SHORT CRUISE REPORT

RV METEOR Cruise 68/3

from Mindelo, Cape Verde to Las Palmas de Gran Canaria, Spain
July 10 to August 6, 2006

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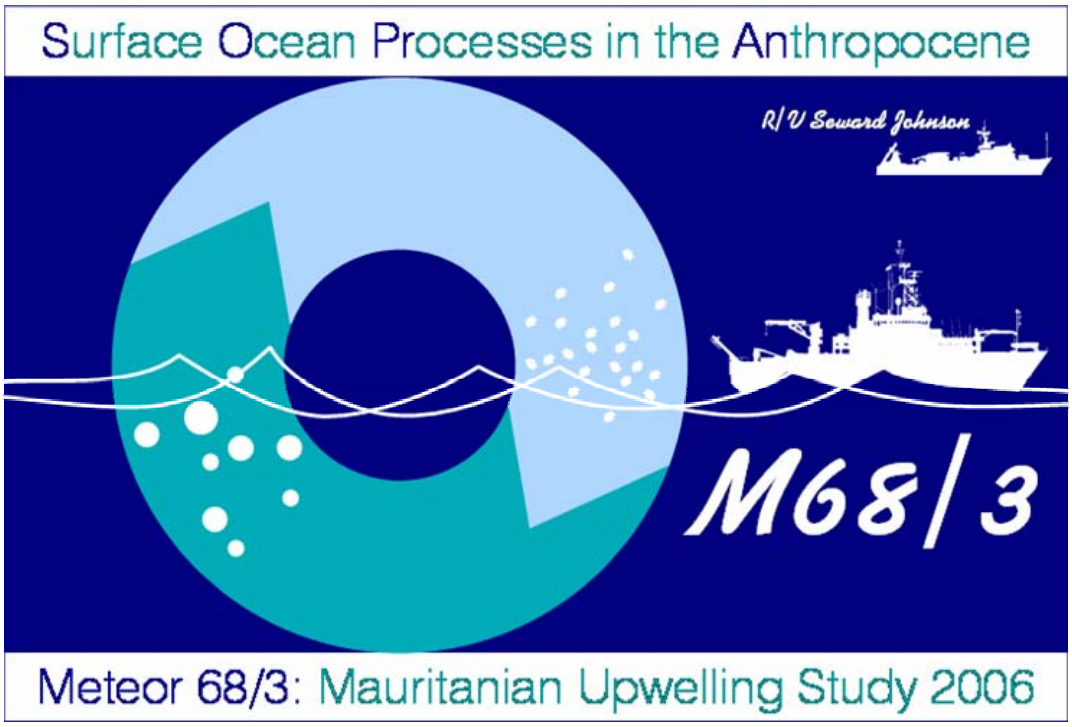

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19	Martino, Manuela, Dr.	Iodinated compounds	UEA
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21	Ochsenhirt, Werner	Meteorological technology	DWD
22	Peeken, Ilka, Dr.	Biogenic trace gas production	IFM-GEOMAR
23	Petrick, Gert	Halocarbons	IFM-GEOMAR
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26	Schlosser, Christian	Trace metals	IFM-GEOMAR
27	Steinhoff, Tobias	Carbon cycle	IFM-GEOMAR
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Research Program

The third leg of Meteor cruise 68 was carried out in the programmatic frame of the international "Surface Ocean Lower Atmosphere Study" (SOLAS) and presents the 2nd major cruise of German SOLAS. It combines a wide spectrum of biological, chemical and physical oceanography as well as atmospheric chemistry under a regional focus on Cape Verdean waters and coastal upwelling off Mauritania. This region is characterized by important SOLAS-relevant phenomena and processes – most importantly atmospheric dust deposition and coastal upwelling – which have major influence on substances (iron, nutrients, CO_2, volatile oxygenated and halogenated organics) and processes (nitrogen fixation, ocean-atmosphere gas exchange). Upwelling regions in major dust deposition areas can be viewed as biogeochemical reactors which are fuelled simultaneously by vertical supply of macro and micro nutrients from the mesopelagial below and the atmosphere above. At the same time, these regions provide means of ventilation of radiatively and chemically active trace gases (e.g., CO_2, nitrous oxide, bromoform) which are produced sub-surface. The resulting flux densities are larger than in the oligotrophic background waters.

Cruise Narrative

The scientific party for cruise 68/3 embarked in the port of Mindelo on São Vicente in the morning of July 10. That day a total of six 20' containers had to be loaded to the ship. These included three containers packed with equipment as well as three laboratory containers (one air chemistry container and two cleanlab containers) which had to be placed at their appropriate positions on the main working deck and the forecastle, respectively. The placement of the heavy (12 t) air chemistry container of the Max-Planck Institute for Chemistry by a floating harbor crane to its desired position turned out unsafe due to adverse wind conditions and had to be cancelled. Therefore a second approach had to be made on the following day by a shore-based mobile crane. For this reason, however, the RV METEOR had to change position and berth with its portside.

RV METEOR left the pier on July 12 at 900L and anchored in the bay of Mindelo to provide the atmospheric working group with some more time for installation of their large amount of equipment in a seaworthy manner. The one-day delay in loading of the group's laboratory container had made this decision necessary. At 1700L RV METEOR finally "set sails" and steamed towards to westernmost station of a hydrographic transect at 18°N which kept us busy until July 21 (see cruise track in Fig. 1).

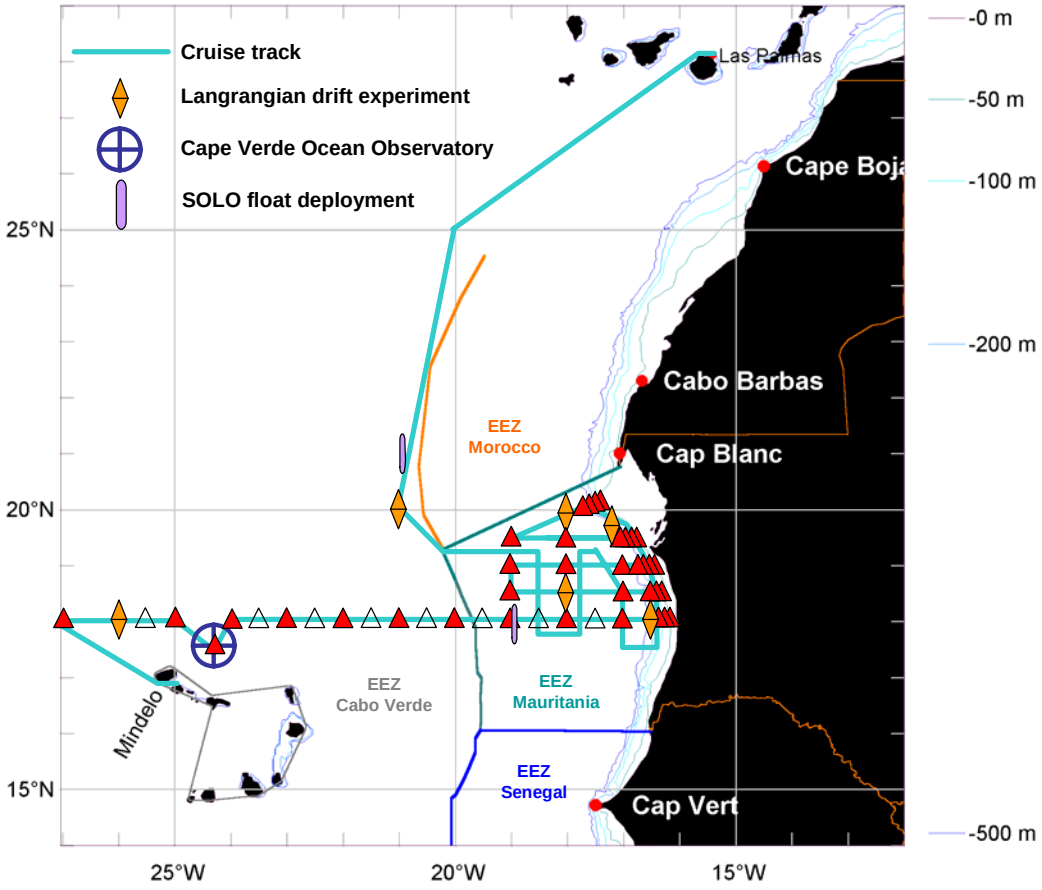

Figure 1: Cruise track of the RV METEOR cruise 68/3 from Mindelo/Cape Verde to Las Palmas de Gran Canaria/Spain (July 12 – August 6, 2006). Shown are locations of hydrographic stations incl. 24h Lagrangian drift stations, the site of the Cape Verde Ocean Observatory, and the deployment sites of two profiling drifters from WHOI.

The 18°N hydrographic section extended from 27°W eastwards and concluded at 16°16.4'W in shallow waters of about 39 m depth. Stations were carried out at 1/2°-spacing with the omission of 26.5°W, a short southward excursion to the newly established Cape Verdean Time Series site at 17°35.4'N/24°15.1'W, and more dense spacing of about 5' above the shelf break. Normal CTD/LADCP profiles extended down to 1000 m depth (or just above seafloor if shallower than 1000 m), with water

sampling performed only in the upper 600 m of the water column. At six stations (stations 257, 261, 264, 268, 272, 276) full water depth hydrocasts were carried out.

Station programs varied slightly during the cruise but typically started with a 1000 m CTD cast with water samples taken in the upper 600 m only. Often a second CTD cast of the upper 200 m was carried out to provide higher vertical resolution as well as larger water volumes required for biological analyses. With a strong focus on the shelf and shelf break region microstructure profiles were made frequently. A typical microstructure station consisted of three profiles taken consecutively at the same station. Roughly every second to third station phytoplankton and/or zooplankton net hauls were done. At nine stations additional GoFlo casts (4 samplers at standard depths of 20, 40, 60, and 80 m) were carried out for trace-metal clean seawater sampling (dissolved and particulate trace metals, iron solubility and dissolution experiments).

After completion of the long 18°N section, four shorter sections (~2° longitude), all roughly orthogonal to the shelf break, were carried out at 18.5°N, 19°N, 19.5°N, and ~20°N. The station program on the section was similar to the one described above.

Measurements performed on water samples drawn from CTD Niskin bottles include the following parameters (list not exhaustive):

- Salinity
- Helium
- SF_6
- Nutrients (Nitrate, nitrite, phosphate, silicate)
- Dissolved oxygen
- Dissolved inorganic carbon (DIC)
- Total alkalinity
- Dissolved organic carbon and nitrogen (DOC/DON)
- Particulate organic carbon and nitrogen (POC/PON)
- δ^{13}C-POC, δ^{15}N-PON
- Chromophoric dissolved organic matter (CDOM)
- Nitrous oxide (N_2O)
- Hydroxylamine (NH_2OH)
- Dimethylsulphide (DMS), Dimethylsulphoniopropionate (p/d DMSP)
- Hydrogenperoxide (H_2O_2)
- Dissolved Ti, Al
- Iodide, iodate
- Coccolithophorid species abundance
- Diazotroph abundance and activity
- Photosynthetic kinetic parameters (FRRF - Fast repletion rate fluorometry)
- Photosynthetic efficiency (PhytoPAM)
- Phytoplankton pigments
- Flow cytometry (bacteria, pico- and nanoplankton)
- Utermöhl (microphyto- and zooplankton)
- Bacterial community composition (CARD-FISH)
- Bacterial activity (^{3}H-leucine uptake)

- Primary production (^{14}C uptake)

In order to better resolve enhanced turbulence and mixing on the shelf and near the shelf break, two dedicated microstructure transects were carried out (Transect I: 20°15'N/17°44'W – 20°23'N/17°32'W; Transect II: 18°11'N/16°34'W – 18°11'N/ 16°24'W). Along the two transects microstructure profiles were acquired continuously at low ship speed (approx. 1.5 kn) for about 7 h each.

During the RV METEOR Cruise 68/3 two SOLO profiling floats were deployed on behalf of Robert J. Roddy from NOAA/AOML, Physical Oceanography Department in Miami, FL 33149.

A special focus of this cruise was to study diel cycles of biological, chemical and physical properties in surface waters of various biogeochemical settings. For this purpose six 24h drift stations (258, 277, 286, 299, 304, 311) were performed. At the beginning of each station a patch of surface water was marked by co-located deployment of two Langrangian drifters: (1) a surface buoy with radar reflector, radio beacon, flash light and flag that carried one or two wheels for *in situ* incubation of quartz bottles at depths of 5 m and/or 20 m, and (2) a surface drifter of the Surface Velocity Program (SVP) with Argos transmitter, thermistor, and holy sock drogue. The RV METEOR followed the surface drifter (1) by optical, radar and radio means for 24 h. Tracking of the SVP drifter by means of a Gonio Argos receiver turned out to be impractical. The estimated directions and intensities of the intercepted Argos messages (90 s interval) were by far not precise enough for tracking purposes. A post-experiment comparison of the drifter trajectories revealed that the two drifter showed very similar drift behavior. It can therefore be assumed that drifter (1) at which all station work was carried showed Langrangian drift chacteristics. The distance covered during the 24h drift experiment varied from 7 to 27 nm (i.e. 0.27 to 1.09 kts). The two drifter stayed within a distance of 1 to 8 nm whereby the Argos positions of SVP drifter are associated with significantly larger error of sometimes up to 1 nm or more.

A sampling schedule of CTD casts (e.g. at 0:00, 6:00, 12:00, 18:00, 24:00 h), underway sampling and microstructure profiles (e.g. every 3 h) was carried out as close as possible to the drifter (typically 2-4 cables). At the end of each 24h drift station the surface-tethered incubation drifter was recovered. The SVP drifters were not recovered since they are an official component of the Surface Velocity Program provided at no charge by the Physical Oceanography Division of the NOAA/AOML in Miami/FL, USA. These drifters have a typical half life of approx. 1.5 years. Drift trajectories accumulated during the course of the METEOR 68/3 cruise a shown in Fig. 2

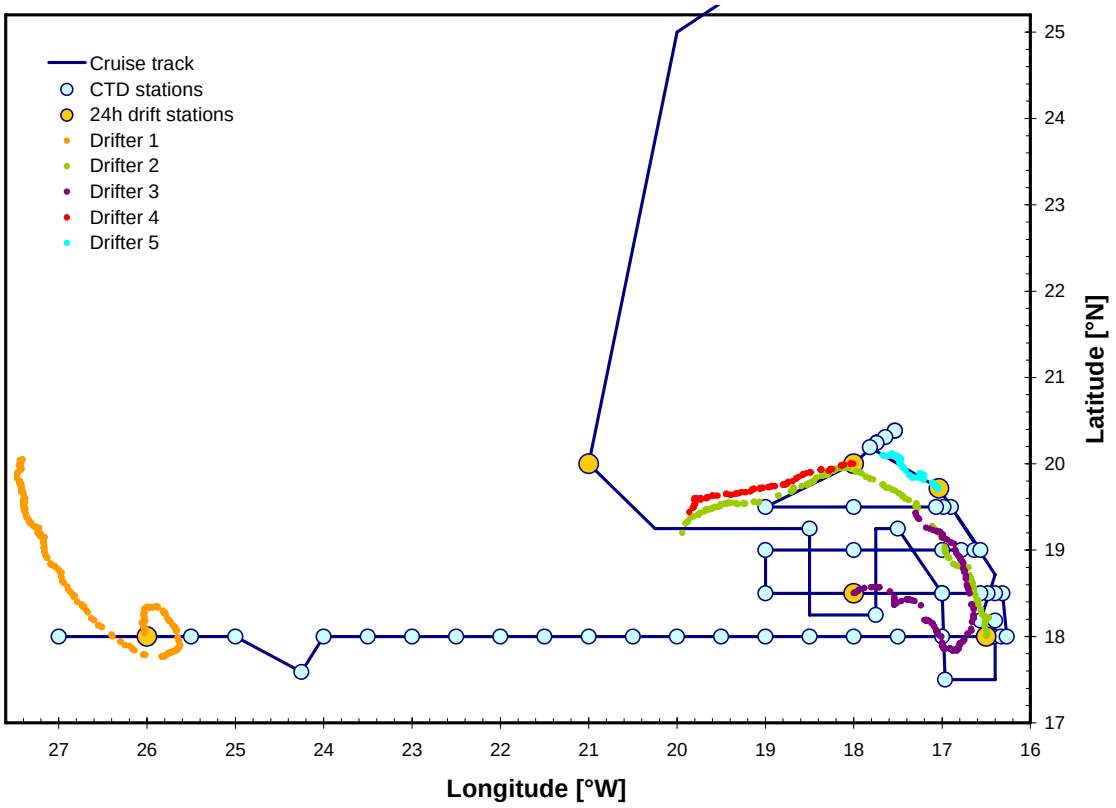

Figure 2: Cruise track of the RV METEOR cruise 68/3 from Mindelo/Cape Verde to Las Palmas de Gran Canaria/Spain (July 12 – August 6, 2006). In addition to the locations of hydrographic stations the trajectories of the SVP surface drifters until early August are shown.

During the entire cruise surface seawater was sampled by means of a submersible pump installed in the ship's moon pool. A small CTD probe was installed next to the intake to provide measurements of surface seawater salinity and temperature. The pumped seawater was used for:

- Continuous pCO_2 measurements using a classical flow-through headspace equilibrator system with NDIR CO_2 detection,
- Continuous pCO_2 measurements using a novel submersible sensor with membrane equilibrator and NDIR CO_2 detection (by Pro-Oceanus Inc., Halifax/Canada),
- Continuous O_2 measurements using a novel oxygen optode (by Aanderaa Instruments, Bergen/Norway),
- Continuous gas tension measurements using a GTD pro gas tension sensor (by Pro-Oceanus Inc., Halifax/Canada),
- Continuous chlorophyll measurements using a submersible MiniTracka fluorescence sensor (Chelsea Instruments, UK),
- Continuous N_2O measurements using a headspace equilibrator with subsequent GC-ECD detection,

- Discrete sampling for other parameters (e.g. nutrients, DIC, total alkalinity, CDOM, chlorophyll, various biological parameters etc.),

Trace-metal clean surface water sampling was accomplished with a tow fish that was lowered into the water by the auxiliary crane on starboard side. Seawater was sampled with an all-teflon membrane pump while the ship was steaming. The pumped seawater was used for trace metal analysis (particularly iron) and for the bioassay work.

A major work component of the biological working groups were a number of dedicated incubation experiments. For this purpose several types of incubators were installed on the working deck and on the forecastle. All incubation devices were fed with large flow rates of surface seawater (through fire extinguishing pumps) to ensure thermostating to near SST and provided with shades for simulation of different light levels. Incubation experiments were performed on the following aspects:

- Long-term (10-day) dark experiments to investigate impact of heterotrophic communities on biogenic trace gas production (jointly with atmospheric working group);
- Possible pathways of biogenic production of iodine and iodinated compounds;
- Impact of variable plankton communities and light intensities on production of inorganic and organic trace gases (jointly with atmospheric working group);
- Bioassays to assess the limitation of nutrients (ammonia, nitrate, phosphate, iron, dust, DOC) under ambient and elevated pCO_2 levels;

In situ light incubations for production of halogenated organic compounds were executed with free-drifting, surface-tethered incubation wheels deployed at 24h drift stations (see description of 24h drift stations above).

The RV METEOR Cruise 68/3 also carried a significant atmospheric program which included the following major components:

- Daily size-segregated aerosol sampling for analysis of major ions, soluble nutrient species (Fe, N, P, Si), and iodine species;
- Analysis of headspace samples from various incubation experiments for CO, non-methane hydrocarbons, volatile oxygenated organics, and volatile halocarbons (together with biological group);
- Micrometeorological measurements of air-sea fluxes (DEC – Disjunct Eddy Covariance, VDEC – Virtual Disjunct Eddy Covariance, REA – Relaxed Eddy Accumulation) with online PTR-MS detection (Proton Transfer Reaction Mass Spectrometry) or cartridge sampling;
- GC-MS measurements of mixing ratios of halogenated compounds in air (CH_3Cl, CH_3Br, CH_3I);
- Aethelometer measurements of black carbon;
- Radon measurements with thorium-daughter detection system;
- GC-FIC measurements of methane.

Due to perfect performance of the CTD-rosette system and the winches the intended station program of RV METEOR Cruise 68/3 was overachieved. No down-time due to technical problems or bad weather had to be accommodated in the work program. All groups bring home a rich data harvest and mostly achieved their work plans. Only a few technical problems with instrumentation caused significant and in one case fatal damage to scientific components of the M68/3 undertaking. Overall the mission has been very successful and extremely pleasant.

RV METEOR reached Las Palmas de Gran Canaria in the early morning of August 6 (0800L) and the usual container packing chaos quickly unfolded. The scientific party disembarked in the afternoon.

I would like to conclude this short cruise report with my very best thanks to

- Mr. Jemal Ould Abed, our Mauritanian observer, for good cooperation and spirit;
- the scientific party for high motivation, endurance and team spirit; and
- the RV METEOR cruise for outstanding performance and cooperativeness well beyond the call of duty;

On the occasion of the very last cruise of Captain Martin Kull I also address to him my sincere thanks for a great service to the German oceanographic community and my very best wishes for the upcoming years – less stressfull, more easygoing but still with the same unfailing energy and motivation.

Table 1: CTD/LADCP stations

Ship expocode	Station No.	CTD Profile No.	Date Start UTC	Time Start UTC	Lat. Degrees Start	Lat. Minutes Start	Lon. Degrees Start	Lon Minutes Start	Water depth	Max pressure	No. Of Bottles
06ME68/3	**256**	1	12.07.2006	20:29	16° N	58.2'	25° W	29.6'	1977.0	301.0	21
06ME68/3	**257**	2	13.07.2006	06:50	17° N	59.9'	27 °W	0.1'	4326.0	401.0	21
06ME68/3	**257**	3	13.07.2006	08:27	17° N	59.9'	27 °W	0.1'	4325.0	4256.0	21
06ME68/3	**258**	4	13.07.2006	21:20	18 °N	0.1'	26 °W	0.1'	3892.0	1006.0	21
06ME68/3	**258**	5	14.07.2006	00:34	18 °N	2.6'	26 °W	1.8'	3891.0	202.0	21
06ME68/3	**258**	6	14.07.2006	06:35	18 °N	4.8'	26 °W	2.1'	3911.0	198.0	21
06ME68/3	**258**	7	14.07.2006	09:32	18 °N	5.6'	26 °W	3.1'	3920.0	200.0	21
06ME68/3	**258**	8	14.07.2006	12:34	18 °N	7.6'	26 °W	3.3'	3924.0	201.0	21
06ME68/3	**258**	9	14.07.2006	15:31	18 °N	9.7'	26 °W	2.7'	3927.0	201.0	21
06ME68/3	**258**	10	14.07.2006	18:29	18 °N	10.1'	26 °W	2.3'	3925.0	200.0	21
06ME68/3	**258**	11	14.07.2006	21:31	18 °N	10.8'	26 °W	2.0'	3932.0	200.0	21
06ME68/3	**259**	12	15.07.2006	02:12	18 °N	0.1'	25 °W	30.0'	3464.0	1003.0	21
06ME68/3	**260**	13	15.07.2006	06:37	18 °N	0.0'	25 °W	0.1'	3649.0	997.0	21
06ME68/3	**261**	14	15.07.2006	20:01	17 °N	36.5'	24 °W	16.2'	3604.0	11.0	21
06ME68/3	**261**	15	15.07.2006	20:17	17 °N	36.8'	24 °W	16.0'	3606.0	401.0	21
06ME68/3	**261**	16	15.07.2006	21:52	17 °N	37.4'	24 °W	15.7'	3606.0	3584.0	21
06ME68/3	**262**	17	16.07.2006	06:55	18 °N	60.0'	24 °W	0.0'	3651.0	1006.0	21
06ME68/3	**263**	18	16.07.2006	13:00	17 °N	59.5'	23 °W	30.2'	3797.0	1001.0	21
06ME68/3	**264**	19	16.07.2006	17:05	18 °N	0.1'	23 °W	0.2'	3501.0	400.0	21
06ME68/3	**264**	20	16.07.2006	18:25	18 °N	0.1'	23 °W	0.6'	3505.0	3501.0	21
06ME68/3	**265**	21	17.07.2006	01:00	17 °N	59.8'	23 °W	30.3'	3333.0	1001.0	21
06ME68/3	**266**	22	17.07.2006	06:30	18 °N	0.1'	22 °W	0.1'	3296.0	1002.0	21
06ME68/3	**267**	23	17.07.2006	13:00	17 °N	59.7'	21 °W	30.2'	3185.0	991.0	21
06ME68/3	**268**	24	17.07.2006	17:00	17 °N	60.0'	21 °W	0.1'	3075.0	399.0	21
06ME68/3	**268**	25	17.07.2006	18:23	18 °N	0.3'	21 °W	0.7'	3071.0	3040.0	21
06ME68/3	**269**	26	18.07.2006	00:39	18 °N	0.0'	20 °W	30.0'	3120.0	998.0	21
06ME68/3	**270**	27	18.07.2006	06:03	18 °N	0.2'	20 °W	1.1'	3200.0	994.0	21
06ME68/3	**271**	28	18.07.2006	12:00	17 °N	59.4'	19 °W	30.3'	3227.0	989.0	21
06ME68/3	**272**	29	18.07.2006	17:00	18° N	0.0'	19° W	0.0'	3139.0	387.0	21
06ME68/3	**272**	30	18.07.2006	18:20	18 °N	0.5'	19 °W	1.0'	3151.0	3156.0	21
06ME68/3	**273**	31	19.07.2006	00:42	17 °N	60.0'	18 °W	30.0'	3028.0	1001.0	21
06ME68/3	**274**	32	19.07.2006	06:18	17 °N	59.9'	18 °W	0.0'	2804.0	1005.0	21
06ME68/3	**275**	33	19.07.2006	11:50	17 °N	60.0'	17 °W	30.2'	2517.0	1003.0	21
06ME68/3	**276**	34	19.07.2006	16:00	18 °N	0.0'	17 °W	0.0'	1712.0	401.0	21
06ME68/3	**276**	35	19.07.2006	17:16	17 °N	59.9'	17 °W	0.4'	1730.0	1700.0	21
06ME68/3	**277**	36	19.07.2006	22:35	18 °N	0.5'	16 °W	29.9'	193.0	182.0	21
06ME68/3	**277**	37	20.07.2006	04:00	18 °N	3.7'	16 °W	29.9'	190.0	178.0	21
06ME68/3	**277**	38	20.07.2006	10:45	18 °N	9.1'	16 °W	30.8'	185.0	161.0	21
06ME68/3	**277**	39	20.07.2006	15:52	18 °N	13.8'	16 °W	32.1'	199.0	192.0	21
06ME68/3	**277**	40	20.07.2006	22:07	18 °N	18.0'	16 °W	33.1'	202.0	181.0	21
06ME68/3	**278**	41	21.07.2006	01:15	18 °N	0.3'	16° W	25.1'	107.0	101.0	21
06ME68/3	**279**	42	21.07.2006	02:47	18 °N	0.2'	16° W	20.0'	72.0	75.0	21
06ME68/3	**280**	43	21.07.2006	04:20	18 °N	3.1'	16 °W	16.4'	39.0	37.0	21
06ME68/3	**281**	44	21.07.2006	07:09	18 °N	30.0'	16 °W	19.0'	39.0	26.0	21
06ME68/3	**282**	45	21.07.2006	08:14	18 °N	30.1'	16 °W	24.1'	56.0	50.0	21
06ME68/3	**283**	46	21.07.2006	09:25	18 °N	30.1'	16 °W	29.1'	85.0	80.0	21
06ME68/3	**284**	47	21.07.2006	11:18	18 °N	29.6'	16 °W	34.6'	182.0	160.0	21
06ME68/3	**285**	48	21.07.2006	15:29	18 °N	30.0'	17 °W	0.0'	1611.0	47.0	21
06ME68/3	**285**	49	21.07.2006	16:01	18 °N	30.4'	17 °W	0.0'	2686.0	992.0	21
06ME68/3	**286**	50	22.07.2006	00:34	18 °N	30.7'	17° W	58.6'	2624.0	1001.0	21
06ME68/3	**286**	51	22.07.2006	06:30	18 °N	31.5'	17° W	53.0'	2484.0	206.0	21
06ME68/3	**286**	52	22.07.2006	13:59	18 °N	30.7'	17 °W	44.6'	2517.0	199.0	21
06ME68/3	**286**	53	22.07.2006	18:58	18 °N	29.4'	17 °W	39.8'	2433.0	245.0	21
06ME68/3	**286**	54	22.07.2006	23:41	18 °N	25.4'	17 °W	33.1'	2433.0	199.0	21
06ME68/3	**287**	55	23.07.2006	09:06	18 °N	29.9'	19 °W	0.0'	3046.0	996.0	21
06ME68/3	**288**	56	23.07.2006	14:21	18 °N	59.8'	19 °W	0.4'	3005.0	1001.0	21
06ME68/3	**289**	57	23.07.2006	20:37	19 °N	0.1'	17 °W	60.0'	2551.0	1003.0	21
06ME68/3	**290**	58	24.07.2006	04:05	19 °N	0.2'	17 °W	0.1'	1172.0	801.0	21
06ME68/3	**291**	59	24.07.2006	06:39	19 °N	0.1'	16 °W	47.1'	194.0	180.0	21
06ME68/3	**292**	60	24.07.2006	09:36	19 °N	0.1'	16 °W	38.0'	85.0	80.0	21
06ME68/3	**293**	61	24.07.2006	12:39	19 °N	0.4'	16 °W	33.8'	67.0	61.0	21
06ME68/3	**294**	62	24.07.2006	20:22	19 °N	30.0'	16 °W	54.1'	72.0	71.0	21
06ME68/3	**295**	63	24.07.2006	21:49	19 °N	30.0'	16 °W	59.1'	103.0	98.0	21
06ME68/3	**296**	64	24.07.2006	23:25	19 °N	30.1'	17 °W	4.0'	552.0	449.0	21
06ME68/3	**297**	65	25.07.2006	06:29	19 °N	30.0'	18 °W	0.3'	2322.0	1001.0	21
06ME68/3	**298**	66	25.07.2006	12:56	19 °N	30.1'	19 °W	0.1'	2975.0	1003.0	21
06ME68/3	**299**	67	26.07.2006	00:32	19 °N	59.7'	18 °W	2.6'	1943.0	1020.0	21
06ME68/3	**299**	68	26.07.2006	06:31	19 °N	57.8'	18 °W	6.0'	2002.0	200.0	21
06ME68/3	**299**	69	26.07.2006	13:01	19 °N	56.1'	18 °W	11.2'	2164.0	200.0	21
06ME68/3	**299**	70	26.07.2006	19:06	19 °N	53.0'	18° W	16.0'	2289.0	201.0	21
06ME68/3	**299**	71	26.07.2006	23:29	19 °N	51.7'	18 °W	20.7'	2401.0	201.0	21
06ME68/3	**300**	72	27.07.2006	12:35	20 °N	23.1'	17 °W	32.0'	64.0	50.0	21

Table 2: Microstructure stations

Date	Station	CTD cast	Water depth	Time	Start latitude		Start longitude		MSS profiles	max pressure
[UTC]	No.	No.	[m]	[UTC]	degrees N	minutes N	degrees W	minutes W	No.	[dbar]
13.07.2006	**257**	3	4317	11:49	18	1.24	26	59.27	1_3	249
13.07.2006	**258**	4	3891	22:40	18	1.17	25	59.83	4-6	234
14.07.2006	**258**	5	3903	01:15	18	2.90	26	1.90	7-9	245
14.07.2006	**258**	6	3915	07:20	18	5.27	26	2.27	10-12	261
14.07.2006	**258**	7	3924	10:18	18	6.05	26	3.47	13-15	276
14.07.2006	**258**	8	3921	13:15	18	8.01	26	2.90	16-18	251
14.07.2006	**258**	9	3923	16:11	18	9.70	26	2.00	19-21	253
14.07.2006	**258**	10	3928	19:15	18	10.36	26	1.94	22-24	308
19.07.2006	**277**	36	195	23:14	18	0.64	16	29.86	25-27	185
20.07.2006	**277**	36	124	02:39	18	2.97	16	29.19	28-30	124
20.07.2006	**277**	37	189	04:35	18	4.30	16	30.00	31-33	168
20.07.2006	**277**	38	179	10:05	18	8.90	16	30.68	34-36	167
20.07.2006	**277**	38	206	14:30	18	12.60	16	32.10	37-39	212
20.07.2006	**277**	39	212	18:00	18	15.70	16	32.81	40-42	213
21.07.2006	**278**	41	106	01:35	18	0.80	16	24.90	43-46	98
21.07.2006	**279**	42	78	03:07	18	0.80	16	20.10	47-49	72.9
21.07.2006	**282**	45	55	08:32	18	30.49	16	24.15	50-52	53
21.07.2006	**283**	46	88	09:46	18	30.46	16	29.33	53-55	85
21.07.2006	**284**	47	172	10:45	18	29.55	16	33.98	56-58	170
24.07.2006	**291**	59	219	07:35	19	0.11	16	47.79	59-62	170
24.07.2006	**292**	60	84	09:59	19	0.16	16	38.02	63-66	78.8
24.07.2006	**293**	61	66	13:02	19	0.39	16	33.91	67-71	63
24.07.2006	**294**	62	73	20:44	19	30.03	16	54.16	72-76	68
24.07.2006	**295**	63	102	22:14	19	30.21	16	59.44	77-80	99
25.07.2006	**296**	64	550	00:17	19	30.85	17	4.29	81-83	258
27.07.2006	**after 299**	Transect 1	522	05:44	20	15.18	17	44.06	84-89	278
27.07.2006	**after 299**	Transect 1	396	07:38	20	16.68	17	41.48	90-103	231
27.07.2006	**after 299**	Transect 1	89	09:52	20	19.50	17	37.28	104-117	84.1
27.07.2006	**after 299**	Transect 1	72	11:26	20	21.76	17	33.88	118_131	66.8
28.07.2006	**304**	80	81	19:17	19	44.67	17	3.67	132-145	80.2
29.07.2006	**after 305**	Transect 2	416	12:40	18	11.01	16	33.39	146-150	229
29.07.2006	**after 305**	Transect 2	83	16:38	18	11.00	16	25.20	151-175	93
29.07.2006	**after 305**	Transect 2	122	19:10	18	10.78	16	29.07	176-178	124
29.07.2006	**after 305**	Transect 2	152	19:46	18	10.88	16	30.16	179-181	153.4
29.07.2006	**after 305**	Transect 2	176	20:28	18	11.39	16	30.99	182-184	201.9
01.08.2006	**311**	90	3735	21:06	20	0.38	20	59.87	185-187	341
02.08.2006	**311**	91	2729	01:28	19	59.80	20	59.60	188.19	309
02.08.2006	**311**	92	3727	03:08	19	59.20	21	0.20	191-193	311
02.08.2006	**311**	93	3733	06:21	19	59.66	21	1.31	194-196	311.5
02.08.2006	**311**	93	3737	09:19	19	59.94	21	1.16	197-199	274.1
02.08.2006	**311**	94	3736	12:17	20	0.11	21	0.27	200-202	190
02.08.2006	**311**	94	3736	14:14	20	0.10	20	59.50	203-205	299
02.08.2006	**311**	95	3727	18:30	19	59.39	20	59.78	206-208	294
02.08.2006	**311**	96	3724	21:20	19	58.35	20	54.46	209-211	250

Table 3: Vertical phytoplankton and zooplankton net hauls

Station no.	*PN*	*ZPN*	*Latitude*			*Longitude*		
			°	*'*	*N/S*	*°*	*'*	*W/E*
256	X		18	0.02	N	26	59.96	W
	X		18	0.08	N	26	59.89	W
260	X		18	0.59	N	25	0.08	W
		X	18	0.78	N	25	0.32	W
		X	18	0.82	N	25	0.45	W
266	X		18	0.20	N	21	59.96	W
		X	18	0.20	N	21	59.91	W
		X	18	0.25	N	21	59.94	W
270	X		17	59.97	N	20	0.42	W
		X	18	0.13	N	20	0.66	W
		X	18	0.22	N	20	0.81	W
274		X	17	59.95	N	18	0.06	W
		X	18	59.98	N	18	0.01	W
	X		17	59.95	N	17	59.99	W
277	X		18	13.60	N	16	32.20	W
284	X		18	29.92	N	16	35.37	W
		X	18	30.00	N	16	35.44	W
		X	18	30.10	N	16	35.50	W
286	X		18	32.20	N	17	46.31	W
287		X	18	30.15	N	19	2.11	W
		X	18	30.13	N	19	2.52	W
288	X		18	59.90	N	19	0.20	W
	X		18	59.90	N	19	0.30	W
293	X		19	0.21	N	16	33.80	W
		X	19	0.22	N	16	33.82	W
		X	19	0.29	N	16	33.81	W
297	X		19	30.10	N	18	0.07	W
		X	19	30.02	N	18	0.17	W
		X	19	29.99	N	18	0.21	W
299	X		19	54.05	N	18	14.53	W
		X	19	52.63	N	18	17.60	W
		X	19	52.60	N	18	17.82	W
303	X		20	12.47	N	17	43.67	W
305	X		18	11.41	N	16	34.23	W
	X		18	11.10	N	16	33.60	W
306		X	17	29.86	N	16	58.80	W
		X	17	29.77	N	16	58.88	W
307	X		18	29.90	N	17	0.30	W
308		X	19	15.05	N	17	30.24	W
		X	19	15.10	N	17	30.25	W
309	X		18	15.18	N	17	45.14	W
		X	18	15.07	N	17	45.10	W
		X	18	15.02	N	17	45.09	W
311		X	20	0.10	N	21	0.10	W
		X	20	0.10	N	21	0.30	W
		X	19	58.10	N	20	58.02	W

Table 4: GoFlo casts (trace metal clean water sampling)

Station no.	*Bottle depths*				*Latitude*			*Longitude*		
					°	*'*	*N/S*	*°*	*'*	*W/E*
261	20	40	60	80	17	37.36	N	24	15.68	W
264	20	40	60	80	18	0.12	N	23	0.59	W
268	20	40	60	80	18	0.19	N	21	0.68	W
272	20	40	60	80	18	0.48	N	19	0.90	W
277	20	40	60	80	18	16.71	N	16	32.68	W
284	20	40	60	80	18	29.81	N	16	35.25	W
289	20	40	60	80	19	0.13	N	18	0.02	W
307	20	40	60	80	18	29.30	N	17	1.70	W
311	20	40	60	80	19	59.20	N	20	59.96	W

Table 5: Surface drifter deployments (SVP – Surface Velocity Program)

Argos ID	*WMO #*	*Date*	*Time*	*Longitude*	*Latitude*	*Sensors*
		dd.mm.yy	*UTC*			
62279	13640	14.07.06	00:12	26 º 01,50 ' W	18 º 02,28 ' N	T
62278	13639	19.07.06	22:15	18 º 29,92 ' W	18 º 00,30 ' N	T
62277	13638	21.07.06	22:10	17 º 59,82 ' W	18 º 30.20 ' N	T
62276	13637	25.07.06	21:16	18 º 00,33 ' W	19 º 59.96 ' N	T
62275	13636	27.07.06	23:21	17 º 03,27 ' W	19 º 4,15 ' N	T

Table 6: Profiling float deployments (ARGO)

Float S/N	*WMO*	*ID (DEC)*	*Date*	*Time*	*Longitude*	*Latitude*	*Sensors*	*Depth*	
			dd.mm.yy	*UTC*				*Park*	*Profile*
604	WHOI SOLO		18.07.06	16:30	19 º 01,00 ' W	18 º 00,00 ' N	T/S/P	1000	1100
551	WHOI SOLO		02.08.06	23:52	20 º 59.43 ' W	19 º 58,03 ' N	T/S/P	1000	1100