Regional Operations Centre
Canadian Coast Guard – Pacific

PACIFIC REGION CCG VESSEL - POST CRUISE REPORT

Line P Program – Fisheries and Oceans Canada

NAME OF SHIP/PLATFORM: John P Tully

DATE: **FROM:** 8 February 2011 **TO:** 22 February 2011

SCIENCE CRUISE NUMBER: 2011-01 **SHIP'S PATROL NUMBER:** 10-12

CHIEF SCIENTIST[S]: Marie Robert

SCIENTIFIC PERSONNEL:

Female	Male
Hiu Yan Choi (CUNY)	Michael Arychuk (IOS)
Jane Eert (IOS)	Steven Bell (BIOS)
Marie Robert (IOS)	Ian Beveridge (UVic)
Christina Schallenberg (UVic)	Evan Howard (UW)
Cassie Schwanger (UVic)	Keith Johnson (IOS)
	Roger P. Kelly (URI)
	Hugh Maclean (IOS)
	Craig Mewis (UBC)
	Kyle Simpson (IOS)

AREAS OF OPERATION: North East Pacific, Line P, Station P.

INTRODUCTION/PROGRAM BACKGROUND: Line P is a long standing program which surveys a 1400 km long section 3 times annually. Data has been collected along this line since 1956 and shows evidence of the impact of climate variability on ocean productivity. It is the only Canadian long time-series that allows scientists to monitor climate changes in the Pacific Ocean. It is also the best opportunity for other programs (e.g. Universities) to do research in the Pacific since the Line P data give them background as well as current water properties. In addition, it is the best occasion for other projects (e.g. CWS) to access offshore waters.

During this cruise (2011-01) we were faced with all kinds of problems – science equipment problems, ship problems, and weather. Only 20 of the planned 29 stations were visited, and only 54 of the planned 80 profiles got done. The drifting sediment traps experiment had to be cancelled because of weather, but at least we got to deploy the University of Washington Iridium float at Station Papa.

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CRUISE OBJECTIVE/OBJECTIVES: Repeat hydrography section. Deploy one Iridium float. Perform a Drifting Sediment Trap Experiment.

DAYS ALLOCATED: 14 **DAYS OF OPERATION:** 12 (8)

DAYS LOST DUE TO WEATHER: ~1.

SAMPLING:

- The Line P survey was only about 70% successful. Only 20 of planned 29 stations were visited and only 54 of the planned 80 profiles got done, due to a mix of bad weather and equipment and ship problems. The drifting sediment trap experiment got cancelled.
- One Iridium float was deployed for University of Washington at Papa.
- The samples collected include:
  1) Underway: **IOS**: Thermosalinograph (Temperature, Salinity, Fluorescence), pCO_2, acoustic sounder.
  2) "E-data" from CTD: Pressure, Temperature, Conductivity, Dissolved Oxygen, Transmissivity, Irradiance, Fluorescence.
  3) From the Rosette: **IOS:** dissolved oxygen, salinity, nutrients, chlorophyll, HPLC, DIC, Alk, DMS, DMSP-p, DMSP-t, pH – **UBC (Mewis):** dissolved nitrogen (N_2), oxygen (O_2), carbon dioxide (CO_2), argon (Ar), nitrous oxide (N_2O), number of cells per millilitre, bacterial genomic (DNA, RNA), Hydrogen Sulfide – **UW (Howard):** Oxygen, ONAr (Oxygen, Nitrogen, Argon) – **City Uni. NY, URI, BIOS (Choi, Kelly, Bell):** Thorium, Polonium, Total Chlorophyll, 5µm Chlorophyll, Total HPLC, 5µm HPLC, FCM, µplankton, Primary Production.
  4) From the pump/X-Niskins: **IOS:** Iron – **U. Victoria (Schallenberg, Schwanger):** Fe, Cu and others, total dissolved Cu.
  5) **IOS and City Uni. NY (Choi):** Zooplankton using vertical net hauls.

RADIOISOTOPE USE:

The following radioisotope was used in the Rad-Van: $NaH^{14}CO_3$ in solution. Wipe tests were done in all appropriate areas of the ship upon completion of the studies and the lab was decommissioned at the end of the cruise.

PROBLEMS [SCIENTIFIC GEAR AND OPERATIONS]:

Once again the CTD gave us grief. For 5 stations (P3 to P8) and 7 casts we lost the data from the Primary Conductivity sensor as well as the Dissolved Oxygen sensor. It turned out to be because of a faulty cable between the Primary Conductivity sensor and the CTD. Most sincere "Thank you" to Scott Rose at IOS for contacting Seabird for us and sending us some trouble-shooting instructions. Thanks also to Jane Eert for getting very involved in the fixing of the CTD. Hopefully the new "wet-pluggable" connectors will help getting rid of those problems re-occurring on pretty much every cruise.

The problem of the CTD computer freezing during a cast also occurred a few times. Will this also be fixed by the "wet-pluggable" connectors? Or should we get a brand new computer for CTD acquisition? A working spare computer would sure be a good thing to have.
We also need a new Rosette frame that can be used with the LARS (mid-ship station). No one wants to have to do rosettes from the aft-deck anymore, the LARS being so much SAFER and efficient. But there is only one rosette at the moment that has the appropriate head to fit the latching mechanism of the LARS and appropriate extra weight and height underneath the main frame. We do have a spare rosette on board, but it can only be used for parts … or on the aft-deck, which is not a desirable option.

SUCCESSES [SCIENTIFIC]:

We used to have problems with the latching mechanism of the rosette; some bottles would consistently NOT close. All the Niskins were closing properly this time.

Despite the fact that it is not totally completed yet, the "upgraded" Rad-Van is much more appropriate for radioisotope use at sea.

PROBLEMS [SHIP'S EQUIPMENT/OPERATIONS/PLATFORM SUITABILITY]:

Some email accounts on the ship's email system are still not set-up properly and therefore not working. This has been the case since August 2010 and it is very frustrating that this issue has not been resolved yet.

There was a problem with the CTD winch loosing power during casts. The CTD would stop either on down or upcast for a few seconds/minutes until the power was back on, sometimes up to five times during a single cast. At some point we had to abort a cast to bring the rosette back on board as quickly as possible so that the winch could be fixed. Thanks to the engineers to finally get that issue resolved.

There was a problem with the ship's generators. Because of this we had a black-out on board that, although for a very short period of time (20 seconds or so) affected some of our instruments. The main implication was that, although we did make it to Station P this year, we had to start heading home only 6 hours after our arrival at this main station instead of spending the planned 28 hours or so. Some people were on board only to sample at Station P and therefore did not get any data to bring back home. We also could not stop on the return leg to pick up the stations skipped either because of weather, or in order to arrive at Station P in a "nice weather window", or that needed to be revisited because of CTD problems on the way offshore.

There were some problems with water coming up the deck drain in Cabin D as well as in the instrument lab. A "safety" valve was stuck in the open position in the pipes and the water was coming back into the ship instead of flowing out. The loop water had to be turned off a few times to deal with this problem.

SUCCESSES [SHIP]:

We had new deck crew not accustomed to the LARS crane, but every deployment/recovery of the rosette was very well done.

Thanks to Captain McGregor and the whole crew for letting us and helping us load our gear on the Tully starting on Monday 7 February. This allowed us to leave on the 8th, which would not have been possible otherwise.

DELAYS [OTHER THAN WEATHER]:

A few hours because of scientific gear not delivered to Victoria by UPS as planned.
A few hours because of the CTD winch problems.

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SAFETY CONCERNS:

Problems with the generators and small fire in one of them.

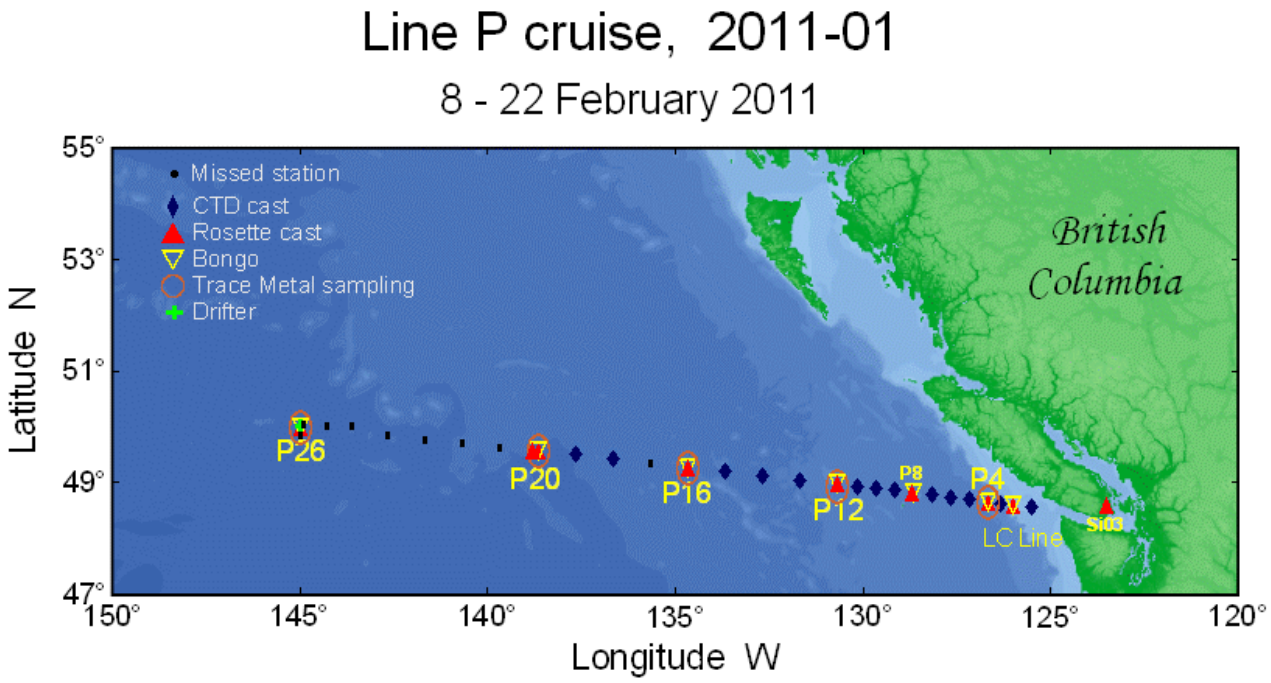
HAZARDOUS OCCURRENCES:

None involving science personnel.

EVENT LOG:

DATE		OPERATIONS
Monday	**7 Feb:**	**Start loading the ship at IOS.**
Tuesday	**8 Feb:**	**Depart after dinner. Saanich Inlet cast.**
Wednesday	**9 Feb:**	**Start Line P.**
Sunday	**13 Feb:**	**Skip station P17 due to weather.**
Monday	**14 Feb:**	**Complete Station P20. Go straight to Station Papa.**
Tuesday	**15 Feb:**	**Get to Station P around 1500. Deploy UW Iridium float. Leave by 2200.**
Th/Fr	**17/18 Feb:**	**Weather days.**
Sunday	**20 Feb:**	**Arrive at IOS..**
Monday	**21 Feb:**	**Offload.**

CRUISE TRACK:



SUMMARY/FINAL COMMENTS:

- We would like to thank everyone on board for such great help. It is because of everyone of you that our program can be so successful. Again, thanks to Captain McGregor for letting us load the ship a day early. This helps immensely. Thanks for the officers for keeping station so well and adapting without complaint to all our changes of plans. Thanks to the cooks and galley crew for such wonderful food and great smiles! Thank you and congratulation to the deck crew to be so efficient so quickly with the LARS operation, and for all the extra help every day. And finally, thanks to the engineering department to address problems (winch and drains) quickly and efficiently, and for doing the impossible to time the "burning and flushing" in order to avoid interference with our sampling time. Looking forward to seeing you all in June for another great cruise!

  Marie Robert and the science team.

- We wish to thank the Tully crew for their assistance and excellent work throughout the cruise. Thanks to Marie Robert and the scientists onboard for their help on deck and in the lab. Special thanks to everyone who helped me collect samples.

  Craig Mewis, UBC

- Thanks to the officers and crew of the John P. Tully. Special thanks to Eric Zwarich and Dave Wilhelmson for lending a magnet and bushing for repairs to equipment damaged during the transit to P26. Thanks and appreciation to Len Bilby and the deck crew for assistance securing our equipment on the weather decks. We would also like to thank Marie Robert and the science party for their, sometimes very innovative, suggestions and sampling assistance. We'd like to single out Jane Eert for help and advice throughout the cruise regarding interpreting PAR sensor data as well as setting up the primary production incubator along with Hugh Maclean. Thanks to Mike Arychuk for assistance with inter-cruise chemical storage and handling. We'd also like to thank Darren Tuele, Janet Barwell-Clarke, and Hugh Maclean for help during pre- and post-cruise operations.

  Roger Kelly (URI), Hiu Yan Choi (CUNY), Steven Bell (BIOS)

PROJECTS AND RESULTS:

Carbonate System Analysis Cruise 2011-01 Feb-8 – feb22, 2011

Kyle G. Simpson and W. Keith Johnson

Purpose:

We are monitoring four aspects of the carbonate system on expeditions to OSP. Both pH and underway continuous automated pCO2 are measured onboard the Tully. Samples for DIC and TA are collected preserved and returned to the shore-based lab for analysis. Profiles of DIC, TA, and pH are collected from the same depths and bottles.

Profiles of pH were determined at all 7 major stations occupied, namely P2, P4, P8, P12, P16, P20 and P26. The analysis of bottle pH at P20 was compromised by a generator fire and subsequent power failure resulting in the loos of data for roughly half of the bottles. An attempt was made to re-analyze those samples but the data should be flagged. No samples were collected post P26 – (ie. No calibration cast was preformed.

Methods/analytical issues:

pH analyses were conducted at major line P stations using an agilent (HP) spectrophotometer. And the m-cresol purple technique of Clayton and Byrne. Spectrophotometric cells (100mm cylindrical glass) were filled directly from Niskins, stabilized at 25^{o} C using a constant temperature bath and an aluminium block. A temperature controlled cell holder was also used to maintain sample temperature at 25C while performing spectrophotometric determinations . Profiles consistent with DIC/TA depths were collected from all major line P stations Duplicate samples were taken/analysed from pre-determined depths.

The pH system was set up the Temperature Control lab. Air temperature fluctuations occurred, but the seawater temperature inside the cell (determined useing a Fluke model temperature probe, after spectrophotometric determination) revealed that sea water temperatures varied little once stabalized in the Block.

Note: Teflon stoppers only were used for this expedition as opposed to one Teflon and one silicone or rubber.
2 depths (over the entire cruise) were lost. One to a broken cell, and the other to a mal-seated Teflon stopper which came loose.

At station P20, a fire resulted in a power outage, and some unsaved work was lost. (roughly half of the P20 profile)

Overall the analysis looked very good for most duplicates. Profiles were very consistent at mid to deeper depths. Surface pH decreased as we travelled eastward.

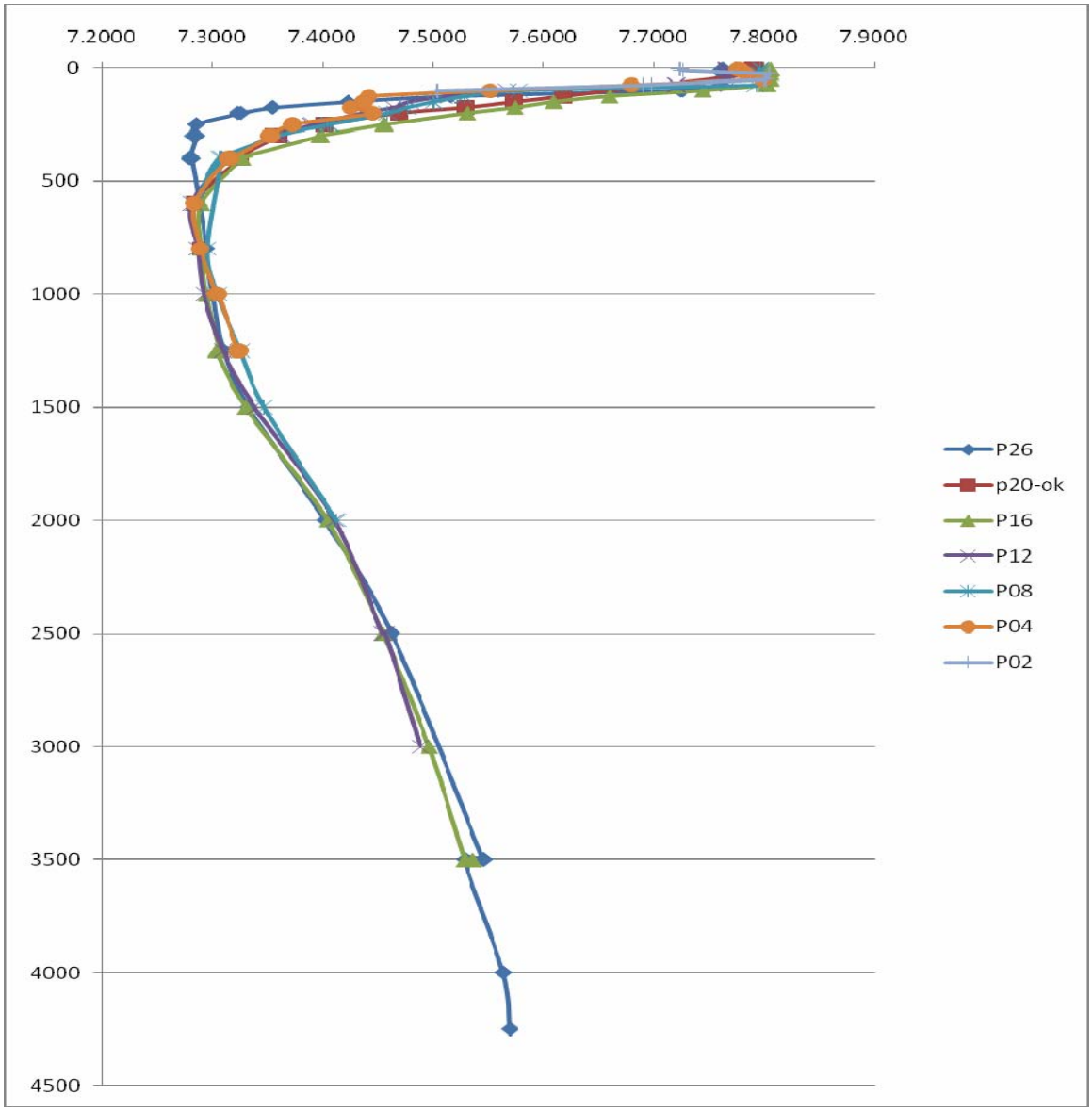


Fig 1. *NOTE* the data in the above figure is Raw, uncorrected data from Line P cruise Feb, 8-22, 2011.

2) pCO2

pCO2 was run using the seawater loop system for the entire expedition until Juan de Fuca straits (~6pm – Feb 19,2011-02-19).
As usual Mike ran the entire trip using the forward air intake. This resulted in some stack gases being analyzed at times but this data will be easy to remove from the file.

3) DIC/alkalinity sampling

DIC/alkalinity samples were collected in 500ml bottles at all major stations (including P02) on line P. Samples were poisoned with mercuric chloride for later analysis. One duplicate was collected at each station usually between 1000 and 3000m when deep enough as well as a duplicate bottle tripped at one of the deeper depth.

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IRON/TRACE METAL SAMPLING JP TULLY 2011-01, February 8th to February 22nd.
W. K. Johnson.

Line P trace metal sampling was carried out with IOS's normal clean sampling methods except we were using the university of Victoria's Go-flos (2 - 10L and 2 - 12L bottles). Sampling by the two group was divided with IOS sampling from the Asti all Teflon pump for 10to 40m samples and U. Vic sampling from their 12Land 10L Go-flos from 70m to 800m. The HEPA hood was set up in the Wet lab as it was February and rough conditions were expected. The hood used was an EACI hood not our normal Lexan/Seastar hood. Plumbing for the seawater and compressed air was run from the hood to the new "Chains" just outside the Wet lab for the first time since trace metal sampling was moved to the smaller chains. The clean hood is used for all pumped samples, 10-40m samples for both unfiltered and filtered (0.2u Opti cartridge) and bulk seawater sampling. The Kevlar (~850-900m) seemed to fit much better over the 6000m steel line than it did in June 2009. This Kevlar is twelve years old so a new piece should be considered. The winch had UMHWPE rollers coupled with our normal SS shive.

Sampling for IOS was limited as no iron analysis system was onboard. The goal was to collect some samples for future analysis to continue the time series on a reduced scale as well as for archiving for possible other trace metal analysis if so desired. Limited samples were undertaken at P16 and P20 at 10m and 20m depths only for both filtered (0.22u) and unfiltered. 250ml samples were collected and acidified with 1 ml of 1:1 Seastar ultra pure acid. Note this acidification is les than the normal IOS procedure for "total" analysis (2ml of 6N HCL per 250ml) but greater than the Geotrace protocol of 0.5ml of 6N HCl for 250 ml samples.

We planned to collect a full profile at Ocean station Papa but were cut short due to a ship emergency (generator failure). See summary below for depths sampled. All depths samples at OSP were also done in duplicate (28 * 250ml bottles filled for OSP).

Go-flo sampling was performed by Ian Beveridge, and Christina Schallenberg. Samples from the Go-flos were subsampled by Christina Schallenberg and Cassie Schwanger and I collected their CDOM, Cu, Superoxide etc from the pump as well as a 25L carboy for TM clean seawater.

Sampling Summary for Fe,

Depth	P04	P12	P16	P20	P26
10m			X	X	XX
20m			X	X	XX (25m)
40m					XX
75m					
100m					
150m					
200m					XX
300m					
400m					XX
600m					XX
800M					X X

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Craig Mewis UBC Line P – February 2011

Objectives:
Describe the taxonomic and metabolic diversity of the bacterial communities involved in the cycling of major nutrients and gases along Line P, focusing on the communities in the Oxygen Minimum Zone.

Sampling plan:
At 5 stations (P4, P12, P16, P20, P26)

1) Measure dissolved nitrogen (N_2), oxygen (O_2), carbon dioxide (CO_2), argon (Ar), nitrous oxide (N_2O) using Gas Chromatography Mass Spectrography.
2) Count the number of cells per millilitre using Flow Assisted Cytometry
3) Filter 1 L samples at 16 depths for high resolution bacterial DNA and sequencing

Additionally, at 3 major stations, (P4, P12, and P26) the following will be sampled at four depths across the oxygen minimum zone

1) Filter large volumes (20L) to create genomic libraries of the bacterial communities.
2) Samples were taken at stations P4, P12 and P26 at 16 depths to perform a Whole Genome Analysis, if wanted. This enables genomic sequencing at a later date if promising results are found in those regions of the transect.
3) Measure the levels of Hydrogen Sulfide in the water as this is an indicator of anaerobic respiration.

At Ocean Station Papa I will save the filtrate from the 20L filtrations to use as a growth media in the lab.

Comments:
This cruise went very well, although the number of properties being measured was lower than in previous cruises because our group only used one berth this trip. It was very convenient to have the area near the fume hood to work in, and we will try to use the same setup in future cruises.

Although all the Line P stations were visited, the generator fire shortly before P26 meant that the dedicated UBC cast at P26 was cancelled. This meant that the large volume filtrations that were scheduled to be performed here were not done. Because the IOS deep cast went down, however, the Whole Genome Analysis and the Sulfide assay were sampled using water from the IOS cast instead of the UBC cast. Other than this, all the other sampling went according to plan.

We continued to use on-deck temperature measurement to check for misfires, there were none discovered at any point during this cruise.

Gas samples were taken, in duplicate at 16 depths at stations P4 (12 depths), P12, P16, P20 and P26. Additionally, gas samples were also taken in duplicate at the 4 UBC depths at P4 and P12.

Furthermore, the number of cells per millilitre will be measured using a Flow Assisted Cytometer upon my return to UBC. Samples were taken at 16 depths from the IOS casts (13 for P4) and 4 depths for the UBC casts.

We wish to thank the Tully crew for their assistance and excellent work throughout the cruise. Thanks to Marie Robert and the scientists onboard for their help on deck and in the lab. Special thanks to everyone who helped me collect samples.

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Cullen Lab, University of Victoria
Cassie Schwanger: Total dissolved copper
Christina Schallenberg: Kinetic experiments of superoxide decay in seawater

Employing trace metal-clean sampling techniques with 4 Go-Flo bottles mounted on a Kevlar line, the 5 major stations along Line P were sampled at 8 (7) depths in 2 casts each:

P4	P12	P16	P20	P26
15 m	15 m	25 m	25 m	10 m (pump)
25 m	25 m	50 m	50 m	25 m (pump)
50 m	50 m	70 m	70 m	40 m (pump)
100 m	100 m	120 m	120 m	200 m
200 m	200 m	200 m	200 m	400 m
400 m	400 m	400 m	400 m	600 m
600 m	600 m	600 m	600 m	800 m
800 m		800 m	800 m	

At Station P26, the mixed layer samples were retrieved with a Teflon pump rather than with Go-Flo bottles. At all stations and depths, samples were gravity filtered through a 0.2 μm Acropak filter capsule. 500 mL LDPE bottles were filled for future trace metal analysis in the lab (Fe, Cu and others) and 60 mL samples were taken for measurement of total dissolved Cu employing ZoneFluidics with a FloPro mini analyzer (Cassie Schwanger). At Stations P4, P16 and P26, 1 L samples were drawn at 5 depths for onboard kinetic experiments with superoxide (Christina Schallenberg).

Briefly, at each sampled station and depth, 6 treatments were prepared for superoxide decay experiments (in duplicate): addition of iron at two concentrations, addition of copper at two concentrations, addition of the ligand DTPA, and an untreated control. After sufficient time for the seawater to equilibrate with the added metals and ligand (at least 12 hours for DTPA treatment and 3 hours for metal additions), samples were spiked with superoxide that was generated from potassium superoxide in a sodium hydroxide solution at pH 12.7. The decay of superoxide in the sample was followed with a chemiluminescence flow injection system with a Hamamatsu photo-multiplier tube, using the chemical MCLA (2-methyl-6-(4-methoxyphenyl)-3,7-dihydroimidazo[1,2-a]pyrazin-3(7H)-one hydrochloride). The goal of the work was to investigate the sinks of superoxide in these waters.

At Station P26, filtered and unfiltered 250 mL samples were also taken from the Go-Flo bottles for Keith Johnson, IOS, for future Fe analysis.

PROJECT TITLE

POC production, POC export and POC-^{210}Po-^{234}Th interactions in relation to plankton community structure in the subarctic NE Pacific

PI's: Gillian Stewart, City University of New York, Queens College, Flushing NY USA
Bradley Moran, University of Rhode Island, Graduate School of Oceanography, Narrangansett, RI USA
Michael Lomas, Bermuda Institute of Ocean Sciences, St. George, BERMUDA

2011-01 February Line P Cruise Participants:
Roger P. Kelly, University of Rhode Island, Graduate School of Oceanography, Narragansett, RI USA
Yan Choi, City University of New York, Queens College, Flushing NY USA
Steven Bell, Bermuda Institute of Ocean Sciences, St. George, BERMUDA

OBJECTIVES and BACKGROUND

The overarching goal of this collaborative project is to investigate the relationship between variability in plankton community structure with variability in POC production, POC export and POC-^{210}Po-^{234}Th interactions in the subarctic NE Pacific.

This study is motivated by the need to illuminate the role of euphotic zone ecosystem processing in predicting the eventual fate of export flux in the mesopelagic. The project will provide a mechanistic understanding of the processes controlling the production and export of POC and associated elements in the upper subarctic Pacific. Specifically, we will investigate and directly test hypotheses on ecosystem processes that link variability in plankton community structure to variability in particle production, export, and POC-210Po-234Th interactions in the upper ocean. We anticipate that outcomes from field work at Line P in conjunction with laboratory experiments will demonstrate strong and consistent relationships between planktonic food webs and the rates of carbon, ^{210}Po, and ^{234}Th packaging, sinking, and remineralization. Further, the information gathered will guide future use of radionuclide tracers, including mechanistic justifications for which tracer to use, when and where to use each tracer, as well as insight into the specific aspect of carbon that ^{210}Po and ^{234}Th are tracing. This project is relevant to several national and international research programs. These include: GEOTRACES, which is focused on the global-ocean distribution of trace elements and isotopes in seawater; and IMBER, which is focused on the structure and functioning of ocean ecosystems. This project will also build upon the results of earlier process studies at OSP including SUPER (Subarctic Pacific Ecosystem Research, Miller 1993), VERTEX (VERTical EXchange, Martin et al. 1987) and the Canadian JGOFS study.

SAMPLING:

At 4 major stations (P12, P16, P20, and P26) two discrete rosette/CTD casts were made to collect seawater for our measurements. One cast was made for 234Th and 210Po samples, tripping bottles at 13 depths, of which 12 were fixed depths (5, 10, 20, 30, 50, 75, 100, 150, 200, 300, 400, 500m) and 1 was the chlorophyll maximum (DCM). The DCM was chosen based on observation of the instrument traces (fluorometer, transmissometer), which varied at each station but generally ranged between 35-40m. When no discernable fluorescence peak was observed, a depth near the midpoint of the surface mixed layer was selected. The second cast was for phytoplankton community structure and primary productivity samples. 7 depths were selected based on PAR light levels (100%, 50%,30%,17%,9%,5%,1%). Water samples were processed on board (described below) for later analyses at respective PI laboratories.

Phytoplankton structure profiles were measured from 7 depths (DCM, 5, 10, 20, 30, 50, 75m).

- Fluorometric chlorophyll - 300ml filtrations each for "total" (GF/F filters, nominally 0.7µm) and 5 µm (polycarbonate membrane filters) size fractions in duplicate, stored in -80°C.
- HPLC pigments – 1L filtrations each for "total" (GF/F filters, nominally 0.7µm) and 5 µm (polycarbonate membrane filters) size fractions, occasional duplicates, stored in -80°C.
- Flow Cytometry – 4ml samples preserved with 200 µl paraformaldehyde, stored in -80°C.

Preserved microplankton – 200ml samples preserved with 10ml buffered formalin and 1 ml alkaline lugols solution, stored in the dark at room temperature. (we intended to do this on P26 only but alas we all know what happened there)

Thorium profiles were measured on 12 depths (DCM, 1, 10, 20, 30, 50, 75, 100, 150, 200, 300, 500m). 4L samples were pH adjusted with 8 drops 28% NH_4OH then 25 µl 0.2M $KMnO_4$ and 10 µl 1 M $MnCl_2$ to form a MnO2 precipitate which was collected on GM/F filters. The filters were stored frozen (-20C) and brought to URI-GSO for analysis by direct beta counting.

Polonium profiles were measured on a subset of 10 depths . Whole-rosette bottle samples (10.1 L) were drained into 20L cubitainers (contained in milk crates for easier handling). Samples were pH adjusted with HNO_3 then spiked with 25 µl ^{210}Po tracer, 1 ml Pb standard and 5 ml $FeCl_3$. Samples were pH adjusted again with NH_4OH, oxidized with 1 ml $NaCrO_4$, and pH increased again with more NH_4OH. Samples were allowed to precipitate and sediment for at least 10-12 hours. Samples were decanted to ~1L and transferred, with most of the precipitate to LDPE bottles.

Large volume size-fractionated particles, in-situ pumps, and sediment traps were not collected / deployed due to the early termination of science operations on account of multiple failures of the ships generators.

Summary table of samples collected on 2011-01 Line P cruise by URI-BIOS-CUNY•QC group.

Samples were collected at P12, P16, and P20

Sample	P12	P16	P20	P26
Total Chlorophyll	7	7	7	
5 µm Chlorophyll	7	4	7	
Total HPLC	7	7	7	
5 µm HPLC	7	3	4	
FCM	7	7		
Primary Production			35	
Total ^{234}Th	12	12	12	12
Total ^{210}Po	11	12	12	
Bongo Tow	1	1		
In-situ pumps				
Sediment Traps				
LVSF Particles				

RADIOISOTOPE USE:

The following radioisotope was used in the Rad-Van: $H_{14}CO_3$, A total of 4 wipe tests were conducted prior to and during the cruise. The van had been completely refurbished prior to this cruise. A wipe test was carried out before any radioisotope was loaded onto the van. A second test was conducted after the working $H_{14}CO_3$ spike had been made. A check test was performed after P20 samples were collected, spike added and samples were placed in the incubator. A final comprehensive wipe test was conducted after the final $H_{14}CO_3$, sample had been processed.

RADIATION VAN REPORT:

The IOS radiation van had undergone a complete refurbishment prior to this cruise. Overall the van was easy to work in. The floor space is good. Bench height is comfortable to work on. There is plenty of bench space and draws. The bench draws are held in place by magnets at the rear of the draw. This system worked very well in rough seas with only one draw needing a stronger magnetic attraction. The van however does need some fine tuning. The small sink opposite the fridge has a small leak. The overhead heaters are too low. A tall person will not be able to use them until they are placed closer to the ceiling. The mats have to be removed. If spike was spilt on them they would be impossible to clean. The van needs blinds to block out light when doing primary production experiments. There should be some tape on the floor just before fridge delineating a non rad. zone

as one enters the van. If someone passes this line they must be geared up. Fume hood is hopeless. The alarm just keeps on going off regardless where the sash is. Also there is a metal plate on the entrance door frame which catches jackets. I have evidence. Finally, there needs to be somewhere to secure waste carboys. None of these problems are major and can all be easily rectified. Considering that this was the first time the refurbished van had been to sea and the rough conditions experienced, it was no surprised that small problems would surface. Once these problems are addressed IOS will have an excellent sea going radiation van.

SUMMARY/FINAL COMMENTS::

Thanks to the officers and crew of the John P. Tully. Special thanks to Eric Zwarich and Dave Wilhelmson for lending a magnet and bushing for repairs to equipment damaged during the transit to P26. Thanks and appreciation to Len Bilby and the deck crew for assistance securing our equipment on the weather decks. We would also like to thank Marie Robert and the science party for their, sometimes very innovative, suggestions and sampling assistance. We'd like to single out Jane Eert for help and advice throughout the cruise regarding interpreting PAR sensor data as well as setting up the primary production incubator along with Hugh Maclean. Thanks to Mike Arychuk for assistance with inter-cruise chemical storage and handling. We'd also like to thank Darren Tuele, Janet Barwell-Clarke, and Hugh Maclean for help during pre- and post-cruise operations.