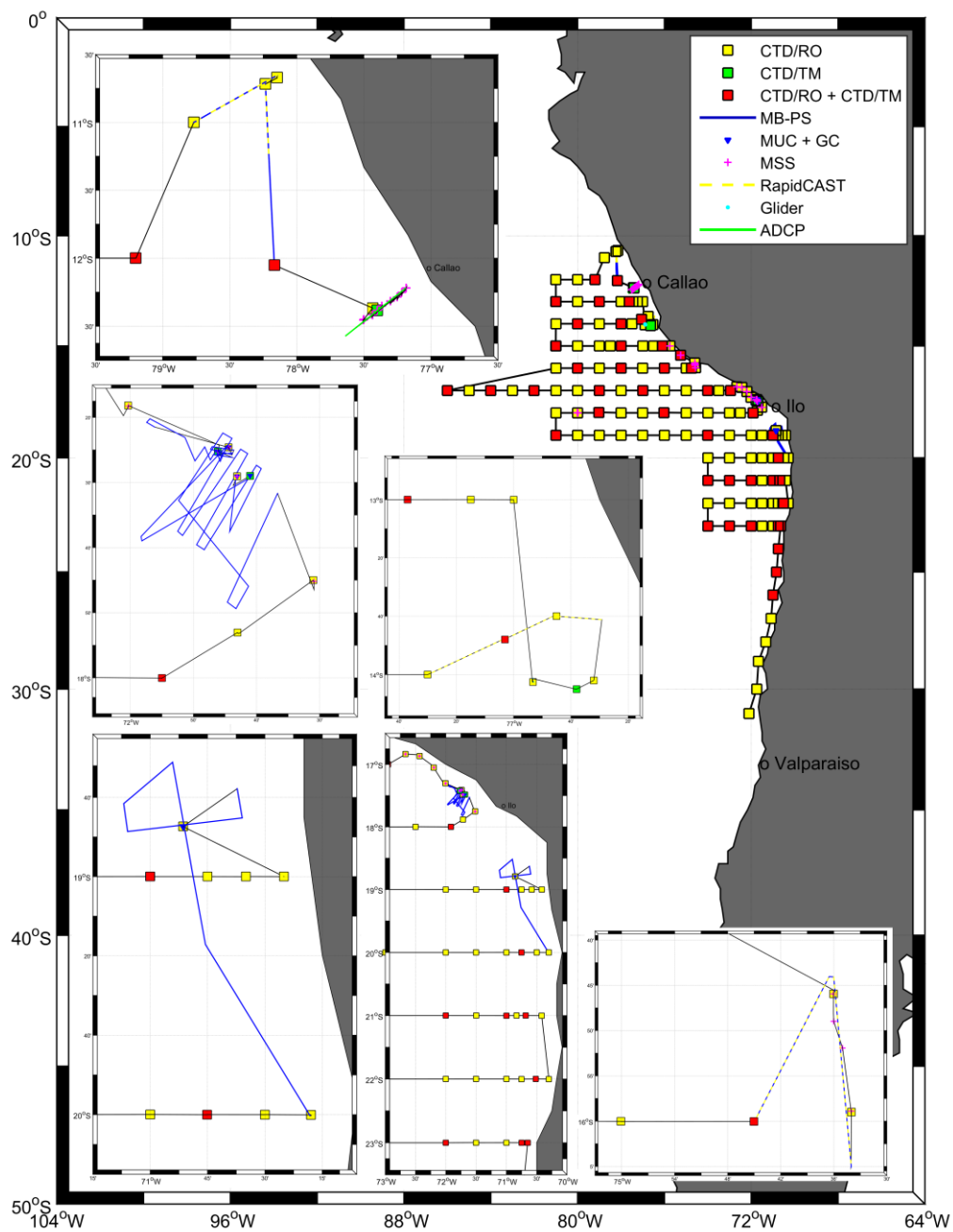


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**Short Cruise Report**  
**R/V METEOR M135 Valparaiso – Callao**  
**1<sup>th</sup> Mar – 8<sup>th</sup> Apr 2017**  
**Chief Scientist: Prof. Dr. Martin Visbeck**  
**Captain: Jan Schubert**



## Objectives

The primary goal of this cruise was to quantify the role of diffusive and advective pathways connecting water within the bottom boundary layer (i.e. the water directly affected by sediment processes) to the pelagic and surface ocean. This exchange can be a consequence of either enhanced mixing close to the bottom or advective processes. To achieve this, we have injected a conservative tracer (CF3SF5) in October 2015 within the bottom boundary layer at three different sites along the Peruvian coast at a depth of about 300 m that was surveyed for the first time. In addition we were able to perform a substantial mapping of the South Pacific oxygen minimum zone (OMZ) south of 12°S. Observational and experimental work addressed the fluxes of N, P and Fe and the behaviour of Fe in the water column.

The paleoceanographic studies focused on the retrieval of sediment cores for the reconstruction of centennial to millennial scale climate change and low-latitude oxygen minimum conditions off Peru: How have past surface and subsurface ocean conditions within the Peru-Chile Current changed with respect to temperature (salinity), thermocline structure, productivity, and OMZ conditions south of the central Peruvian upwelling area during the last 25 ka BP?

Thus the main objectives were:

- Map the conservative tracer along the Humboldt-Current System
- Map the water mass properties with regards to temperature, salinity, oxygen, nutrients, transient tracer and trace elements
- Map the boundary current and eddy velocity and density fields
- Determine the diapycnal mixing along the Peruvian shelf region.
- Observe the pCO<sub>2</sub> fluxes and sea surface temperature and salinity conditions
- Map the particle abundance using an Underwater Vision Profiler
- Perform biological sampling and incubation experiments
- Execute an acoustic sediment survey
- Recover sediment cores
- Deploy two gliders for the subsequent M136 leg

The cruise was very successful and all objectives were reached and the measurements were carried out as planned.



*Scientific party of the cruise M135*

## **Narrative**

R/V METEOR departed from Valparaiso, Chile in the evening of March 1 2017 and began a transect along the 2000m isobath northward with the first CTD-station at 31°S with a station every 1° until 23°S. On March 5 we performed the first zonal section along 23°S west until 74°W and returning along 22°S back to the shelf. The pattern was repeated along 21° and 20°S until the afternoon of March 10 when an acoustic survey of Chilean shelf between 71°W and 70°20'W and 18°48'S and 18°30'S was performed and a core was recovered at 18°47'S and 70°51'W. On March 11 afternoon the CTD survey resumed from the coast of Chile along 19°S. On March 12 lunch time we crossed into the economic zone of Peru. At 74°W we returned to the coast along 18°S and made a brief stop near Ilo on March 18 to remove an entangled drifting fisher net from the ships hull. The next two days were spent with acoustic surveys and coring operation that yielded five 4-9m long cores near 17°28'S and 71°43'W. On March 21 we began a westward survey along 17°S and reached the western most station at 86°W on March 25. On March 29 we returned to the coast after a section along 16°S and completed two shelf break surveys with echo sounder, underway CTD sections and micro structure profiles. The next CTD survey went westward along 15°S and reached 81°W on March 31 and returned to the coast along 14°S. On April 3 two gliders were deployed at 14° 2'S and 76° 53'W near the position of the last tracer release site. The next section went west along 13°S and on April 5 the final section east along 12°S started at 81°W. On April 6 a short dog leg brought us to the shelf at 10° 40'S the location of the first tracer release position. On April 7 we finished the 12°S section and moved slightly south with a last CTD at the second tracer release site. The expedition finished with a micro structure transect onto the shelf south of 12°S.

METEOR reached the port of Callao, Peru on April 8 2017.

## **Acknowledgements**

We greatly appreciate the wonderful working atmosphere as well as the professionalism and seamanship of crew, officers and Captain of R/V METEOR, which made this work a success. Financial support came from the German Science Foundation (DFG).

## Participants

	<b>Name</b>	<b>Position/Discipline</b>	<b>Institute</b>
1.	Visbeck, Martin, Prof. Dr.	Chief Scientist	GEOMAR
2.	Tanhua, Toste, Dr.	Tracer	GEOMAR
3.	Schmitdtko, Sunke, Dr.	CTD	GEOMAR
4.	Begler, Christian (technician)	CTD	GEOMAR
5.	Klenz, Thilo (student)	ADCP/CTD	GEOMAR
6.	Stramma, Lothar, Dr.	CTD/Salinometer	GEOMAR
7.	Link, Rudolf (technician)	CTD	GEOMAR
8.	Evers, Florian (technician)	CTD/ TM winch	GEOMAR
9.	Lüdecke, Nils (student)	O <sub>2</sub> and nutrients	GEOMAR
10.	Mutzberg, Andre (technician)	O <sub>2</sub> and nutrients	GEOMAR
11.	Eroglu, Sümeyya, Dr.	O <sub>2</sub> and nutrients	CAU
12.	Bogner, Boie (technician)	Tracer	GEOMAR
13.	Freund, Madeleine (PhD student)	Tracer	GEOMAR
14.	L'Esperance, Chris (PhD student)	Tracer	DAL
15.	Ketelhake, Sandra (student)	Tracer	GEOMAR
16.	Lange, Nico (student)	Tracer	GEOMAR
17.	Liu, Mian (PhD student)	Tracer	GEOMAR
18.	Hopwood, Mark, Dr.	Trace metals	GEOMAR
19.	Chu, Keshen (PhD student)	Trace metals	GEOMAR
20.	Nehir, Münevver (PhD student)	Trace metals	GEOMAR
21.	Langmaack, Jannis (student)	CTD	GEOMAR
22.	Steinig, Sebastian (student)	Geological sampling	CAU
23.	Salvatteci, Renato, Dr.	Geological sampling	CAU
24.	Groß, Felix, Dr.	Geological sampling	CAU
25.	Velazco, Federico, Dr.	Geological sampling	IMARPE
26.	Ortiz-Cortes, Joaquin (student)	N <sub>2</sub> -fix	GEOMAR
27.	Lorca Luna, Alejandra	Observer Chile	PUCV
28.	Raeke, Andreas	Weather Technician	DWD
29.	Rentsch, Harald	Meteorologist	DWD
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**Station List:** of R/V METEOR cruise M135.

Station M135	Type	Num	Date (2017)	Time UTC	Latitude	Longitude	max. depth [m]	Parameters
179-1	CTD/RO	1	02/03	11:56	31° 01' S	72° 06' W	724	T,S,P,O2,Fl
180-1	CTD/RO	2	02/03	19:46	30° 00' S	71° 45' W	763	T,S,P,O2,Fl,nuts, tracer
181-1	CTD/RO	3	03/03	02:59	28° 49' S	71° 40' W	655	T,S,P,O2,Fl,nuts, tracer
182-1	CTD/RO	4	03/03	08:37	28° 00' S	71° 19' W	1664	T,S,P,O2,Fl,nuts, tracer
183-1	CTD/RO	5	03/03	15:47	27° 00' S	71° 04' W	1437	T,S,P,O2,Fl,nuts, tracer
184-1	CTD-TM	1	03/03	22:40	26° 00' S	71° 00' W	500	T,S,P,O2,Fl,TM
184-2	CTD/RO	6	03/03	23:19	26° 00' S	71° 00' W	1990	T,S,P,O2,Fl,nuts, tracer
185-1	CTD-TM	2	04/03	06:38	25° 00' S	70° 49' W	505	T,S,P,O2,Fl,TM
185-2	CTD/RO	7	04/03	07:12	25° 00' S	70° 49' W	1653	T,S,P,O2,Fl,nuts, tracer
186-1	CTD-TM	3	04/03	14:00	24° 00' S	70° 45' W	500	T,S,P,O2,Fl,TM
186-2	CTD/RO	8	04/03	14:32	24° 00' S	70° 45' W	2312	T,S,P,O2,Fl,nuts, tracer
187-1	CTD-TM	4	04/03	21:47	23° 00' S	70° 39' W	502	T,S,P,O2,Fl,TM
187-2	CTD/RO	9	04/03	22:24	23° 00' S	70° 39' W	526	T,S,P,O2,Fl,CDOM, tracer,bio
188-1	CTD-TM	5	04/03	23:42	23° 00' S	70° 45' W	1010	T,S,P,O2,Fl,TM
188-2	CTD/RO	10	05/03	00:31	23° 00' S	70° 45' W	2075	T,S,P,O2,Fl,CDOM, nuts, tracer
189-1	CTD/RO	11	05/03	03:26	23° 00' S	71° 00' W	2008	T,S,P,O2,Fl,CDOM, nuts, tracer
190-1	CTD/RO	12	05/03	07:30	23° 00' S	71° 30' W	2002	T,S,P,O2,Fl,CDOM, nuts, tracer
191-1	CTD-TM	6	05/03	11:40	23° 00' S	72° 00' W	1009	T,S,P,O2,Fl,TM
191-2	CTD/RO	13	05/03	12:28	23° 00' S	72° 00' W	2024	T,S,P,O2,Fl,CDOM, nuts, tracer
192-1	CTD-TM	7	05/03	19:35	23° 00' S	73° 00' W	1008	T,S,P,O2,Fl,TM
192-2	CTD/RO	14	05/03	20:25	23° 00' S	73° 00' W	2001	T,S,P,O2,Fl,nuts, tracer
193-1	CTD/RO	15	06/03	03:22	23° 00' S	74° 00' W	206	T,S,P,O2,Fl,bio
193-2	CTD-TM	8	06/03	03:47	23° 00' S	74° 00' W	1001	T,S,P,O2,Fl,TM
193-3	CTD/RO	16	06/03	04:31	23° 00' S	74° 00' W	2000	T,S,P,O2,Fl,nuts, tracer
194-1	CTD/RO	17	06/03	11:48	22° 00' S	74° 00' W	1014	T,S,P,O2,Fl, tracer
195-1	CTD/RO	18	06/03	18:24	22° 00' S	73° 00' W	1002	T,S,P,O2,Fl, tracer
196-1	CTD/RO	19	07/03	00:48	22° 00' S	72° 00' W	1012	T,S,P,O2,Fl, tracer
197-1	CTD/RO	20	07/03	04:29	22° 00' S	71° 30' W	1001	T,S,P,O2,Fl, tracer
198-1	CTD/RO	21	07/03	08:04	22° 00' S	71° 00' W	1011	T,S,P,O2,Fl, tracer
199-1	CTD/RO	22	07/03	10:20	22° 00' S	70° 45' W	1012	T,S,P,O2,Fl, tracer

200-1	CTD-TM	9	07/03	12:32	22° 00' S	70° 31' W	1008	T,S,P,O2,Fl,TM
200-2	CTD/RO	23	07/03	13:24	22° 00' S	70° 31' W	1746	T,S,P,O2,Fl, tracer
201-1	CTD/RO	24	07/03	16:02	22° 00' S	70° 18' W	606	T,S,P,O2,Fl, tracer
202-1	CTD/RO	25	07/03	22:18	21° 00' S	70° 25' W	523	T,S,P,O2,Fl, tracer
203-1	CTD-TM	10	08/03	00:27	21° 00' S	70° 40' W	1009	T,S,P,O2,Fl,TM
203-2	CTD/RO	26	08/03	01:14	21° 00' S	70° 40' W	2139	T,S,P,O2,Fl,nuts, tracer,bio
204-1	CTD/RO	27	08/03	03:41	21° 00' S	70° 49' W	1001	T,S,P,O2,Fl,nuts, tracer
205-1	CTD-TM	11	08/03	05:32	21° 00' S	71° 00' W	1000	T,S,P,O2,Fl,TM
205-2	CTD/RO	28	08/03	06:19	21° 00' S	71° 00' W	1004	T,S,P,O2,Fl, tracer
206-1	CTD/RO	29	08/03	09:57	21° 00' S	71° 30' W	1005	T,S,P,O2,Fl,nuts, tracer
207-1	CTD-TM	12	08/03	13:40	21° 00' S	72° 00' W	1012	T,S,P,O2,Fl,TM
207-2	CTD/RO	30	08/03	14:27	21° 00' S	72° 00' W	1013	T,S,P,O2,Fl, tracer
208-1	CTD-TM	13	08/03	20:42	21° 00' S	73° 00' W	1002	T,S,P,O2,Fl,TM
208-2	CTD/RO	31	08/03	21:28	21° 00' S	73° 00' W	1006	T,S,P,O2,Fl, tracer
209-1	CTD/RO	32	09/03	03:38	21° 00' S	74° 00' W	201	T,S,P,O2,Fl,bio
209-2	CTD-TM	14	09/03	04:04	21° 00' S	74° 00' W	989	T,S,P,O2,Fl,TM
209-3	CTD/RO	33	09/03	04:48	21° 00' S	74° 00' W	1003	T,S,P,O2,Fl, tracer
210-1	CTD/RO	34	09/03	11:16	20° 00' S	74° 00' W	4775	T,S,P,O2,Fl,nuts, tracer
211-1	CTD/RO	35	09/03	19:59	20° 00' S	73° 00' W	1002	T,S,P,O2,Fl, tracer
212-1	CTD/RO	36	10/03	02:34	20° 00' S	72° 00' W	1017	T,S,P,O2,Fl, tracer
213-1	CTD/RO	37	10/03	06:24	20° 00' S	71° 30' W	1004	T,S,P,O2,Fl, tracer
214-1	CTD/RO	38	10/03	10:06	20° 00' S	71° 00' W	1003	T,S,P,O2,Fl, tracer
215-1	CTD-TM	15	10/03	12:31	20° 00' S	70° 45' W	1009	T,S,P,O2,Fl,TM
215-2	CTD/RO	39	10/03	13:18	20° 00' S	70° 45' W	1276	T,S,P,O2,Fl,nuts, tracer
216-1	CTD/RO	40	10/03	15:50	20° 00' S	70° 30' W	1189	T,S,P,O2,Fl, tracer
217-1	CTD/RO	41	10/03	17:56	20° 00' S	70° 18' W	996	T,S,P,O2,Fl, tracer
218-1	MB-PS	1	10/03	18:45	20° 00' S	70° 18' W		acoustic survey
218-1	MB-PS	1	11/03	12:30	18° 37' S	70° 37' W		acoustic survey
219-1	CTD/RO	42	11/03	14:23	18° 47' S	70° 51' W	1417	T,S,P,O2,Fl,nuts, tracer
219-2	MUC	1	11/03	15:31	18° 47' S	70° 51' W	1417	sediment probes
219-3	GC	1	11/03	16:51	18° 47' S	70° 51' W	1416	sediment core
220-1	CTD/RO	43	11/03	21:15	19° 00' S	70° 25' W	514	T,S,P,O2,Fl, tracer
221-1	CTD/RO	44	11/03	22:48	19° 00' S	70° 34' W	1196	T,S,P,O2,Fl, tracer
222-1	CTD/RO	45	12/03	00:44	19° 00' S	70° 45' W	1532	T,S,P,O2,Fl, tracer
223-1	CTD/RO	46	12/03	03:24	19° 00' S	71° 00' W	199	T,S,P,O2,Fl,bio
223-2	CTD-TM	16	12/03	03:46	19° 00' S	71° 00' W	995	T,S,P,O2,Fl,TM
223-3	CTD/RO	47	12/03	04:29	19° 00' S	71° 00' W	1772	T,S,P,O2,Fl,nuts, tracer
224-1	CTD/RO	48	12/03	08:36	19° 00' S	71° 30' W	1007	T,S,P,O2,Fl, tracer
225-1	CTD/RO	49	12/03	12:17	19° 00' S	72° 00' W	1005	T,S,P,O2,Fl, tracer
226-1	CTD/RO	50	12/03	18:37	19° 00' S	73° 00' W	1004	T,S,P,O2,Fl, tracer
227-1	CTD-TM	17	13/03	00:54	19° 00' S	74° 00' W	1010	T,S,P,O2,Fl,TM
227-2	CTD/RO	51	13/03	01:54	19° 00' S	74° 00' W	1002	T,S,P,O2,Fl,CDOM,

								tracer,bio
228-1	CTD/RO	52	13/03	08:20	19° 00' S	75° 00' W	1004	T,S,P,O2,Fl,CDOM, tracer
229-1	CTD/RO	53	13/03	14:51	19° 00' S	76° 00' W	1011	T,S,P,O2,Fl,CDOM, tracer
230-1	CTD/RO	54	13/03	21:22	19° 00' S	77° 00' W	1005	T,S,P,O2,Fl,CDOM, tracer
231-1	CTD/RO	55	14/03	03:43	19° 00' S	78° 00' W	1003	T,S,P,O2,Fl,CDOM, tracer
232-1	CTD/RO	56	14/03	10:34	19° 00' S	79° 00' W	1004	T,S,P,O2,Fl,CDOM, tracer
233-1	CTD/RO	57	14/03	16:56	19° 00' S	80° 00' W	1003	T,S,P,O2,Fl,CDOM, tracer
234-1	CTD-TM	18	14/03	23:22	19° 00' S	81° 00' W	1000	T,S,P,O2,Fl,TM
234-2	CTD/RO	58	15/03	00:17	19° 00' S	81° 00' W	1012	T,S,P,O2,Fl,CDOM, tracer,bio
235-1	CTD/RO	59	15/03	07:16	18° 00' S	81° 00' W	1007	T,S,P,O2,Fl,CDOM, tracer
236-1	CTD/RO	60	15/03	14:13	18° 00' S	80° 00' W	1008	T,S,P,O2,Fl,CDOM, tracer
236-2	MSS	1	15/03	15:54	18° 00' S	80° 00' W	225	T,S,P,velocity shear
236-3	MSS	2	15/03	16:31	18° 00' S	79° 59' W	252	T,S,P,velocity shear
237-1	CTD-TM	19	15/03	23:50	18° 00' S	79° 00' W	1000	T,S,P,O2,Fl,TM
237-2	CTD/RO	61	16/03	00:47	17° 59' S	79° 01' W	1062	T,S,P,O2,Fl,CDOM, tracer
238-1	CTD/RO	62	16/03	08:01	18° 00' S	78° 00' W	1005	T,S,P,O2,Fl,CDOM, tracer
239-1	CTD/RO	63	16/03	14:40	18° 00' S	77° 00' W	1005	T,S,P,O2,Fl,CDOM, tracer
240-1	CTD-TM	20	16/03	21:36	18° 00' S	76° 00' W	1000	T,S,P,O2,Fl,TM
240-2	CTD/RO	64	16/03	22:28	18° 00' S	76° 01' W	4507	T,S,P,O2,Fl,CDOM, nuts, tracer
241-1	CTD/RO	65	17/03	07:22	18° 00' S	75° 00' W	1007	T,S,P,O2,Fl,CDOM, tracer
242-1	CTD/RO	66	17/03	14:11	18° 00' S	74° 00' W	1007	T,S,P,O2,Fl,CDOM, tracer
243-1	CTD/RO	67	17/03	21:05	18° 00' S	73° 00' W	1006	T,S,P,O2,Fl,CDOM, tracer
244-1	CTD/RO	68	18/03	00:57	18° 00' S	72° 30' W	1014	T,S,P,O2,Fl,CDOM, tracer
245-1	CTD-TM	21	18/03	05:16	18° 00' S	71° 55' W	1960	T,S,P,O2,Fl,TM
245-2	CTD/RO	69	18/03	06:34	18° 00' S	71° 55' W	2005	T,S,P,O2,Fl,CDOM, tracer
246-1	CTD/RO	70	18/03	09:18	17° 52' S	71° 43' W	792	T,S,P,O2,Fl,CDOM, tracer
247-1	CTD/RO	71	18/03	11:35	17° 45' S	71° 31' W	561	T,S,P,O2,Fl,CDOM, tracer
247-2	MSS	3	18/03	12:15	17° 45' S	71° 31' W	335	T,S,P,velocity shear
248-1	MB-PS	2	19/03	01:24	17° 31' S	71° 36' W		acoustic survey
248-1	MB-PS	2	19/03	21:00	17° 28' S	71° 43' W		acoustic survey

249-1	CTD/RO	72	19/03	21:08	17° 28' S	71° 43' W	458	T,S,P,O2,FI,CDOM, tracer
249-2	MUC	2	19/03	21:40	17° 28' S	71° 43' W	466	sediment probes
249-3	GC	2	19/03	22:28	17° 28' S	71° 43' W	469	sediment core
249-4	GC	3	19/03	23:14	17° 28' S	71° 43' W	469	sediment core
249-5	MSS	4	19/03	23:52	17° 28' S	71° 43' W	298	T,S,P,velocity shear
250-1	CTD-TM	22	20/03	02:05	17° 28' S	71° 40' W	460	T,S,P,O2,FI,TM
250-2	MUC	3	20/03	02:37	17° 28' S	71° 40' W	473	sediment probes
250-3	GC	4	20/03	03:25	17° 28' S	71° 40' W	473	sediment core
251-1	MB-PS	3	20/03	04:13	17° 29' S	71° 41' W		acoustic survey
251-1	MB-PS	3	20/03	12:41	17° 21' S	71° 56' W		acoustic survey
252-1	CTD/RO	73	20/03	14:03	17° 24' S	71° 44' W	218	T,S,P,O2,FI,CDOM, tracer
252-2	MUC	4	20/03	14:20	17° 24' S	71° 44' W	233	sediment probes
252-3	GC	5	20/03	15:02	17° 24' S	71° 44' W	234	sediment core
252-4	MSS	5	20/03	15:36	17° 24' S	71° 44' W	323	T,S,P,velocity shear
253-1	MB-PS	4	20/03	18:52	17° 25' S	71° 43' W		acoustic survey
253-1	MB-PS	4	20/03	20:36	17° 26' S	71° 43' W		acoustic survey
254-1	CTD-TM	23	20/03	21:01	17° 25' S	71° 46' W	189	T,S,P,O2,FI,TM
254-2	MUC	5	20/03	21:24	17° 25' S	71° 46' W	192	sediment probes
254-3	GC	6	20/03	22:03	17° 25' S	71° 46' W	195	sediment core
254-4	MSS	6	20/03	22:24	17° 25' S	71° 46' W	162	T,S,P,velocity shear
255-1	CTD/RO	74	21/03	01:42	17° 18' S	72° 00' W	410	T,S,P,O2,FI,CDOM, tracer
255-2	MSS	7	21/03	02:13	17° 18' S	72° 00' W	339	T,S,P,velocity shear
256-1	CTD/RO	75	21/03	05:34	17° 03' S	72° 12' W	550	T,S,P,O2,FI,CDOM, tracer
256-2	MSS	8	21/03	06:12	17° 03' S	72° 12' W	351	T,S,P,velocity shear
257-1	CTD/RO	76	21/03	09:19	16° 52' S	72° 25' W	743	T,S,P,O2,FI,CDOM, tracer
257-2	MSS	9	21/03	10:03	16° 52' S	72° 25' W	327	T,S,P,velocity shear
258-1	CTD/RO	77	21/03	12:47	16° 49' S	72° 40' W	115	T,S,P,O2,FI,CDOM, tracer
258-2	MSS	10	21/03	13:09	16° 49' S	72° 40' W	119	T,S,P,velocity shear
259-1	CTD/RO	78	21/03	16:06	17° 00' S	72° 57' W	205	T,S,P,O2,FI,CDOM, bio
259-2	CTD-TM	24	21/03	16:30	17° 00' S	72° 57' W	1741	T,S,P,O2,FI,TM
259-3	CTD/RO	79	21/03	17:44	17° 00' S	72° 57' W	1750	T,S,P,O2,FI,CDOM, nuts, tracer
260-1	CTD/RO	80	21/03	22:00	17° 00' S	73° 30' W	1008	T,S,P,O2,FI,CDOM, nuts, tracer
261-1	CTD-TM	25	22/03	01:42	17° 00' S	74° 00' W	1004	T,S,P,O2,FI,TM
261-2	CTD/RO	81	22/03	02:28	17° 00' S	74° 00' W	1006	T,S,P,O2,FI,CDOM, nuts, tracer
262-1	CTD/RO	82	22/03	08:51	17° 00' S	75° 00' W	1005	T,S,P,O2,FI,CDOM, nuts, tracer
263-1	CTD/RO	83	22/03	15:18	17° 00' S	76° 00' W	1007	T,S,P,O2,FI,CDOM, nuts, tracer
264-1	CTD-TM	26	22/03	21:43	17° 00' S	77° 00' W	1009	T,S,P,O2,FI,TM



264-2	CTD/RO	84	22/03	22:28	17° 00' S	77° 00' W	1005	T,S,P,O2,FI,CDOM, nuts, tracer,bio
265-1	CTD/RO	85	23/03	04:57	17° 00' S	78° 00' W	1007	T,S,P,O2,FI,CDOM, nuts, tracer
266-1	CTD-TM	27	23/03	11:21	17° 00' S	79° 00' W	1003	T,S,P,O2,FI,TM
266-2	CTD/RO	86	23/03	12:08	17° 00' S	79° 00' W	1008	T,S,P,O2,FI,CDOM, nuts, tracer
267-1	CTD/RO	87	23/03	18:35	17° 00' S	80° 00' W	1007	T,S,P,O2,FI,CDOM, nuts, tracer
268-1	CTD/RO	88	24/03	00:49	17° 00' S	81° 00' W	1007	T,S,P,O2,FI,CDOM, nuts, tracer
269-1	CTD-TM	28	24/03	07:12	17° 00' S	82° 00' W	1002	T,S,P,O2,FI,TM
269-2	CTD/RO	89	24/03	07:58	17° 00' S	82° 00' W	1007	T,S,P,O2,FI,CDOM, nuts, tracer,bio
270-1	CTD/RO	90	24/03	14:12	17° 00' S	83° 00' W	1007	T,S,P,O2,FI,CDOM, nuts, tracer
271-1	CTD-TM	29	24/03	20:42	17° 00' S	84° 00' W	1003	T,S,P,O2,FI,TM
271-2	CTD/RO	91	24/03	21:28	17° 00' S	84° 00' W	1005	T,S,P,O2,FI,CDOM, nuts, tracer
272-1	CTD/RO	92	25/03	03:43	17° 00' S	85° 00' W	1009	T,S,P,O2,FI,CDOM, nuts, tracer
273-1	CTD/RO	93	25/03	10:05	17° 00' S	86° 00' W	282	T,S,P,O2,FI,CDOM, bio
273-2	CTD-TM	30	25/03	10:35	17° 00' S	86° 00' W	1005	T,S,P,O2,FI,TM
273-3	CTD/RO	94	25/03	11:18	17° 00' S	86° 00' W	4495	T,S,P,O2,FI,CDOM, nuts, tracer
274-1	CTD/RO	95	26/03	20:22	16° 00' S	81° 00' W	1002	T,S,P,O2,FI,CDOM, tracer
275-1	CTD-TM	31	27/03	03:32	16° 00' S	80° 00' W	1007	T,S,P,O2,FI,TM
275-2	CTD/RO	96	27/03	04:23	16° 00' S	80° 00' W	4802	T,S,P,O2,FI,CDOM, nuts, tracer
276-1	CTD/RO	97	27/03	13:51	16° 00' S	79° 00' W	1012	T,S,P,O2,FI,CDOM, tracer
277-1	CTD-TM	32	27/03	21:00	16° 00' S	78° 00' W	1003	T,S,P,O2,FI,TM
277-2	CTD/RO	98	27/03	21:45	16° 00' S	78° 00' W	1004	T,S,P,O2,FI,CDOM, tracer
278-1	CTD/RO	99	28/03	04:59	16° 00' S	77° 00' W	1008	T,S,P,O2,FI,CDOM, tracer
279-1	CTD-TM	33	28/03	12:08	16° 00' S	76° 00' W	1003	T,S,P,O2,FI,TM
279-2	CTD/RO	100	28/03	12:56	16° 00' S	76° 00' W	1003	T,S,P,O2,FI,CDOM, tracer
280-1	CTD/RO	101	28/03	20:05	16° 00' S	75° 00' W	1006	T,S,P,O2,FI,CDOM, tracer
281-1	CTD-TM	34	28/03	22:44	16° 00' S	74° 45' W	2126	T,S,P,O2,FI,TM
281-2	CTD/RO	102	29/03	00:10	16° 00' S	74° 45' W	2127	T,S,P,O2,FI,CDOM, nuts, tracer
282-1	MB-PS	5	29/03	01:43	16° 00' S	74° 45' W		acoustic survey
282-2	RapidCA ST	1	29/03	01:48	15° 59' S	74° 45' W	~125	T,S,P
282-2	RapidCA	2	29/03	04:07	15° 43' S	74° 36' W	~125	T,S,P

	ST							
282-1	MB-PS	5	29/03	06:47	16° 05' S	74° 34' W		acoustic survey
283-1	CTD/RO	103	29/03	07:30	15° 58' S	74° 34' W	817	T,S,P,O2,FI,CDOM, tracer
284-1	MSS	11	29/03	08:19	15° 58' S	74° 34' W	285	T,S,P,velocity shear
285-1	MSS	12	29/03	10:21	15° 52' S	74° 34' W	318	T,S,P,velocity shear
286-1	MSS	13	29/03	12:01	15° 49' S	74° 36' W	223	T,S,P,velocity shear
287-1	CTD/RO	104	29/03	13:18	15° 46' S	74° 36' W	123	T,S,P,O2,FI,CDOM, nuts, tracer
287-2	MSS	14	29/03	13:43	15° 46' S	74° 36' W	122	T,S,P,velocity shear
288-1	CTD-TM	35	29/03	18:49	15° 25' S	75° 15' W	275	T,S,P,O2,FI,TM
288-2	CTD/RO	105	29/03	19:09	15° 25' S	75° 15' W	295	T,S,P,O2,FI,CDOM, nuts, tracer
288-3	MSS	15	29/03	19:38	15° 24' S	75° 15' W	219	T,S,P,velocity shear
289-1	CTD/RO	106	29/03	23:57	15° 00' S	75° 45' W	170	T,S,P,O2,FI,CDOM, tracer
289-2	MSS	16	30/03	00:21	15° 00' S	75° 45' W	250	T,S,P,velocity shear
290-1	CTD/RO	107	30/03	03:17	15° 00' S	76° 05' W	143	T,S,P,O2,FI,CDOM, bio
290-2	CTD-TM	36	30/03	03:41	15° 00' S	76° 05' W	2030	T,S,P,O2,FI,TM
290-3	CTD/RO	108	30/03	05:04	15° 00' S	76° 06' W	2045	T,S,P,O2,FI,CDOM, nuts, tracer
291-1	CTD/RO	109	30/03	08:40	15° 00' S	76° 30' W	1003	T,S,P,O2,FI,CDOM, nuts, tracer
292-1	CTD/RO	110	30/03	12:17	15° 00' S	77° 00' W	1005	T,S,P,O2,FI,CDOM, nuts, tracer
293-1	CTD-TM	37	30/03	18:53	15° 00' S	78° 00' W	999	T,S,P,O2,FI,TM
293-2	CTD/RO	111	30/03	19:39	15° 00' S	78° 00' W	1012	T,S,P,O2,FI,CDOM, nuts, tracer
294-1	CTD/RO	112	30/03	23:39	15° 00' S	78° 30' W	1007	T,S,P,O2,FI,CDOM, nuts, tracer
295-1	CTD/RO	113	31/03	03:24	15° 00' S	79° 00' W	1009	T,S,P,O2,FI,CDOM, nuts, tracer
296-1	CTD/RO	114	31/03	10:15	15° 00' S	80° 00' W	1004	T,S,P,O2,FI,CDOM, nuts, tracer
297-1	CTD/RO	115	31/03	16:40	15° 00' S	81° 00' W	238	T,S,P,O2,FI,CDOM, bio
297-2	CTD-TM	38	31/03	17:02	15° 00' S	81° 00' W	1001	T,S,P,O2,FI,TM
297-3	CTD/RO	116	31/03	17:48	15° 00' S	81° 00' W	1003	T,S,P,O2,FI,CDOM, nuts, tracer,bio
298-1	CTD/RO	117	01/04	00:46	14° 00' S	81° 00' W	1009	T,S,P,O2,FI,CDOM, tracer
299-1	CTD-TM	39	01/04	07:53	14° 00' S	80° 00' W	1005	T,S,P,O2,FI,TM
299-2	CTD/RO	118	01/04	08:40	14° 00' S	80° 00' W	1004	T,S,P,O2,FI,CDOM, tracer
300-1	CTD/RO	119	01/04	16:02	14° 00' S	79° 00' W	1003	T,S,P,O2,FI,CDOM, tracer
301-1	CTD-TM	40	01/04	23:58	14° 00' S	78° 00' W	1000	T,S,P,O2,FI,TM
301-2	CTD/RO	120	02/04	00:49	14° 00' S	78° 00' W	1005	T,S,P,O2,FI,CDOM, tracer

302-1	CTD/RO	121	02/04	05:12	14° 00' S	77° 30' W	1002	T,S,P,O2,FI,CDOM, tracer
302-2	RapidCA ST	3	02/04	06:12	13° 59' S	77° 28' W	~125	T,S,P
303-1	CTD-TM	41	02/04	09:46	13° 48' S	77° 03' W	2028	T,S,P,O2,FI,TM
303-2	CTD/RO	122	02/04	11:08	13° 48' S	77° 03' W	2031	T,S,P,O2,FI,CDOM, nuts, tracer
304-1	RapidCA ST	4	02/04	12:42	13° 47' S	77° 02' W	~125	T,S,P
305-1	CTD/RO	123	02/04	16:19	13° 40' S	76° 45' W	284	T,S,P,O2,FI,CDOM, tracer
306-1	RapidCA ST	5	02/04	16:47	13° 40' S	76° 45' W	~125	T,S,P
306-1	RapidCA ST	6	02/04	17:42	13° 40' S	76° 44' W	~125	T,S,P
307-1	CTD/RO	124	03/04	00:24	14° 01' S	76° 31' W	257	T,S,P,O2,FI,CDOM, tracer
308-1	CTD-TM	42	03/04	01:40	14° 04' S	76° 37' W	602	T,S,P,O2,FI,TM
309-1	Glider	1	03/04	14:30	14° 01' S	76° 53' W		T,S,P,O2,FI,CDOM, Nitrate
310-1	CTD/RO	125	03/04	15:24	14° 02' S	76° 53' W	1006	T,S,P,O2,FI,CDOM, tracer
310-2	Glider	2	03/04	16:12	14° 02' S	76° 53' W		T,S,P,O2,FI,velocity shear
311-1	CTD/RO	126	04/04	00:03	13° 00' S	77° 00' W	415	T,S,P,O2,FI,CDOM, nuts, tracer
312-1	CTD/RO	127	04/04	02:04	13° 00' S	77° 15' W	1239	T,S,P,O2,FI,CDOM, nuts, tracer
313-1	CTD/RO	128	04/04	05:11	13° 00' S	77° 37' W	146	T,S,P,O2,FI,CDOM, bio
313-2	CTD-TM	43	04/04	05:34	13° 00' S	77° 37' W	2042	T,S,P,O2,FI,TM
313-3	CTD/RO	129	04/04	06:54	13° 00' S	77° 37' W	120	T,S,P,O2,FI,CDOM
313-3	CTD/RO	130	04/04	07:07	13° 00' S	77° 37' W	1001	T,S,P,O2,FI,CDOM, tracer
314-1	CTD/RO	131	04/04	10:10	13° 00' S	78° 00' W	1010	T,S,P,O2,FI,CDOM, nuts, tracer
315-1	CTD/RO	132	04/04	16:43	13° 00' S	79° 00' W	1002	T,S,P,O2,FI,CDOM, tracer
315-2	CTD-TM	44	04/04	17:32	13° 00' S	79° 00' W	1004	T,S,P,O2,FI,TM
316-1	CTD/RO	133	04/04	23:56	13° 00' S	80° 00' W	1003	T,S,P,O2,FI,CDOM, bio
317-1	CTD/RO	134	05/04	06:42	13° 00' S	81° 00' W	159	T,S,P,O2,FI,CDOM
317-2	CTD-TM	45	05/04	06:58	13° 00' S	81° 00' W	1004	T,S,P,O2,FI,TM
317-3	CTD/RO	135	05/04	07:40	13° 00' S	81° 00' W	1006	T,S,P,O2,FI,CDOM, tracer
318-1	CTD/RO	136	05/04	14:30	12° 00' S	81° 00' W	1001	T,S,P,O2,FI,CDOM, tracer
319-1	CTD/RO	137	05/04	22:10	12° 00' S	80° 00' W	1006	T,S,P,O2,FI,CDOM, tracer
320-1	CTD-TM	46	06/04	04:13	12° 00' S	79° 12' W	1008	T,S,P,O2,FI,TM

320-2	CTD/RO	138	06/04	04:59	12° 00' S	79° 12' W	1003	T,S,P,O2,FI,CDOM, tracer
321-1	CTD/RO	139	06/04	12:00	11° 00' S	78° 46' W	2121	T,S,P,O2,FI,CDOM, nuts, tracer
321-2	MB-PS	6	06/04	13:28	11° 00' S	78° 46' W		acoustic survey
321-3	RapidCA ST	7	06/04	13:46	10° 59' S	78° 44' W	~125	T,S,P
321-3	RapidCA ST	8	06/04	14:29	10° 55' S	78° 38' W	~125	T,S,P
321-2	MB-PS	6	06/04	17:45	10° 39' S	78° 09' W		acoustic survey
322-1	CTD/RO	140	06/04	17:58	10° 40' S	78° 09' W	166	T,S,P,O2,FI,CDOM, tracer
323-1	CTD/RO	141	06/04	18:58	10° 43' S	78° 13' W	250	T,S,P,O2,FI,CDOM, tracer
323-1	CTD/RO	142	06/04	19:05	10° 43' S	78° 13' W		T,S,P,O2,FI,CDOM, nuts, tracer
322-2	MB-PS	7	06/04	19:16	10° 43' S	78° 13' W		acoustic survey
322-3	RapidCA ST	9	06/04	19:22	10° 43' S	78° 13' W	~125	T,S,P
322-2	MB-PS	7	07/04	03:28	12° 02' S	78° 10' W		acoustic survey
324-1	CTD/RO	143	07/04	03:36	12° 03' S	78° 10' W	2092	T,S,P,O2,FI,CDOM, tracer
324-2	CTD-TM	47	07/04	05:04	12° 03' S	78° 10' W	2095	T,S,P,O2,FI,TM
325-1	CTD/RO	144	07/04	11:16	12° 22' S	77° 25' W	248	T,S,P,O2,FI,CDOM, tracer
326-1	MSS	17	07/04	12:26	12° 27' S	77° 30' W	250	T,S,P,velocity shear
326-1	MSS	18	07/04	13:03	12° 27' S	77° 30' W	250	T,S,P,velocity shear
327-1	MSS	19	07/04	14:42	12° 25' S	77° 25' W	250	T,S,P,velocity shear
328-1	CTD-TM	48	07/04	16:31	12° 22' S	77° 24' W	233	T,S,P,O2,FI,TM
328-2	MSS	20	07/04	16:56	12° 22' S	77° 24' W	250	T,S,P,velocity shear
329-1	MSS	21	07/04	18:38	12° 21' S	77° 22' W	250	T,S,P,velocity shear
330-1	MSS	22	07/04	20:18	12° 19' S	77° 18' W	250	T,S,P,velocity shear
331-1	MSS	23	07/04	21:52	12° 16' S	77° 15' W	250	T,S,P,velocity shear
332-1	MSS	24	07/04	23:24	12° 15' S	77° 13' W	250	T,S,P,velocity shear
333-1	MSS	25	08/04	01:00	12° 13' S	77° 10' W	250	T,S,P,velocity shear
334-1	ADCP	1	08/04	05:08	12° 34' S	77° 37' W		velocity