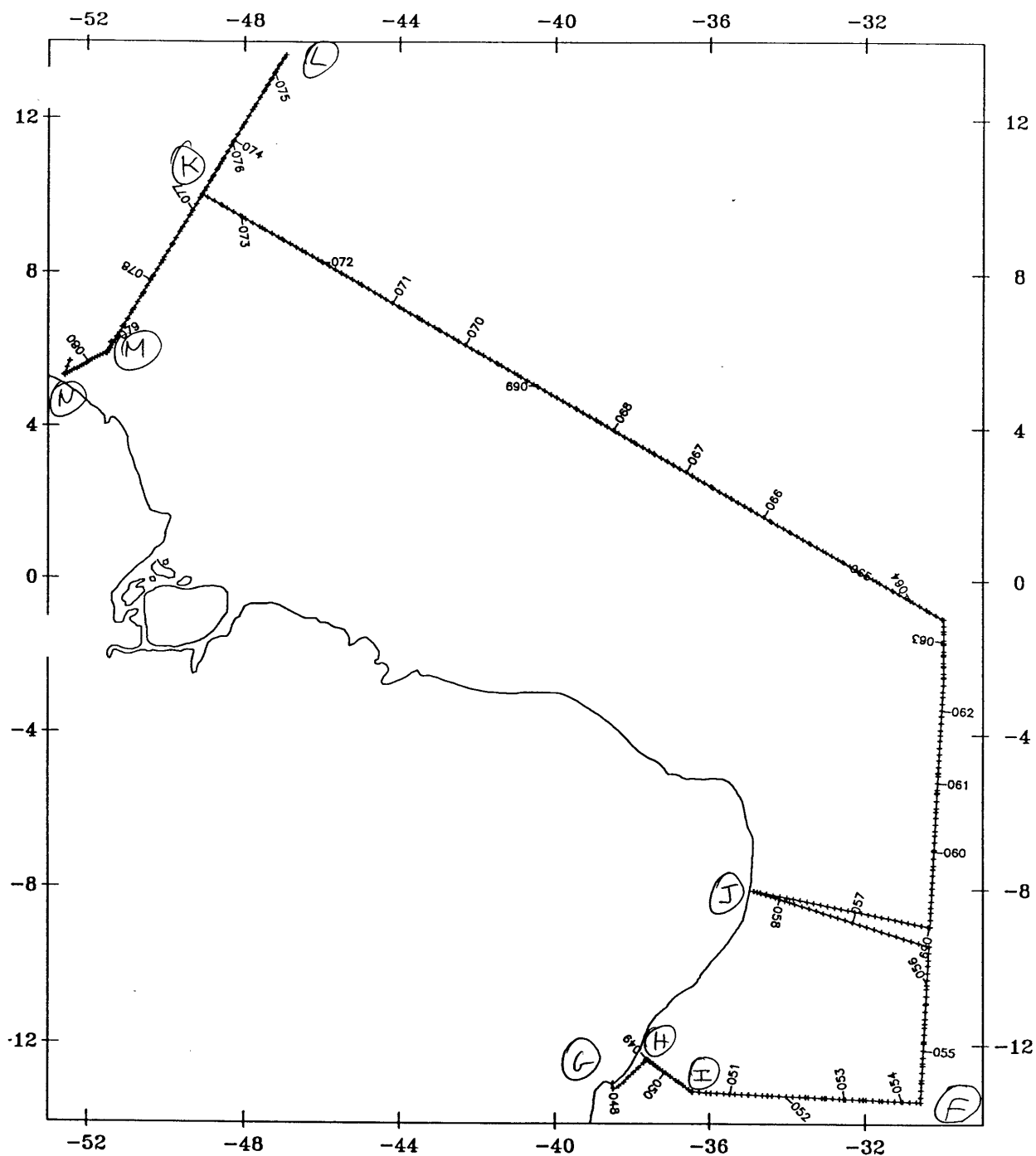


Fig.1b: EW – 9402 NAVIGATION TRACK LINE; SCALE = 0.3 inch/deg.

WOCE A17 DQE Notes: Dissolved Oxygen and Nutrients
Joe C. Jennings, Jr. and Louis I. Gordon

Overall impressions:

The WOCE A17 section was comprised of two legs and roughly parallels the coastline of eastern South America from just north of the Falkland/Malvinas Islands to a point northwest of the mouth of the Amazon River in northern Brazil. A port call of several days separated the two legs.

CTD temperature, salinity, and oxygen were not reported and so could not be used in evaluating the bottle oxygen data. Neither bottle numbers nor sample numbers were included in the data set. NO_3 (nitrate) was reported, but not a separate NO_2 (nitrite) determination. This suggests that the “nitrate” values in the data set are actually “nitrate plus nitrite” (N+N). For most of the water column, the difference between NO_3 and N+N would be negligible, but near the bottom of the mixed layer, NO_2 concentrations significantly different from zero could be expected. This point should be checked by the WHPO.

The A17 section has a few noisy oxygen samples, which could have been caused by an inexperienced sampler(s). Overall, the nutrient and oxygen data are quite good, with few problems.

Comparisons with other WOCE cruises:

Detailed examinations of inter-cruise discrepancies have been separately funded. Some preliminary, general observations follow.

A17/A10: These two sections intersect near the Rio Grande Rise, which separates the Brazil and Argentine basins at ca. 39°W , 30°S . There is some overlap of salinity in the broad salinity maximum between 2000 and ca. 3300 m, with greater variability in the deeper water. A10 nitrate and phosphate concentrations are mostly higher $1.4 \mu\text{M}$ and $0.07 \mu\text{M}$, respectively, than for A17 in this depth interval. The oxygen and silicate concentrations overlap in the salinity maximum within WOCE specifications. In the bottom waters, the nutrient concentrations at the more southerly A17 stations all increase and become higher than the A10 concentrations. This is probably a real and due to the influence of the Argentine Basin waters, but the offset at mid-depths remains.

A17/A08: These sections intersect at ca. 30.5°W , 11.5°S in the west-central Brazil Basin. Although the T/S plots of stations at the crossing are in good agreement [w/in WOCE specifications], there are large differences in the nutrient and oxygen concentrations between the two sections. A17 is higher in oxygen, silicate, and nitrate by 6 – 8 % over most of the water column. (Phosphate was not analyzed on the A08 cruise.) There is some overlap of the silicate data from the two cruises in

the mid-depth range, but a clear difference between them in the deep waters. These observations may call into question the quality of the A08 or A17 data.

A17/A06: These sections intersect at ca. 43°W, 7.5°N. Nitrate and phosphate concentrations for A17 exceeded A06 by 3- 6% while the A17 oxygen concentrations were 2 – 5 % lower than the A08 oxygen data. There is more overlap of the silicate data from the two cruises

Comments on specific stations:

A list of stations at which specific bottle data seems to be questionable follows. The Q2 data quality flags for these data have been set to “3.” There are a number of Q1 data flags of “5” in the A17.HYD file. These indicate “not reported” data and the values of these oxygen and nutrient data have been reported as “-9” by the data originator. [WOCE specifications called for reporting of bad data, not eliminating it, unless the originator explicitly knew the cause of the problems. We assume that this is the case here but perhaps this should be checked by the WHPO.] “NOP” indicates that we could find “No Obvious Problem”.

Station	Pressure	O2	Silicate	NO ₃	PO ₄	Comments
13	3300.5	NOP	High	High	High	All nutrients appear to be too high.
14	3299.3	High	Low	Low	Low	Nutrients appear to be low.
31	699.1	Low	NOP	NOP	NOP	Single bottle oxygen minimum.
38	300.7	High	High	High	High	Possible double-trip with bottle below.
52	3999	High	NOP	NOP	NOP	Oxygen appears to be too high.
72	3197.6	High	NOP	NOP	NOP	Oxygen appears to be too high.
77	1.8	NOP	NOP	NOP	NOP	Theta value is wrong.
80	300.6	High	NOP	NOP	NOP	1 bottle oxygen max. in overall min.
85	500.6	NOP	High	High	High	Nutrients look like those from bottle below, possible double-trip?
129	2598.8	High	NOP	NOP	NOP	Maybe a sampling problem w/ oxygen.
129	2999	High	NOP	NOP	NOP	“ “ “ “
129	4199.1	High	NOP	NOP	NOP	“ “ “ “
134	650.3	High	Low	Low	Low	Kink in profile.
137	1601.3	High	NOP	NOP	NOP	Very high oxygen
142	2200.2	High	High	High	High	Odd high silicate.
143	885.8	High	High	Low	Low	Possible bottle problem.
143	2200.2	High	High	Low	Low	High silicate. This bottle was supposed to be a duplicate, but doesn't agree with its duplicate or the trend of the rest of the profile.

155	401.2	High	NOP	Low	Low	Oxygen up in the middle of a minimum; NO ₃ and PO ₄ low.
159	3198.4	High	NOP	NOP	NOP	Possible sampling problem
160		High	NOP	NOP	NOP	Possible sampling problem
167	3548.9	High	NOP	NOP	NOP	Possible sampling problem
174	1400.7	High	NOP	NOP	NOP	Sampling problems? Nutrients look ok.
174	3398.3	High	NOP	NOP	NOP	“ “ “
174	3697.3	High	NOP	NOP	NOP	“ “ “
174	3997.1	High	NOP	NOP	NOP	“ “ “
175	2699	High	NOP	NOP	NOP	Possible sampling problem.
178	1999.9	High	NOP	NOP	NOP	Odd 3-bottle oxygen maximum w/ no salt or nutrient feature.
178	2198.2	High	NOP	NOP	NOP	See above
178	2398.9	High	NOP	NOP	NOP	See above
181	1401.4	High	NOP	NOP	NOP	Possible sampling problem.
182	2598.5	High	NOP	NOP	NOP	Possible sampling problem.
182	3678.5	High	NOP	NOP	NOP	Possible sampling problem.
183	301.8	High	NOP	NOP	NOP	High oxygen in the midst of a minimum.
185	200.1	High	Low	Low	Low	Bottle problem?
189	2199.7	High	NOP	NOP	NOP	Possible sampling problem.
196	3997.3	High	NOP	NOP	NOP	Possible sampling problem.
211	3003.4	NOP	NOP	0/ -9	NOP	NO ₃ not reported. Should be “-9” and not zero.
228	3000.5	Low	High	High	High	1 bottle silicate max. Leaking bottle?