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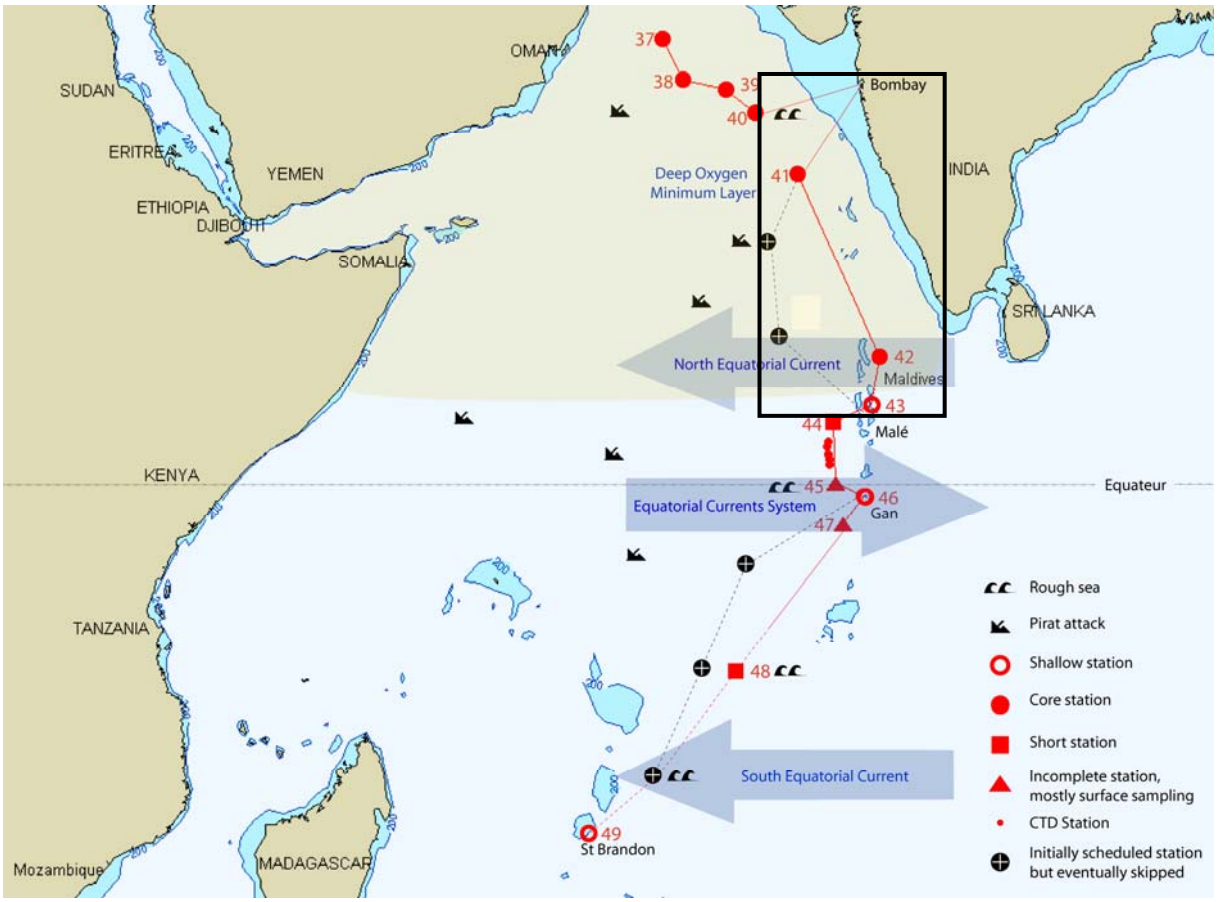
CHIEF SCIENTIST'S SUMMARY REPORT

CRUISE OBJECTIVES

The sampling between Mumbai and Male aims at collecting and describing planktonic organisms - ranging from viruses to macro-zooplankton - and of physico-chemical characteristics of the water column in the tropical Indian Ocean north of the Equateur. The layer of Oxygen Minimum Zone that still appears in this part of the North Indian Ocean was sampled (Fig. 1).



MAJOR ACHIEVEMENTS & FINDINGS

As Tara was not authorized to sample in the Indian EEZ, we initially planned to sampled close to the Indian EEZ limit heading south towards the Maldives (Fig. 1). It comprises two stations locations in the frontal zones – with cyclonic eddy and filaments - between the arabian sea surface waters and the sligthy warmer and fresher water originating the the north eastern Indian ocean and flowing west with the north equatorial current. The third station was located in the north equatorial current downstream of the eight degree channel

However due a unexpected recrudecence of piracy activity close to the Indian and Maldivian EEZs, the plan was changed after the first station, and two new stations were made in the Maldivians water prior to reach Malé (Fig. 2). The excellent weather and sea state conditions allowed the good and complete execution of the stations.

The first station was a standard deep core station done around 14°35'N 69°58'E. The lagrangian approach using the Argos buoy of Gilles Reverdin set up during the previous leg was used. The night

work with nets was performed the preceeding day (march 29), and the rest day time operations (CTD casts, rosette and pump water sampling, nets) were carried out on March 30.

The second core station was done in the northern Maldives at 06°00'N 73°54'E southeast of the eight degree channel.

The thrid station was a shallow station (50 m water depth) done in a lagoon in the northern part of the Malé atoll at 04°N39.6' 73°29.1'E. We took the opportunuity to make this type of coastal station as little time was left, and

The utilisation of the Mercator focast map of sea-surface chlorophyll was very helpfull in the positioning of the station with respect to the major surface current and hydrological patterns.

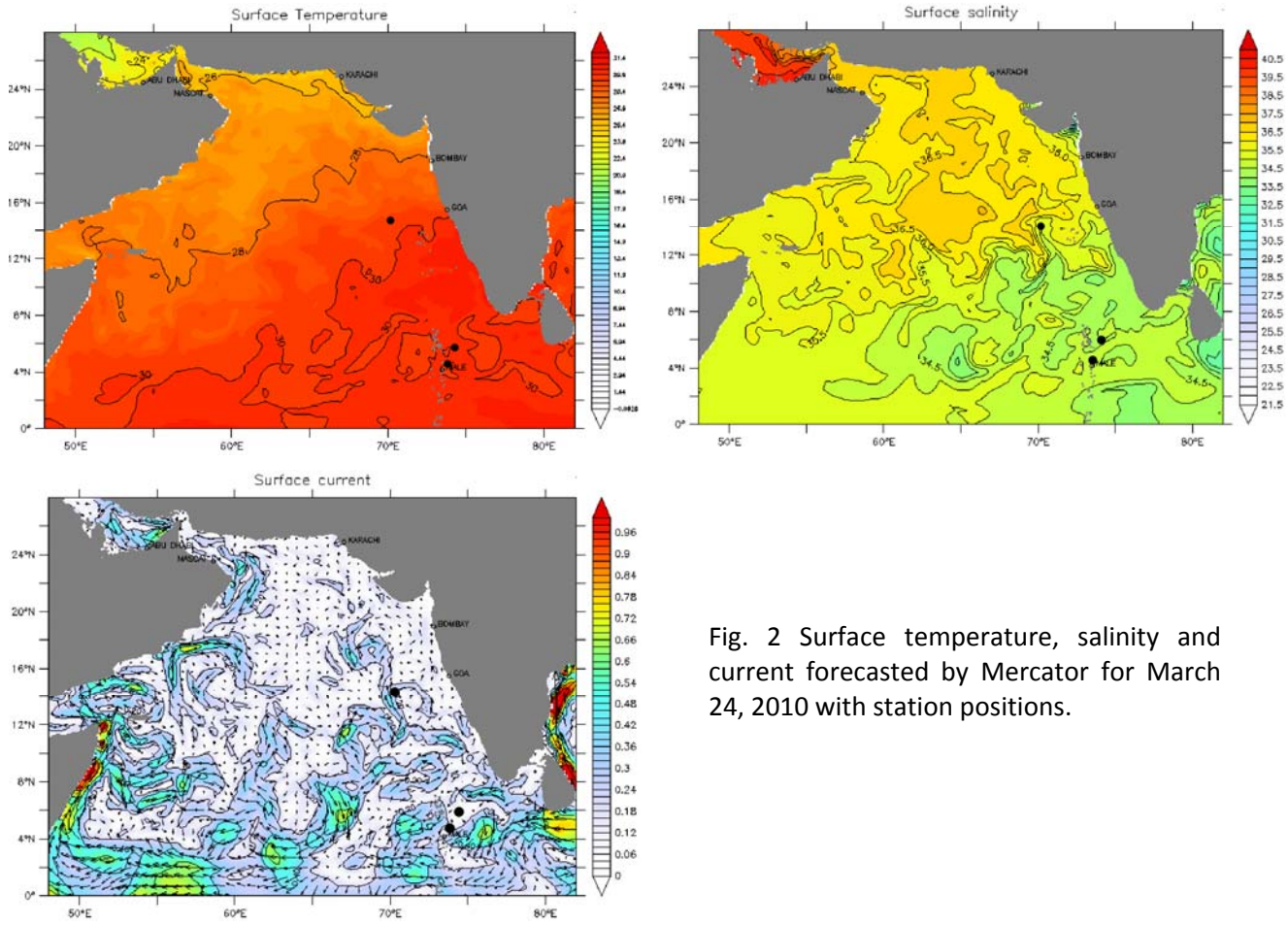


Fig. 2 Surface temperature, salinity and current forecasted by Mercator for March 24, 2010 with station positions.

MAJOR CONCERNS & ACTIONS TO TAKE

The major concerns of this leg were of both nature. Firstly, the unexpected burst of piracy activity in this region did not allow the realisation of the initially scheduled plan, and constrain us to run away towards safer water. Unfornulately the lack of autorization to work in the Indian EEZ led to an absence of stations between 15° and 8°N. Furthermore, we did not know until the last moment if we had the autorisation to sample in the Maldivian EEZ. It is critical for the programming and achievement of the workplan to get the autorisation long before the beginning of the leg.

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PARTICIPANTS

	ROLE	NAME, Surname, Affiliation
1	CREW- Captain	BOURMAUD Hervé, Tara expeditions
2	CREW- 1st Officer	MENARD Mathilde, Tara expeditions
3	CREW- Deck officer	BRACQ Guillaume, Tara expeditions
4	CREW- Chiel engineer	DANIEL Julien, Tara expeditions
6	CREW- Cook	GIRARDOT Julien, Tara expeditions
7	CREW- Media	BASTION Jérome, Tara expeditions
7	CREW- Artist	FLAHAULT Benjamin
10	SCIENCE- Chief Scientist	DURRIEU DE MADRON Xavier, CNRS Perpignan
11	SCIENCE- Oceanography Engineer	PICHERAL Marc, CNRS Villefranche/mer
12	SCIENCE- Optical Engineer	GUIGAND Cédric, Univ. Miami, USA
13	SCIENCE- Biology Engineer	DIMIER Céline, CNRS Roscoff
14	SCIENCE- Biology	THOMPSON Anne, MIT, USA
15	SCIENCE- Backup	PESANT Stephane, Univ. Bremen, Germany
16	SCIENCE- Backup	ARSLAN Defne, CNRS Marseille
17	Maldivian Observer	ZYAD Adam, Marine Research Center Malé

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GENERAL DIVISION OF WORK

RESPONSIBILITIES	**NAME**
LOGISTICS – Planning, quality assurance, data & metadata archives	Chief Sci. DURRIEU DE MADRON Xavier
LOGISTICS – Consumables and samples storage & inventories	Biol. Eng. DIMIER Céline
BGC – Nutrients	Chief Sci. DURRIEU DE MADRON Xavier
BGC – Carbonates	Chief Sci. DURRIEU DE MADRON Xavier
BGC – Hg	Chief Sci.*NOT SAMPLED*
BGC – OM Lugol/Formol	Chief Sci. DURRIEU DE MADRON Xavier
BGC – Cultures	Chief Sci. DURRIEU DE MADRON Xavier
BGC – HPLC	Chief Sci. DURRIEU DE MADRON Xavier
META – Metagenomic	Opt. Eng. GUIGAND Cédric
META – Taxo Genetic	Opt. Eng. GUIGAND Cédric
META – Taxo Morphology	Opt. Eng. GUIGAND Cédric
BACT – GIRUS – VIRUS	THOMPSON Anne
PROT – dDNA	Biol. Eng. DIMIER Céline
IMAG – FlowCam	Opt. Eng. GUIGAND Cédric
IMAG – Macroscopy	Opt. Eng. GUIGAND Cédric
IMAG – SeaFlow	Opt. Eng. *NOT WORKING*
IMAG – SPIM	Opt. Eng. *NOT WORKING*
OCEANO – Rosette	Oceano. Eng. PICHERAL Marc
OCEANO – Nets	Oceano. Eng. PICHERAL Marc
OCEANO – Pump	Oceano. Eng. PICHERAL Marc
OCEANO – TSRB	Oceano. Eng. PICHERAL Marc
OCEANO – ARGO floats	Oceano. Eng. PICHERAL Marc
OCEANO - TSG	Oceano. Eng. PICHERAL Marc
OCEANO – FRRF	Oceano. Eng. PICHERAL Marc
OCEANO – ACS	Oceano. Eng. PICHERAL Marc

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CALENDAR OF ACTIVITIES

DATE (MMDD)	ACTIVITY	COMMENTS
March 27	Departure from Mumbai Sailing toward station 41	Good weather
March 28	Sailing toward station 41	Good weather
March 29	Core station 41 work at night with nets	Good weather
March 30	Core station 41 work during the day	Good weather
March 31	Sailing toward station 42	Good weather
April 01	Sailing toward new station 42	Cancelation of initially scheduled stations 42 and 43 because of nearby pirat activity. Crossing through indian EEZ to reach new station position in Maldivian EEZ Good weather
April 03	Sailing toward new station 42	Sailing toward new station 42 in Maldivian EEZ Clearance in Uligan atoll and pick up of Maldivian observer Good weather
April 04	Core station 42	Good weather
April 05	Shallow station 43	Opportunuity to make a short station in a shallow lagoon north of the Male atoll during the short remaining time. Good weather
April 06	Arrival and landing in Male	Good weather

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GENERAL ASSESSMENT, SPECIFIC CONCERNS & ACTIONS TO TAKE

LIFE ONBOARD

Chief of science (Xavier Durrieu de Madron). Somehow, life onboard was tiring due to the excessive heat and moisture, which led to lack of sleep.

Biological engineer (Céline Dimier). No problem with life onboard occurred during the leg from Mumbai to Malé.

Optical enginee (Cedric Guiguand). Very good, good crew and good spirit

COMMUNICATION (ONBOARD and WITH LAND)

Biological engineer (Céline Dimier). Communication between scientist was good, with talks lead by scientist on various subjects.

Optical enginee (Cedric Guiguand) Science group and sailors communicate well. Science team members have more difficulty communicating among each other this is mainly due to the regular change of science team members the transition takes time.

SECURITY

Biological engineer (Céline Dimier). Security rules have been clearly explained when I arrived onboard. They were quite well respected by everyone (lifejacket, secure shoes, etc…).
In areas potentially submitted to pirates attacks, the watch was re-inforced during the night (with 3 people instead of 2) and during the day as well.

Optical enginee (Cedric Guiguand). Security and safety measures were respected at all time. Especially for equipment deployment

SAMPLING STRATEGY

Biological engineer (Céline Dimier). Sampling strategy was defined according to the pirates attacks occurring in the Indian ocean. Station location was modified to avoid these attacks. The strategy applied during this leg was 2 core stations and 1 core station with only one depth.

Optical enginee (Cedric Guiguand). The large quantity and variety of samples can be confusing at times.

STATION PREPARATION

Chief of science (Xavier Durrieu de Madron). The use of the bar-coding systems was confusing at first, but appeared logical later on.

Biological engineer (Céline Dimier). Good preparation of the stations within the scientist team. A meeting lead by the chief scientist explained to everybody the location and the sampling strategy applied during the station.

Optical enginee (Cedric Guiguand). Good

ACTIVITIES ON DECK (e.g. instruments, protocols, timing)

Chief of science (Xavier Durrieu de Madron). The number and rapid succession of tasks devoted to the chief scientist during the station (especially core station) might be confusing for newcomers. A time of adaptation and the help of somebody who knows the work is needed. I was fine after the first station.

Biological engineer (Céline Dimier). From the protist point of view, timing was optimized to prevent samples from staying at sun and heat for a long time. Protocoles for RNA and DNA were slightly modified to improve the Genoscope analysis. For all fractions, cryotube were fully filled with RNA later.
After filtration, RNA and DNA samples were flash frozen in liquid nitrogen and then immediately stored at -20°C. In addition, for big fractions (20 and 180 um), the 4 filters were divided into 2 cryotubes instead of being pulled togther in one.

Optical enginee (Cedric Guiguand). Excellent

ACTIVITIES IN THE WETLAB (e.g. instruments, protocols, timing)

Biological engineer (Céline Dimier). No problem with protocols, instruments or timing.

ACTIVITIES IN THE DRYLAB (e.g. instruments, protocols, timing)

Optical enginee (Cedric Guiguand). A few problems to address:

- The macroscope needs a dark field illuminator in order to capture good images of plankton
- The flowcam need a new key board otherwise it works very well. The pump dial seem to be a bit offset it seems slower than the protocol indicates.
- No instruction or protocol for the SPIM?
- The Canon camera and the macro equipment are buried inside the forward hold and the small mess supposed to be used to set up a photo bench is always busy with other activities.
- The seaflow is not functional at this time

EQUIPMENT & CONSUMABLES (e.g. filters, tubes, chemicals)

Biological engineer (Céline Dimier). Filters (PC 47 mm 10 um and PC 47 mm 3 um) , as well as lugol were brought by Dr Chris Bowler in Mumbai, so that we did not lack them. We lack glutaraldehyde aliquots but a frozen stock allowed us to prepare some.

Optical enginee (Cedric Guiguand). Need more insect forceps for manipulating plankton under the scope

SAMPLE STORAGE

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Biological engineer (Céline Dimier). Fridge is full with samples. LN2 tank is also full of samples. Last station samples were not put in the canister because space was lacking. They were directly thrown in the LN2 tank.

Optical enginee (Cedric Guiguand). Good, considering the challenge of small multifunction space

METADATA & DATA

Optical enginee (Cedric Guiguand). Lots of data coming from lots of different instruments: need very good record keeping and back ups

OTHER

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Deck Engineer Report

Abu Dhabi - Male

2010/04/05

Marc Picheral

1 DRY Lab and Underway

1.1 AC and DC power issues

We had a lot of power cut during first week. Even the 24 DC was not stable to keep instruments running briefly. We (Herve B. Romain T.) decided to keep the main AC generator running all time. All trials to turn it off ended with problems in the Dry Lab.

1.2 Data backup

A new USB drive (500 Gb provided with the ACS) is now installed behind the ACS computer. The SyncBack application has been installed on the 3 PCs and a backup task defined.

I backup data from ACS, TSG and FRRF every day. I start and connect the USB drive to each of the PCs successively and run the SyncBack task.

The data are then copied to the Iomega #1 or #2 drive to be brought back to Villefranche.

1.3 Lab organization

I have cleared and attached the cables linking the different instruments in the drylab.

1.4 Pumping and flow rates

As Jennifer had some problems reaching the necessary pressure to start the SeaFlow when the pumping is OFF, we added a vane (vane 19) between the pump and the ACS to allow starting the pump without flushing the ACS with seawater. This option is useful when ACS has been cleaned in port and people want to test the SeaFlow. This vane must be kept opened when ACS is in use.

We had many problems running the drylab cooling. The seawater intake for the cooling has thus been moved to the front peak manifold. We now reach higher flow rates in the ACS (> 6L/min) and no problem with the cooling running continuously now.

1.5 TSG

1.5.1 TSG GPS

I installed a new CArmin GPS directly connected to the SBE interface box. Its antenna is placed close by the FRRF antenna below the deck window. The position of the antenna is critical. It cannot be

placed vertically on the sides. I removed the connection to the NMEA splitter as the data are no longer utilized by any other system than the TSG. I kept experimenting NMEA problems quite often. The consequence is a frequent loss of data when the Seasave application is not restarted. I now "capture" all frames in SEATERM and clean the files manually before processing for CORIOLIS.

If too many corrupted frames are displayed in Seaterm, I recommend switching ON/OFF the interface box and the TSG breaker in the pink box.

The *.cap files are acquired in the RAWFULL folder and the manually cleaned daily files are stored in the RAW DAILY CORRECTED folder.

I sent files everyday to CORIOLIS.

1.5.2 TSG cleaning

G. Reverdin noticed that the GPS drifted of more than 0.15 PSU since Tara left Lorient. No cleaning procedure was defined for the TSG. I cleaned the TSG and the difference between CTD and TSG remains now - 0.01.

We now consider that the TSG must be cleaned at least on a monthly base. The last cleaning date is reported. The TSG must be removed for proper cleaning using TRITON at 40°C according to SBE recommendations (App. Note printed in the DryLab and available in the Oceano_3 PC)

1.6 ACS

1.6.1 Laptop

A new DELL laptop was received in AbuDhabi. This PC is running with VISTA. The Valve Controll application was not tested for VISTA and was finally not compatible with this OS. I set back the old PC and added a "cooling" table below the computer.

I experienced very few Time Out errors on the ACS. They probably results from a 24 VDC power drop. The ACS breaker must be reset ON/OFF and Compass acquisition restarted. I added a USB hub to facilitate the connexion with the USB drive for backup.

1.6.2 Filters

A box containing new filters has been delivered in Abu Dhabi. I replaced the filter and cleaned the ACS on a weekly base.

1.7 FRRF

1.7.1 Water flow

I experienced many problems to get the water flowing through the instrument. I initially used the pump to both extract (as recommended) and push water into the instrument. This option had the risk to flush the instrument with seawater. I also moved the water intake vane 6 from a top to a bottom position. It did not help much. I then opened the reduction just after the vane and found much big stuff that can obstruct the 3 mm tube. This cleaning should now be performed on a weekly

base with the ACS cleaning and in case of pumping issues. In addition the outflow connexion on the FRRF sampling cell had an air intake that we only fixed (almost) after Bumbay using Teflon tape. I then moved the pump on top of the FRRF to better allow the bubbles extraction and a better visualisation of the flow in the instrument.

1.7.2 Backup

I installed an USB hub and the SyncBack application to save data. The FRRF application must be exited during the backup that I do during the cleaning of the instrument.

2 On deck work, technical concerns

We experienced a cable break in the counting pulley two times the same morning with different winch operators. We could not conclude if this was due to a technical problem or a wrong manoeuvre. I had fortunately secured the instruments and we did not loose anything except the confidence and some time to repair le cable. I thus now secure all instruments during deployment and recovery, even the small WP2 nets.

I have been very busy on deck to deploy instruments during successive stations. Program should be re-considered accordingly.

3 NETS

All repaired nets were brought back on board in AbuDhabi. We did not damage any of them. I observed that the 180 µm Bongo has two small holes that should not impact the quality of the sampling.

The WP2 nets have been separated and reset to their initial configuration. We also utilized a cord to smoothly lower the 25 Kg weights as we do for the Regent net.

We now utilize one gaffe and a hook to secure the nets for all recovery operations.

The template has been corrected to facilitate the computing of the volumes. An error was corrected. **ALL VOLUMES COMPUTED from 2010/01 to 2010/02 must be divided by a factor of 4.**

The 50µm WP2 net has been repaired using epoxy glue.

The silk of cod ends 30µm has been replaced by new 50µm glued using SikaFlex 221. The silk for 180µm as also been replaced using the same method.

4 Depth Recorders

The depth recorders were all calibrated at two different depths. A template has been created to help compute the corrected depth from the DAT files. I utilized EXCEL to open the dat files and read the values because of a new bug in Seastar maybe due to the newly installed version.

The new interface box did not solve the communication problem with SN 4568. I will take it back to France with the 4568 unit.

To do: find a method to better organize the files

Solve a bug in SeaStar to display the data.

5 Library

5.0.1 Oceano PC

The old Dell laptop is replaced by the new oceano_3 HP computer.

I reinstalled all software including the old mailboxes for Thunderbird. Password is **Oceano**.

The Multinet is now connected to this PC.

The PPT cabling document has been updated accordingly.

The old Dell PC remains onboard for backup even if the batteries are out of use.

I have created new stickers to remind the tasks to be performed regularly and the number of the communication ports for all instruments.

I tested the simultaneous communication with the 5 instruments connected on the serial ports.

The new Fujitsu scanner is installed but the Oceano_3 PC must not be utilized to scan logsheets except the CTD/UVP ones.

Scheduled daily backup tasks have been defined using SyncBack to backup all data from D drive to the USBdrive #1. The D drive folders should not be moved or renamed.

5.0.2 Cabling

The cables have been re-organized as for the DryLab. I have also purchased two cooling tables for the computers.

5.0.3 Logbooks

I have modified the CTD logbook to make it usable for both CTDs and for the UVP5 simplifying the filling. This logbook must be scanned.

6 CTD-Rosette (954)

6.0.1 Bottle numbering

I was not happy not being informed that the bottles were renamed without notice. We have to manage to pass the information to data users.

6.0.2 Bottle depth

I observed that the BTL files often did not contain any data for some bottles when the depth range between bottles was low. I now slow down the cable speed to 0.5 m/s around the releasing depth of the bottles and get correct BTL files.

6.0.3 Sensors and Tigon tube cleaning

I cleaned the tubing and the sensors with Triton. The dirty Tigon tubes were removed and internally cleaned with ear tips. I reported the date of the operation on the Oceano_3 sticker.

6.0.4 Searam Flash

I exchanged the two Searam units: cabling drawing and calibration files modified accordingly.

I experienced two problems with Searam: memory overflow and low battery. Both created memory problems for the following casts. The conclusion seems that you MUST initialize the flash after each memory overflow or low power stop.

The display of the remaining memory can be false in Seaterm. I thus wrote the reference value in a sticker on the oceano_3 PC.

I did not replace the Searam mother board in Seram SN 256 (previously installed on Rosette).

6.0.5 Connector cleaning

I cleaned the connectors for communication two times, in Abu Dhabi and after Mumbay stopover.

6.0.6 TC duct broken

I broke the TC duct intake for the CT #1 set. I repaired it using epoxy glue and reinforced it (and the other one) using tie wraps. It did not influence the measurements. I ordered a spare part as no parts was included in the spares delivered last summer. Fabrice Not should bring it in Male.

6.0.7 Data quality

We experienced many problems with jellies and salps at stations 36-37 resulting in CTO2 errors.

The difference between the two conductivity sensors is very low, while the temperature difference is now 0.002 °C.

We have sampled at 800 and 400m for Salinity at station 42.

6.0.8 ISUS

The post calibration will be performed later using the nutrient samples. I think that considering the time we spent to make the ISUS working well, we should not try to change anything on the instrument. I had to remove it from the Rosette for a deep cast at each station.

6.0.9 Rosette handling

I have rotated the rosette to facilitate its handling and storage. The blocks have been screwed and better positioned.

7 CTD (499)

7.0.1 Searam Flash

I exchanged the two Searam units. Cabling drawing and calibration files modified accordingly.

7.0.2 Inter-calibration

I performed an inter calibration with CTD-Rosette. The Fluorescence and Oxygen sensors give the same measurements. Both C and T sensors drifted two much.

7.0.3 C and T Sensors replacement

I decided to replace the sensors with new ones after Mumbay. The PPT cabling file, the calibration and the configuration files modified accordingly. The removed sensors are in the spare box with the new ones.

7.0.4 Sensors and Tigon tube cleaning

I cleaned the tubing and the sensors with Triton. The Tigon tubes were removed and internally cleaned with ear tips. I reported the date of the operation on the Oceano_3 sticker.

8 CTD data processing CORIOLIS

I processed all CTD data on a daily base and sent the CNV files to CORIOLIS as soon as possible after the deployment. This must be continued.

9 TSRB

We checked the tilt values in Masqat marina. It remained around 2° in flat water with on X or Y tendency. We thus modified nothing and add no weight.

We deployed the TSRB at sea in different conditions. In flat seas, the tilt remained in the range we observed in Masqat marina, in small waves, the TSRB swigged more. I removed the black foam with no consequence on the stability.

10 ECO triplet 670

I added the dummies and locking sleeves that I brought. The crew cleaned the aluminium connexions and added some Blue Moloy grease that I provided.

We could not make the adaptations as the new parts brought in Abu Dhaby were both the same 1’ diameter.

11 Multinet

11.0.1 On deck installation

We could finally set the rails and the platform in Abu Dhabi. I also set the communication cable from the aft platform to the library and built an additional test cable which is stored in the bench with the other test cables.

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11.0.2 Deployment

We adapted the solution we had defined in Beyruth last December. The deployment method is similar to the Rosette. The operation is quite easy but requires some concentration and expertise. Herve B. keeps the winch and frame commands as for the rosette. I thus recommend performing the Multinet early in the evening.

The major problem is to keep the nets and cod ends free behind the Multinet frame. We attached all cod ends together with the delivered assay and utilized an elastic cord and a weight attached to cod end #5. These solution worked fines except for last cast were the elastic came back with the depressor.

11.0.3 Programming and data recovery

I tried to work with the Panasonic toughbook. I could sometimes connect and retrieve data but the connexion was not reliable and some data files could not be retrieved. I thus connect the system on Oceano_3 laptop in the library.

12 Paperwork

I slightly modify most of the quick protocols to adapt them to the modifications made in the Drylab and the library.

13 To do

Inventory the oceano equipments in the aft peak.

14 Working load and station organization

We experienced a series of consecutive sampling days between Masqat and Mumbay. We performed two intense days in station followed by only one day to finish the work, clean and repair the instruments and had no rest. We repeated this at three locations ending with fully tired scientists and crew. The risky operations on desk were performed at night ending with the Multinet deployment.

My opinion is that a core station should never end after midnight and can only be followed by a short sampling day only if the next day is free of sea operations.

Both the CTD rosette and the Multinet are expensive instruments and more risky to deploy than the nets or the pump. They must not be deployed at the last end of a busy working day if only one skilled operator is on board and the crew is reduced to 5/6 persons.

It is necessary to limit the number of operations during the core station to the necessary. The core station working load can be reduced considering that at the scale of the sampling performed during Tara Oceans, a 5/10 m error on sampling depth is a residual. In this case, the depth of the DCM can de deducted from the previous CTD-Rosette cast and the depths of the Multinet releases can be defined using the CTD already performed in the morning and at midday. **It is essential that the TECHNICIANS and CREW working for science are consulted in the organisation of the sampling**

strategy and that this strategy can be assumed by the limited number of scientists on board and can be kept for long time with the same quality.

My proposal for a core station that can be performed in all conditions:

UTC	FWD DECK STB	AFT DECK		CRANE
	START	**START**		**START**
08:00		Mooring deployment		
08:15	PUMPING - IN			Double 20µm **SURF**
08:30		CTD rosette	**1000m**	
08:45				
09:00				
09:15		WPII 50um (Vert)	**100m**	
09:30		WPII 200um (Vert)	**100m**	
09:45		Bongo 300µm	**500m**	
10:00				
10:15				
10:30		Regent 680µm	**500m**	
				Bongo 180µm
10:45				**SURF**
11:00				
11:15				
11:30				TSRB
11:45	PUMPING - END			
12:00		**Lunch**		
12:15		**Lunch**		
12:30		**Lunch**		
12:45		**Lunch**		
13:00		Double 20µm **DCM**		
13:15		Bongo 180µm **DCM**		
13:30		CTD rosette	**500m**	

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13:45		
14:00		
14:15	PUMP - Lowered	**DCM**
14:30		
14:45		
15:00		
15:15		
15:30		
15:45		
16:00		
16:15		
16:30		
16:45	PUMP - END	
17:00		
17:15	CTD rosette	**1500m**
17:30		
17:45		
18:00		
18:15	**Dinner**	
18:30	**Dinner**	
18:45	**Dinner**	
19:00	**Dinner**	
19:15	Multinet	**1000m**
19:30		
19:45		
20:00		
20:15		
20:30		

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20:45			
21:00			
21:15		Bongo 300µm	500m
21:30			
21:45			
22:00		Regent 680µm	500m
22:15			
22:30			
22:45		WPII 50um (Vert)	100m
23:00		WPII 50um (Vert)	100m
23:15		WPII 200um (Vert)	100m
23:30		WPII 200um (Vert)	100m
23:45		Mooring recovery	
00:00	END	END	END