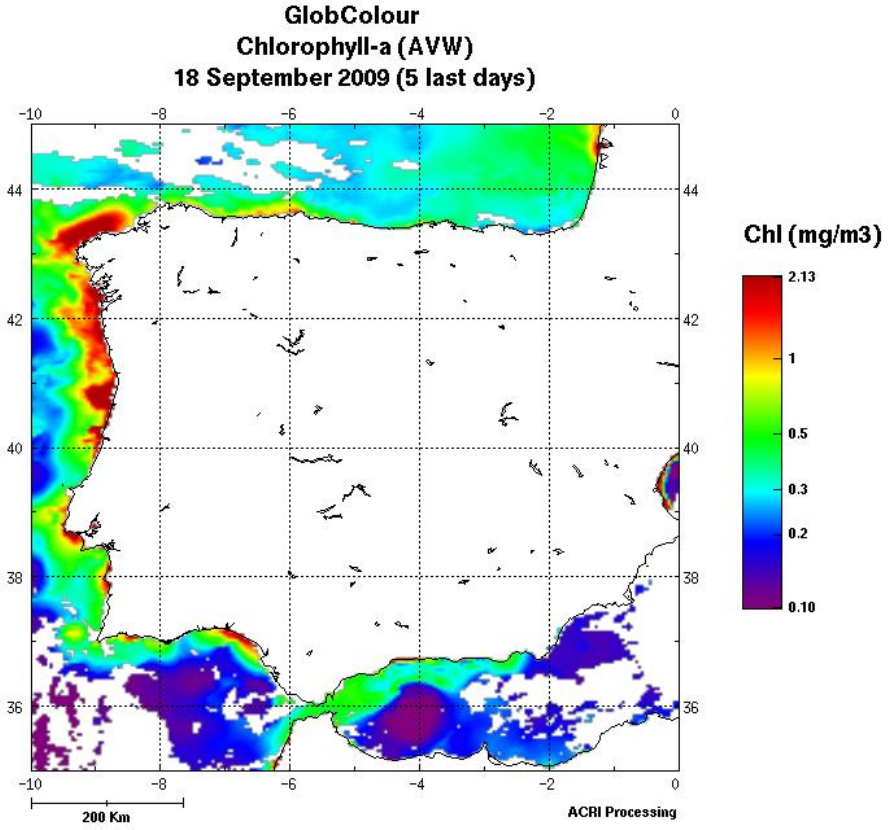
TARA-OCEANS
LEG 3 – TANGER-ALGER
CHIEF SCIENTIST REPORT

The first objective of the third leg was to further test the feasibility of full stations (i.e. as originally planned) and reduced stations, but always including biogeochemistry (nutrients, carbonate and HPLC) using Niskin bottles, P.B.G.V. using water pumped from surface and DCM, and zooplankton using 2 daytime net tows and 5 night time net tows. The second objective was to review the setup of deck and lab equipments and to propose improvements to be undertaken in Nice. The third objective was to test the use of barcodes and to propose improvements to be implemented as soon as possible.

OBJECTIVE 1 – SAMPLING & ALIQUOTING

We sampled three stations including the oligotrophic Alboran Sea Gyre (Station 5: 36 00,53 N; 4 31,10 W) , the eutrophic coastal waters (600 m) north of the Gyre (Station 6: 36 31,37 N; 4 00,14 W), and offshore waters near Alger (Station 7: 36 03,06 N; 1 56,270W). A detailed timeline of sampling events conducted at each station is provided in the attached Excel file, in the spreadsheet "SAMPLING".



A few sampling events were not at all considered during this leg because the required equipment was not yet onboard. These are Rosette (optics, UVP, Oxygen, etc…), TSRB, ECO-Triplet, WPII nets, Multinets and opening-closing nets. Likewise a few aliquoting protocols were not at all considered during this leg because of missing consumables. These are PROT-Culture, PROT-Microscopy-HT, PROT-Microscopy-Phyto-SZN, PROT-FlowCytometry, and dDNA. These will be discussed below, along with other protocols. Finally, metagenomics aliquoting from Niskin bottles (above DCM, below DCM and 1000 m) were not considered either during this leg. A detailed list of aliquoting performed at each station is provided in the attached Excel file, in the spreadsheet "ALIQUOTS by PROTOCOL".

At Station 5, we attempted to do all possible sampling and aliquoting, including all replicates that were originally planned. Relatively rough seas ( ) have set the limit of safe operations for Niskin sampling (without a rosette) since the considerable drift of Tara ( ) required that we use the engine to move backwards in order to reduce the angle of the cable holding the Niskin bottles. Tara's engine is not made for thrusting backwards while deploying instruments in relatively rough seas and the captain and crew are concerned that such practice could damage the ship's engine. This concern does not apply to the deployment of nets or pump hose, although the conditions encountered during Station 5 increased the sampling time and risk of accidents. For these reasons, we did not manage to do the full sampling programme so that only half the net tows could be conducted, thus excluding Metazoa metagenomics and large size fractions of Protist sampling (20-200 µm and 200-2000 µm). On the other hand, water sampling with Niskin bottles and with the pump [Surface & DCM (68 m)] was conducted and most planned aliquoting was performed, except qPCR and Virus DNA. However, it must be stressed that replicated sampling of the DCM off the main winch requires considerable time and was in part responsible for reducing the number of net tows. It must also be stressed that the workload involved in processing all aliquots from pump water is "delirious" and can only increase the chances of unreported/unnoticed errors in aliquoting & sample labelling. Finally, it must be noted that variable drift of Tara due to wind and currents introduces significant variability in the sampling depth of the pump. Indeed, data from the CTD attached to the end of the hose show that the first replicate (400L) of the DCM came from ca. 70 m while the second replicate (400L) was pumped at ca. 40 m.

At Station 6, it was decided not to do replicate sampling from the pump in order to let people breathe, minimise the risks of mistakes, and maximise the quality of aliquots. We must keep in mind that metagenomics aliquoting from Niskin bottles (above DCM, below DCM and 1000 m) will eventually add to the workload in the wet lab. This must be factored in the current effort to adjust the sampling plan. Despite good sampling conditions and reduced pump sampling, we were short of time in the afternoon to conduct 1 Metazoa bongo tow and 2 Protist bongo tows. This could have been avoided if we had started sampling at 11h00 instead of 12h00. The morning meeting took longer than expected (9h30-10h30) but was essential to go over the achievements and problems encountered during Station 5. The most important achievement of Station 6 is that people could breathe and be more concentrated on their work; we have done the complete suite of aliquoting on pump water; and we were able to do all planned net tows in the evening.

Station 7 was initially meant to be short (6h) so that we planned to test the barcoding routine on a few selected aliquoting protocols. However, we arrived on station earlier than planned (12h00) and decided to test the barcoding routine on a normal sampling plan (Niskin, Nets and Pumping), without replicated pumping and conducting only DNA & RNA aliquoting, complemented by TEM, FCM and optical microscopy aliquots. The sampling plan was

Commentaire [F1]:
Some of i t was actually on board. For instance CTAB for dDNA in the fridge.

Commentaire [MBS2]: sounds like i twas crazy out there !

Commentaire [F3]:
Even if we all did our best to transform Tara, she is definitely not an Research Vessel as we are used to and we have to live with that.
More importantly we MUST take that into account when we deploy instruments and take samples…
Personally I would rather target the quality rather than the quantity

disturbed by a faulty CTD cast (0-1000m) so that we ran out of time to conduct the 180 µm mesh Bongo tow during daytime. Barcoding is discussed below.

Discussion and action points:

- ACTION – A coordinator meeting will be organised (Steffi & Stéphane) in Paris (or conference call) in late October to discuss the sampling plan in light of the early results from DNA, RNA and qPCR aliquots. Tests with the new equipment onboard (Nice) will also feed in the discussion of this meeting about the sampling plan.
- DISCUSSION – In order to ensure the quality of the overall results of Tara-OCEANS, I suggest that we keep one full day between each sampling to take the time to carefully document (metadata), sort, recondition (ETOH sample) and store aliquots from the previous day.
- DISCUSSION – There is no protocol regarding exceptional specimen collected in nets that are not meant for specimen imagery. Should these be preserved immediately with the rest of the catch or kept alive for imaging? After imaging, should these specimens be discarded, preserved individually in separate jars, or returned to and preserved in the jar containing the rest of the catch?
- DISCUSSION – When the pump hose is deployed vertically for surface sampling, it samples at a depth of 10 m while at stations where there Tara drift, the pump may sample at a depth ranging from 2-10 m. I propose that we consistently deploy the end of the hose at 2 m below surface.
- DISCUSSION – The depth of maximum chla is sometimes near the surface (hence not really a DCM) and we should define how to define sampling depths in such cases. Likewise, we should discuss how to select a second sampling depth when the vertical profile of chla is flat.
- ACTION – In addition to archiving raw output files of the CTD (eventually ECO-Triplet) I propose that Hervé L., Marc P. and Uros K. should find a way to extract a mean value of the effective pumping depth and a time series of depth, T°C, S°/₀₀ and Chla during the pumping event. These data products should be archived in the metadatabase
- DISCUSSION – At the scientific coordinator meeting devoted to sampling, we need to identify the priority level of each aliquot protocol so that Chief Scientists know how to cut the sampling programme if necessary. At station 7 for example, I decided that the minimum sampling was DNA, RNA, FCM, Microscopy, HPLC, Nutrients and CTD. Was that choice reasonable? We need to set priorities.
- DISCUSSION – In order to determine rapidly if filtration volumes for size fractions 0.2-1.6 µm, 1.6-20 µm, 0.8-5 µm and 5-20 µm are sufficient for DNA & RNA analyses, it is proposed to conduct a “quick assessments of protein concentrations” by colorimetry (or something similar). That assessment would be made before 11 am and would determine is >100 L is required for BACTERIA, GIRUS and VIRUS, and if >300 L is required for PROTISTS.
- DISCUSSION – Following discussion with Hervé Bourmaud, station work should not starts before 11h00. However, in the perspective of conducting “quick assessments of protein concentrations” to determine if larger filtration volumes are required, I propose that we ask for the pump be ready to sample surface waters as early as 9 am. Scientists

Commentaire [MBS4]: I’m in DC to try to talk with NSF prgram directors about Tara Oceans Oct 28-30th

Commentaire [F5]: Good if needed I can participate (available from Oct 27th to Nov 4th included)

Commentaire [SKL6]: I can take care of that, before or after Naples???

Commentaire [F7]: I fully agree. That is a minimum and it will be critical when going out on 1 month legs.

Commentaire [MBS8]: This sounds like a very good idea … the sampling day is going to be hectic.

Commentaire [F9]: Should probably be imaged live and subsequently stored individually in Ethanol. Obviously the preservative conditions ideally depends on the type of organisms (silicate, carbonate, organic…). The most experienced biological oceanographer on board (chief scientist ?) should take such decision.

Commentaire [F10]: Sounds good to me as far as we are consistent.

Commentaire [F11]: Honestly in such cases, which will not be that frequent considering the cruise track and also considering the work load, I would just sample one depth and save time for more imaging on fresh material.

Commentaire [MBS12]: if no DCM (i.e., chl max below the mixed layer), then my vote would be for a second large volume sample about 10m below the mixed layer but still well in the photic zone to maximize biological changes

Commentaire [F13]: Good idea

Commentaire [SKL14]: Not only that, we have to define a proper reporting system

Commentaire [F15]: Definitely, I agree too.

Commentaire [MBS16]: agreed 100%

Commentaire [F17]: We will have heterogeneity in the waters sampled anyway. Adjustment will be difficult for routine sampling but would be required for specific purposes. For small cells, as suggested, FCM is probably a good proxy. Don't know about protein concentration, I need to get more information on that aspect.

Commentaire [MBS18]: should one take a look at the concentrated sample in the flow cytometer on board to get a quick cell count for the microbes ?

Commentaire [H19]: 0.2 um filters did not clog during the Lison-Tanger sampling, suggesting 100L may not be enough for some places.

Commentaire [MBS20]: virus is happy wiht 60L at each of 2 large depths. We cannot process more than the 60L of water.

can then proceed independently of the crew between 9 am and 10 am to run the "quick assessments of protein concentrations".

- DISCUSSION – The 20-200 µm size fraction for PROTISTS comes from deploying 20 µm mesh ring nets. However, this net is often not deployed by fear to tear it apart in relatively rough conditions. We should consider using the 20-200 size-fraction collected in the PROTIST GPSS (and B.G.V. GPSS) as an alternative.
- DISCUSSION – There are currently two parallel, but related discussions regarding DNA&RNA protocols and the use of RNA-later. The first one addresses the following question: "Is it safe to prepare "home made" RNA-Later in order to reduce costs (40€/L instead of 600€/L)?" The second one addresses the following questions: "Why are the PROTIST protocols for DNA using RNA-Later while BACTERIA and GIRUS protocols are not?", "Why are we storing aliquots containing RNA-Later at -20°C?" and "Why are we flash freezing aliquots containing RNA-Later?" One argument for not using RNA-Later with DNA was the high cost of RNA-Later. Using "home made" RNA-Later could solve the issue. It seems that flash freezing RNA&DNA aliquots, then adding RNA-Later and then storing in -20°C is the best treatment possible. This is feasible and should be adopted as the standard procedure.
- DISCUSSION – Overall, each team should review its protocols and reduce the number of replicates to the minimum, especially the large volume filtrations. At the moment we have a capacity of 4x100L + 4x10L, which is not even enough to do the first replicate of the PROTIST and GIRUS protocols. Two additional 100L carboys will be delivered to Barcelona so that we will then have a total capacity of 600L. I suggest that 3x100L be dedicated to PROTIST, 1x100L + 4x10L be dedicated to BACTERIA and VIRUS, and 2x100L be dedicated to GIRUS. This way, we will be able to contain enough water to process one full replicate of all large volume filtrations for DNA and RNA, as well as all the other protocols, without much reduction.
- DISCUSSION – The BACT-RNA and BACT-qPCR filtrations take forever to process. Moreover, the two protocols include 4 replicates each. These protocols create backlog so that SRF water is still being filtered while DCM water stands still in carboys. I suggest cutting the two protocols to 2 replicates so that both protocols can be processed simultaneously, thus cutting processing time by half.
- ACTION – Once in Barcelona, DNA, RNA and qPCR aliquots should be sent to their respective labs and processed rapidly so that we can discuss the reduction of sampling with facts. Stations 5 (oligotrophic) and station 6 (eutrophic) should be used for this purpose. Aliquots from station 7 should not be used for that test. We should wait for the metadatabase and online portal to be up and running to test the barcoding system with station 7 aliquots.
- DISCUSSION – The FeCl precipitation protocol for viral DNA must be discussed because it tends to stain the filtering rig and the peristaltic pump tubing. We recommend that this protocol has a dedicated filtering rig and tubing. Suggestions for cleaning residues of FeCl is needed.
- DISCUSSION – Do we sample water for Phytoplankton taxonomy (SZN) from Niskin bottles or the pump, or both? Water from the pump is closely linked to the genomics data, whereas water from the Niskin is closely linked to HPLC data. I recommend that phytoplankton taxonomy be collected as 1 L no-replicate aliquots instead of 250 mL triplicate aliquots, but from both Niskin bottles (SRF & DCM) and Pump water (SRF & DCM).

Commentaire [SKL21]: Already looking into that, difficult !

Commentaire [F22]: Sounds like a good alternative but before that I would definitely test the 20µm nets in real condition. They are long and resistant…we use such nets in Roscoff. If it breaks we have spare ones on board.

Commentaire [MBS23]: the Chisholm lab has well worked out protocols for bacteria that is tried and true … Silvia, is that what we're using ?

Commentaire [F24]: I'm not sure this has been test properly.

Commentaire [F25]: Because at the beginning there was no liq N2 or -80°C on board but only a -20°C. Things have changed but it works well with RNA later (Johan and Steffi did test that) and we decided to stick to that method.

Commentaire [SKL26]: Why adding RNA later to a frozen sample ? RNA later and storing at -20 C in my opinion is the best option, but not up to me to decide

Commentaire [F27]: I agree with Steffi

Commentaire [F28]: Indeed it should not take forever for RNA…something is going wrong.
The 4 in line filtration are actually the same sample…you should pool the filter. The purpose of the 4 channel is to increase the total volume filtered in a define amount of time.Should be sorted out with Silvia.

Commentaire [MBS29]: the bact-rna samples should be done 4 filters at a time with a 4-headed pump – is that happening ? This needs to be done and frozen in <10 minutes or else all RNA work is not meaningful. If it 's taking longer then likely too many cells are there, so maybe can get away with less volume. Same is true of the bact-qPCR samples, except that these can take longer to do.

Commentaire [SKL30]: Samples for Barcelona will be unloaded in Barcelona, the rest of the samples will be unloaded 5 days later in Villefranche as previously decided !

Commentaire [MBS31]: that is weird, I will look into this. Thank you for bringing it up. Are you using Masterflex tubing throughout the systems and stainless steel filter rigs?

Commentaire [F32]: We tested both for cells intergrity and both are fine. We just need to decide the most convenient then.

Commentaire [F33]: You need to divide it up before analysis anyway…so 1 Liter or 2x250L it's up to …

- ACTION – The management (inventory/shipping) of consumables and samples onboard is coordinated by Steffi, in communication with the Chief Scientist. The data management team must setup preformatted electronic (e-mail) reporting of current use/inventories of consumables and samples onboard, based on the metadata records.
- ACTION – The 100L carboys should be rinsed with freshwater after each station.
- ACTION – We need clear written protocols about the procedure for all deployments, e.g. speed for lowering nets, time laps at selected depth, speed of bringing back nets onboard, etc…
- ACTION – In addition to printed satellite maps, we need to ask Mercator to provide GIS maps that can be imported in the navigation system, including SST, Salinity, Chla, and currents. These should be sent directly by Mercator to the captain on a daily basis even on week-ends.
- ACTION – The -80°C has resisted the shocks up to now (although we haven't been in really heavy seas) but its power demand is causing serious trouble to the ship and crew… We should seriously consider replacing the -80°C with one or ideally two -20°C… offering the same storage space and storage drawers and boxes... this works well! We actually need only half the storage space for one month of sampling, so that having two -20°C would allow keeping one as a backup freezer in case the first one fails. Samples that require -80°C (i.e. FCM and bacterial cultures) can be stored in liquid nitrogen. Quotes for -20°C freezers are now being obtained. The -80°C will be shipped to EMBL to store samples there before being reshipped to the respective labs.
- ACTION – In support to training Scientists coming onboard, Christian S. is undertaking to summarise each protocols on one page recto-verso and to produce small films that walk us through each step of the summarised protocols.

OBJECTIVE 2 – DECK & LAB SETUPS

Discussion and action points:

- URGENT ACTION – The PROTIST pump rejects bits of black rubber. The Chief Scientist of the fourth leg is aware of the problem and it was suggested to solve the problem on the short term by inserting a swinex filter holder with a 200 or 20 µm mesh at the outflow of the pump. The pump should be replaced by a spare one onboard when time allows and the faulty pump should be returned to the manufacturer or inspected to trouble shoot the problem.
- URGENT ACTION – The salinity measured by the CTD is unstable… showing spikes and significant differences between downcasts and upcasts. We need 12 Salinity canisters in Barcelona to calibrate the CTD. Hugo S. was contacted to take care of this action item.
- ACTION – There should be a water resistant diagram on how to setup the GPSS… to stick outside the Wet lab next to the GPSS
- ACTION – 100 L carboys must be secured differently so that we can removed them easily for rinsing and washing.
- ACTION – We need a firehose connector fitted with a basket and a 200 mesh to put on the outflow of the pump, above the GPSS.

Commentaire [SKL34]: I'm glad to hear !!!!!

Commentaire [F35]: Indeed, this is important

Commentaire [F36]: I wouldn't consider storing in liqN2 as an option. Too dangerous for safety (more tricky to use containers when full of samples) and for the samples.

Commentaire [SKL37]: This freezer, ONLY ONE, has been ordered. Slightly bigger than the -80C, but the racks do not fit and need to be shortened. This was NOT easy to organize in such a short timeframe!!!Plus, there is not unlimited space onboard. Not mentioning the costs……If everything is going according to plan, the freezer could be exchanged in Villefranche. BTW, keep in mind that I'm not a magician!!!

Commentaire [MBS38]: So, do you no longer need such 1 pagers from us coordinators ? I would be happy to look at Christian S's new version – thanks Christian !

Commentaire [H39]: Girus has sent a one page protocol to Colomban. Aurelie Chamboubet (Lisbon-Tanger) suggested us that a very detailed protocol with pictures (like the one for Girus) was also very useful.

Commentaire [F40]: Work on this issue is in progress

Commentaire [F41]: Ok. Work under progress.

Commentaire [SKL42]: If someone sends me the file by tomorrow, I can laminate this !

Commentaire [F43]: Only people on board can figure out the best way to do so. This is adjustment.

Commentaire [F44]: A 200µm net (smaller ring) was installed in Lorient at the outflow of the pump above the GPSS. Not clear to me why it has been removed and/or not replaced.
There is plenty of 200µm mesh on board if required.

- ACTION – The joint between the bottom collection funnel of the GPSS and its outflow tube must be done properly to be resistant and to avoid leakage
- ACTION – The arms of the GPSS are being damaged. They should be redesigned to be more robust.
- ACTION – We need a 20 µm mesh funnel with 20 µm mesh collector on top of a collecting funnel with a hose to fill the 100L carboys for BACTERIA, GIRUS and VIRUS (The >20µm fraction could be used by the protists)
- ACTION – The HPLC filtration bench often leeks and needs tightening. I propose using 47 mm filtering heads for HPLC instead of 25 mm which currently take >1 hour to filter most samples. By using 47 mm heads, the filtration system could be used by the PROTISTS, thus freeing significant bench space. I recommend using Poretic or Nucleopore 47 mm filter heads with transparent cups (50 ml I think). Having the 2 L bottles sitting directly on top of the cups is simpler than the two-tubes system. Bottles can be secured by bungy cords rather than Velcro. One bottle has already lost its Velcro.
- ACTION – The pumping system installed for the HPLC and 47 mm filtering rigs should be replaced by either a peristaltic system or a jetpump. The current systems is rusting away and requires that we purge it frequently, otherwise if floods.
- ACTION – Samples that need to be stored at +4°C or -20°C (whether flash frozen or not) should be stored in a cooler installed in the wet lab, until they are brought to the fridge or freezer. This is being organised onboard during Leg 4 with dry ice and should be revised in Barcelona to perhaps use -20°C re-iceable ice packs instead of dry ice.
- ACTION – Aliquot must be stored in boxes per shipping address and NOT by station

OBJECTIVE 3 – BARCODING

The barcoding routine was tested at Station 7. It went extremely well for Biogeochemistry and Metazoan sampling because the workload is much less than the other protocols and the log (where you affix the barcode stickers matching those on the aliquots) holds on a single page. In the case of aliquots for P.B.G.V., the log holds on 9 pages that you need to flip back and forth. This is time consuming and needs to be improved. The actual task of picking up stickers while wearing gloves and sticking them on vials and paper is straight forward, but it was also time consuming for some protocols, so that the routine needs to be improved. The stickers are flexible, adhere well to wet or cold sample tubes and the ink is resistant. The use of barcodes is suspended until the routine is improved.

Discussion and action points:

- ACTION – Stephane and Uros will investigate an alternative system which consists of installing a Toughbook inside the wet lab and one outside the wet lab, above the zooplankton sorting table.
- DISCUSSION – ToughBooks could be equipped with a touch screen to select protocols and size fractions, a barcode reader, and a microphone to record comments. This way, barcode stickers could be affixed in advance to tubes, petrislides or jars and would be registered using the barcode reader as they are filled with aliquots.

Commentaire [F45]: Will have a look in Nice. I guess this kind of things can be fixed onboard by the deck engineer or anyone else.

Commentaire [F46]: What kind of dammage ? We could ask the deck engineer to figure this out.

Commentaire [F47]: All the material to do so is available on board.
20µm is actually VERY FAST, even for large volume, no problem to use it as a pre-filter. We experienced it many times.

Commentaire [MBS48]: 20um mesh will likely be pretty slow. We've used 200um mesh as a pre-filter for pulling samples off the Nisken bottle with better success.

Commentaire [H49]: For Girus, 20 um is better than 200 um. 20um mesh was fast enough when Defne Arslen and Nigel tested it on Tara.

Commentaire [F50]: This is crucial to be able to adapt 47 mm filter holder on the HPLC filtration system. That was actually plan initially.
The **deck engineer could make this improvement** with advices of a filtering person.
To me a good option would be to transfer the 500ml funnel onto this systems. Using only the 2Lbottles is not convenient when you have to deal with small volume. We can discuss this over the phone if needed.

Commentaire [H51]: 47 mm is also good for Girus.

Defne Arslen and Aurelie Chambouvet suggested that we may have to fix the funnels for the ramp filtration system that fixes the funnels by magnet. The funnels were easy to drop off by touching by chance

Commentaire [F52]:
Actually, you don't have to purge the system regulraly (I understand it must have been a pain;). You can set up the system to make it overflow and then not have to purge it at all. Properly used these pump are really nice, actually for HPLC it was a special request from Gaby....

Commentaire [H53]: It is important to keep Girus 4C samples being "not" frozen by dry ice. These should contain viable giruses; some giruses do not resist freezing.

Commentaire [SKL54]: That was not the plan and should be discussed. There was initially not enough space to store samples by shipping address. There the colour coding comes in place and I will re-sort the samples in Germany to distribute to the proper destination. If we store and ship boxes by destination, we will increase the storage volume, the shipping volume and the COSTS!But if we have only ... [1]

Commentaire [SKL55]: Will they survive storage in LN2 (the stickers stuck on wet tubes)

Comments such as “volume filtered is 200 ml” or “two filters were placed on top of each other instead of one” could be recorded and archived as digital objects.

- DISCUSSION – Toughbooks would be linked to the metadatabase server so that information would be archived in real time.
- DISCUSSION – Keeping a paper copy of all entries is required and could be done in real time or after each station on a dedicated printer in the dry lab.
- ACTION – Consequently, the design of the sticker layout and printing needs to be reassessed. Stickers of different colours will be requested to differentiate samples based on their destinations.
- ACTION – Log books for sampling events will also be reassessed.

GENERAL MANAGEMENT RECOMMENDATIONS

Discussion and action points:

- ACTION – Inform the scientists that they should bring protective boots with steel caps
- ACTION – Inform the scientists that they should come onboard with an "Ordre de mission"
- ACTION – Information regarding the coordination of scientific activities onboard currently gets requested by and sent to a number of people. This will get confusing. We should formalise a line of communication going from the scientific committee (Steffi for management) → chief scientist onboard (cc'd to the captain and other chief scientists) → scientist onboard. .. and vice versa.
- ACTION – There should be a science-based description of waters visited during each leg with proposed station locations and the rationale for these proposed sites. That information should be available months in advance on the Tara Ocean Project website.

Commentaire [SKL56]: I totally agree, I'm left in the dark since weeks!

SUGGESTED DESCRIPTION OF WORK FOR SCIENTISTS ONBOARD

Deck Engineer:

- Responsible for operating and maintaining deck instruments, dry-lab instruments and the network
- Responsible for keeping log books of electronic instruments (CTD, UVP, TSRB, etc…)
- Assist crew in deploying deck instruments

Commentaire [F57]: And WETLAB related stuff…we NEED someone to do that.

Chief Scientist:

- Responsible for supervising the overall scientific activities onboard
- Responsible for reporting to the scientific committee on all scientific activities onboard, including summary and detailed description of work accomplished, updating the records of consumables and samples onboard
- Determine the sampling plan in concert with the captain and the scientific committee
- Responsible for ensuring the quality of scientific activities onboard and the completeness of metadata records
- Assist crew in deploying deck instruments
- Responsible for collecting net and water samples (from Niskin bottles) pertaining to the METAZOA and BIOGEOCHEMISTRY protocols
- Responsible for aliquoting net and water samples (from Niskin bottles) pertaining to the METAZOA and BIOGEOCHEMISTRY protocols
- Responsible for keeping log books of Rosette/Niskin and Net deployments
- Responsible, along with Scientist 3, for operating the pump, rincing and filling the 100L carbuoys and other carbuoys
- Responsible for updating Scientists 1-3 on the sampling plan and informing them of samples about to be available for them

Scientist 1:

- Responsible for aliquoting all water and net samples that pertain to the PROTIST protocols
- Responsible for completing the metadata that pertain to the PROTIST protocols

Scientist 2:

- Responsible for aliquoting all water and net samples that pertain to the BACTERIA, GIRUS and VIRUS protocols
- Responsible for completing the metadata that pertain to the BACTERIA, GIRUS and VIRUS protocols

Commentaire [MBS58]: I thought that GIRUS was being sampled by the PROTIST scientist. There is no way that one person can do more than BACT + VIRUS, so that must mean also that PROTIST is over-booked ?

Scientist 3:

- Scientist 3 should not be an optical engineer that gets trained for deck and lab work BUT a deck and lab person that gets trained on optical instruments
- Responsible, along with the Chief Scientist, for operating the pump, rinsing and filling the 100L carboys and other carboys
- Responsible for collecting net and water samples (from Niskin bottles) pertaining to the PROTIST, BACTERIA, GIRUS and VIRUS protocols
- Responsible for operating the optical instruments in the dry lab and imaging samples from the METAZOA, PROTIST and BACTERIA groups

Page 6 : [1] Commentaire [SKL54] **Steffi Kandels-Lewis** **29/09/2009 10:55:00**

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