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:** 10 February 2015 **TO:** 24 February 2015

SCIENCE CRUISE NUMBER: 2015-01 **SHIP'S PATROL NUMBER:** 14-11

CHIEF SCIENTIST[S]: Marie Robert

SCIENTIFIC PERSONNEL:

Female	Male
~~Isabelle Baconnais (UBC)~~	Michael Arychuk (IOS)
Lindsay Fenwick (UBC)	Kohen Bauer (UBC)
Tereza Jarnikova (UBC)	Mark Belton (IOS)
Céline Michiels (UBC)	Glenn Cooper (IOS)
Marie Robert (IOS)	Luke Halpin (EC)
Katharine Thompson (UBC)	Sam Kheirandish (UBC)
Maureen Soon (UBC)	Rick Nelson (BIO)
	Kyle Simpson (DFO)
	Doug Yelland (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.

CRUISE OBJECTIVE/OBJECTIVES: Repeat hydrography section (physics, chemistry, zooplankton, trace metal), cesium sampling, deploy three weather data drifting buoys for Environment Canada, deploy 54 various drifters for IOS, *in-situ* pumping for UBC at specific stations.

CRUISE DESCRIPTION: This cruise (2015-01) went really well. Despite having only 2 weeks to do the cruise we managed to do everything we were planning to do. It really, really helped that the crew of the Tully loaded the containers and winches one day before the official start of the cruise, and that we could start loading our gear on Tuesday morning. Also the way the loading was done: first heavy equipment, then IOS gear, then UBC gear, helped a lot. The weather was a touch rough during two short sections of the cruise but for a February cruise we sure could not complain! Finally sailing on two engines for most of the cruise (because of engine problems) was also a key factor of success. All in all, it was an excellent February cruise.

DAYS ALLOCATED: 14 **DAYS OF OPERATION:** 13

DAYS LOST DUE TO WEATHER: about 6 hours getting to P20. Also some stations were cancelled at the beginning of the cruise because of weather and done on the way back.

SAMPLING:

- The Line P survey was 100% successful. All planned stations were visited and all planned profiles got done.
- Three weather data drifting buoys were deployed for Environment Canada, and 54 drifters of 4 types (sponge-bob, drogues, Davis, and surface) were deployed for IOS.
- Trace Metal samples were collected for IOS using the TM pump and the X-Niskins on the Kevlar line at P4, P12, P16, P20 and P26. The TM pump was also used at P26 to collect surface samples for UBC.
- The samples collected include:
  1) Underway: **IOS**: Thermosalinograph (Temperature, Salinity, Fluorescence), acoustic sounder, ADCP, pCO_2, irradiance off the heli-deck – **UBC (Jarnikova):** DMS, DMSP, DMSO, ???
  2) "E-data" from CTD: Pressure, Temperature, Conductivity, Dissolved Oxygen (two sensors), Transmissivity, Irradiance, Fluorescence (one sensor).
  3) From the Rosette: **DFO-IOS:** dissolved oxygen, salinity, nutrients, DMS, DMSP, chlorophyll, pigments (HPLC), dissolved inorganic carbon (DIC), alkalinity, pH, micro-plastics – **DFO-BIO (Nelson)**: Cesium, ^{129}Iodine – **UBC (Kheirandish):** number of cells per millilitre, virus counts, bacterial genomic (DNA, RNA) and sequencing – **UBC (Soon, Bauer):** Neodymium, Rare Earth Elements, Chromium (speciation and isotopes) – **UBC (Michiels, Thompson):** N-species, bacterial production, dark carbon fixation, respiration rates, nitrogen cycle process rates measurements (15N-labeled incubation), sulfide oxidation rates – **UBC (Fenwick):** gases.
  4) **DFO-IOS (Yelland):** Zooplankton using vertical net hauls (Bongos to 250 m and 1200 m).
  5) From the Trace Metal pump and X-Niskins: **DFO-IOS (Simpson):** Dissolved and total dissolvable iron, filtered water for UBC.
  6) From the bridge: **EC-CWS (Halpin):** Bird, marine mammals and turtle observation.

RADIOISOTOPE USE:

C^{14} and H^3 radioisotopes were used during this cruise. The Rad-van was decommissioned properly and all paperwork handed to the appropriate people.

PROBLEMS [SCIENTIFIC GEAR AND OPERATIONS]:

The thermosalinograph (TSG) hoses and sensors were set-up where the pCO2 various components need to be set-up. It is absolutely necessary that the people whose instruments are in that area sit down and redesign that corner in a way that everyone can set-up their instruments without being in each other's way.

The main CTD data acquisition computer crashed at least twice, once during a cast.

The label laptop AND the label printer gave up at once. It's easy enough to use the new printer, but the laptop was NOT set-up at all. It didn't have an network cable-to-USB adapter. Once plugged in, the screen was too small for the label software. And even once plugged in to the network it still would not connect to the other computers. Finally, while trying to get ready for a cast is not a great time to have to figure out how Windows 8 works. Thanks to Doug Yelland to figure it all out and mainly to have the network cable-USB adaptor that was necessary!

This was the first cruise for the new Tully Millipore Direct Q5 water system. We have also added a 2 stage pre-filter system composed of a 1 micron pre-filter and activated carbon filter cartridge, providing pre-filtered feed water to the Direct Q5. The hope is this will increase the longevity of the system and the consumable filter cartridges which are costly. The unit now has a 30 ℓ reservoir tank providing large amounts of RO water to the scientific staff. The unit was installed a day before departure and flushed several times. Although producing 18 Mohm*cm water, Mike Arychuk would occasionally detect levels of a sulfur containing compound 3 times higher than normal background. In order to remedy the issue the tank was sanitized with 0.01% sodium hypochlorite for 2 hours. All lines were flushed with the same solution. Tank and lines were fully flushed with 3 volumes of RO water. Subsequent analysis of the water by Mike Arychuk found it to be within acceptable background levels. It is now recommended that prior to each cruise, the system will be sanitized as outlined above and test before being installed upon the ship.
Also a meeting occurred with Ryan Braidwood (Chief engineer), Marie Robert (Chief scientist), Dave Veldman, and Glenn Cooper on the placement and construction of bracket to mount the new water system to the main science lab bulkhead. We would like to thank the crew for assisting with this endeavor.

Glenn Cooper

XP machines are still used by science, either because some software and instrument interfaces aren't compatible with Windows 7, or simply because no budget has been assigned to modify these machines or else their upgrade got neglected. This has to be addressed ASAP.

The PAR sensor on the heli-deck doesn't seem to be working consistently anymore. It will have to be determined if it is the instrument itself or just a bad connection in the long wire.

We had two trucks available for loading, one being the 'regular' white cube van, the other the small "old CHS cube van". It is mandatory to have two trucks available for loading and offloading. For this cruise we needed both vans to load all the gear: one for chemistry, one for physics, and we used the pick-up truck for the rest. We could do so since there were no other groups before or after this cruise sharing the same equipment. When another IOS group is already on board, or follows our program, it is still necessary to have two cube vans: one for loading the equipment going on and the other to offload the equipment coming off.

We had to swap the latching mechanism on the rosette after Niskin 9 failed to close many times. We also had to swap Niskin 7 of the main rosette with Niskin 1 of the spare rosette because the bottom cap was very loose. Finally, the Niskins on the main rosette were improperly labelled at the beginning of the cruise.

There has been a leak of DMS standard in the fridge of the main lab. Scientists MUST carry and **contain** all their chemicals in spill-proof containers.

One UBC student could not sail with us as planned because of delays in her security clearance procedures.

SUCCESSES [SCIENTIFIC]:

There were many new water requests on this cruise due to new groups joining the program but once again people sent their requests before the cruise and it greatly helped in getting the rosette casts ready on time.

All the lab computers (science server, ADCP, AVOS, EK60 and EA600) worked flawlessly.

The new RBR_Solo pressure sensor worked really well for determining actual depths of each (Trace Metal) bottle deployed to within 0.7m.

Kyle Simpson

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

The trace metal winch with the Kevlar line stopped working at P12 due to problems with the brake. The crew engineered a temporary fix that allowed them to open and close the solenoid valve that controls the brake, but fixing it will require a new part or parts. The winch stopped working again when we revisited P4. Again a temporary fix was obtained, but it's a good thing that only two casts were left since it now involved 3 people (and a drill) to operate the winch.

There is a very loud high pitch noise affecting the forward cabins every time the bow thrusters are in use.

There were very important delays in offloading the ship. The first one was because of a ceremony held on the jetty for the two new ships acquired by CCG. If we had been told of this delay we would have done the bongo net tows in Juan de Fuca strait and Haro strait as requested by an IOS scientist. The other delay occurred the following morning when the same two boats needed fuel and the fuel truck blocked the whole jetty. Surely the ROC knew of this fuelling when we got back on Monday??

SUCCESSES [SHIP]:

The network worked flawlessly this time, no computers were randomly kicked off the network and all science email accounts worked fine as well.

Thanks to the engineers for adapting the "emptying of the tanks" and the burning of garbage around our work on long stations.

Very special thanks to Bruce and his crew for loading the containers and the winches on Monday.

Thanks to the engineers for building the brackets to hold the new milli-Q system (work in progress! ☺)

DELAYS [OTHER THAN WEATHER]:

About one hour for problems with work winch.
About 24 hours of various CCG operations on the jetty after our return.

SAFETY CONCERNS:

None.

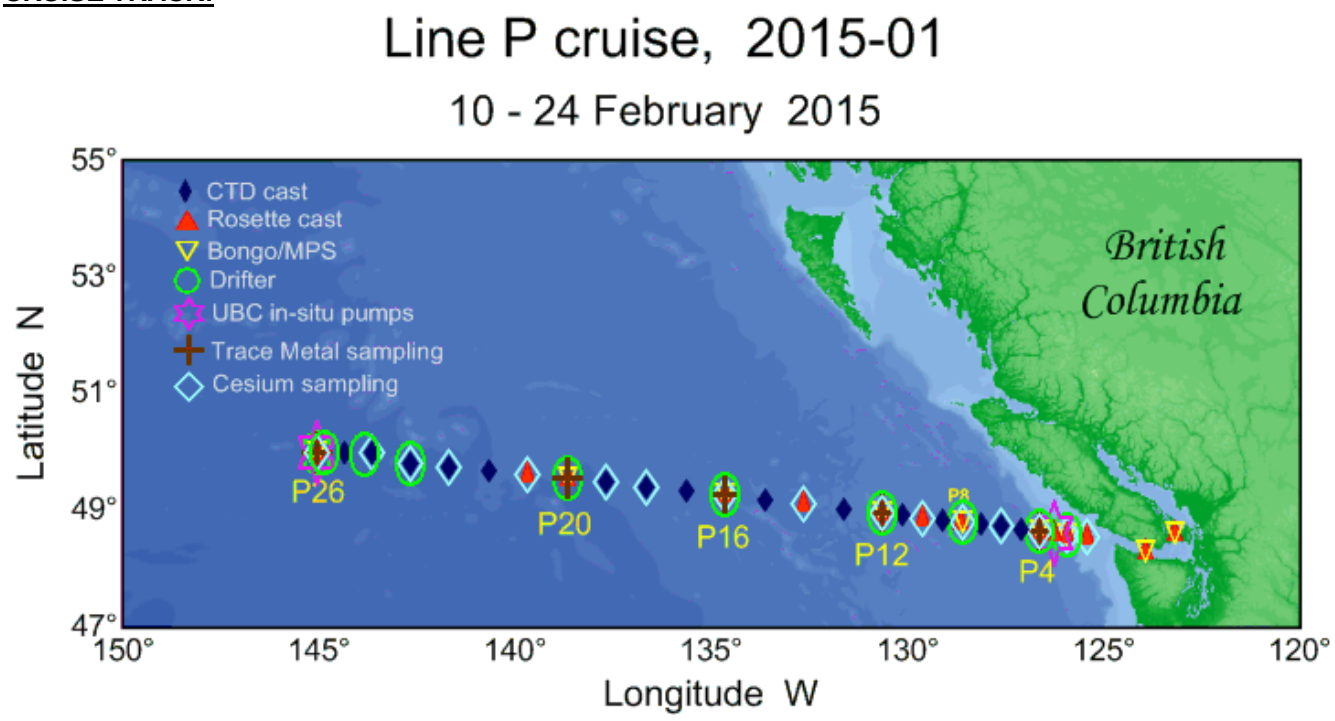
HAZARDOUS OCCURRENCES:

None involving scientific personnel.

EVENT LOG:

Monday 9 February:	Loading of the containers and winches.
Tuesday 10 February:	Start loading the ship at IOS around 0800. Safety meeting at 1300. Leave IOS at 1800. Test cast in Saanich Inlet then proceed to Haro59. Station Haro59.
Wed 11 February:	Fire and boat drill at 1000. Stations JF2 to P4.
Thursday 12 February:	Stations P4 to P9. Cancel 3 casts at P4 and cancel the cast at P5 b/o weather.
Friday 13 February:	Stations P10 to P12.
Saturday 14 February:	Stations P13 to P16.
Sunday 15 February:	Stations P16 to P18.
Monday 16 February:	Stations P19 to P21. About 6 hours lost to weather. Deploy one EC drifter at P20.
Tuesday 17 February:	Stations P22 to P35. Deploy one EC drifter at P24.
Wed 18 February:	Station Papa Day 1. Plastics, Cesium-500m, UBC *in-situ* pumps, DMS, Deep, TM pumping.
Thursday 19 February:	Papa Day 2: TM Go-flos, Bongo to 250 m and 1200 m; Sam's cast, Céline+Kohen's cast, Cesium-150m. Deploy EC drifter. Depart Papa around 0745. Deploy a set of drifters for IOS after lunch.
Friday 20 February:	Sailing east.
Saturday 21 February:	Sailing east.
Sunday 22 February:	P5, complete the missing casts at P4, UBC *in-situ* pumps at P3.
Monday 23 February:	Arrive at IOS and offload the UBC gear.
Tuesday 24 February:	Offload the IOS gear in the afternoon (due to fuel-truck on the jetty).

CRUISE TRACK:



SUMMARY/FINAL COMMENTS:

- Many thanks to everyone at IOS who have helped make this cruise a success: Kenny, Nina, Kelly, Moira, Hugh, Jackie … your help is always greatly appreciated! Thanks for the extra hand (and backs!) while loading and offloading ...

- Special thanks to Don Lee and the crew of the *Tanu* for relieving the *Tully* as early as possible from SAR duties, and to Bruce and the whole deck crew for loading the winches and containers a day early.

- And thanks to everyone on board for such a successful and enjoyable cruise!

  Marie Robert and the science team.

- Many thanks to all of the crew and scientists that helped with the deployment and recovery of (the trace metal) gear!

  Kyle Simpson

- We would like to thank the Officers and crew of this trip. Everyone has been so helpful. We would like to thank the Chief Scientist and the IOS gang for giving us time to accomplish our goal on this successful trip. Thank you ALL.

  Maureen Soon and Kohen Bauer

- It was a pleasure to work with the entire science and CCG crews, the food was excellent, and I look forward to sailing on the *CCGS J. P. Tully* in the future.

  Luke Halpin

- Thanks to the crew and officers of the *CCGS John P. Tully* for the work to make this a successful cruise. Special thanks to Marie Robert for all of the wire time and all those who helped carry the 24 ℓ carboys.

  Rick Nelson

- We would like to thank Marc for his great help during our long sampling from the rosettes, especially on P4 (;-)) as well as Marie to accommodate as best as she could our samples. We would also like to thank Mike and Kyle for their assistance with the RadVan. The scintillation counter was a challenge and they graciously offered up quite a few hours to make sure that everything was in order.

  Céline Michiels and Katharine Thompson

- We wish to thank the captain and *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. A special thanks to the great chef on-boar for the amazing quesadillas. A special thanks to Marie for bringing extra gear for us.
  I really appreciated the time on board with the crew. Great evenings of playing games and the great idea of dart championship to interact with people you normally don't get to meet.
  I would minimize the 10 minutes of "anger" to none. It's very uncomfortable to work around people who are angry. We are all adults and we should be able to control our temper.
  Sam Kheirandish

PROJECTS AND RESULTS:

Water masses – Marie Robert, DFO/IOS.

The main story of 2014 in terms of conditions in the Pacific ocean was the very large mass of warmer-than-usual water situated in the top 100 metres or so, and covering most of the Gulf of Alaska. The big question as we left for this cruise was: is the warm water still there? When looking at the anomaly of temperature with respect to the 1956-1991 averages, it seems that the warm water is still present. Not only is the anomaly actually even more pronounced than in February of last year, is also now extends all the way to the coast, as can be seen in Figure 1.

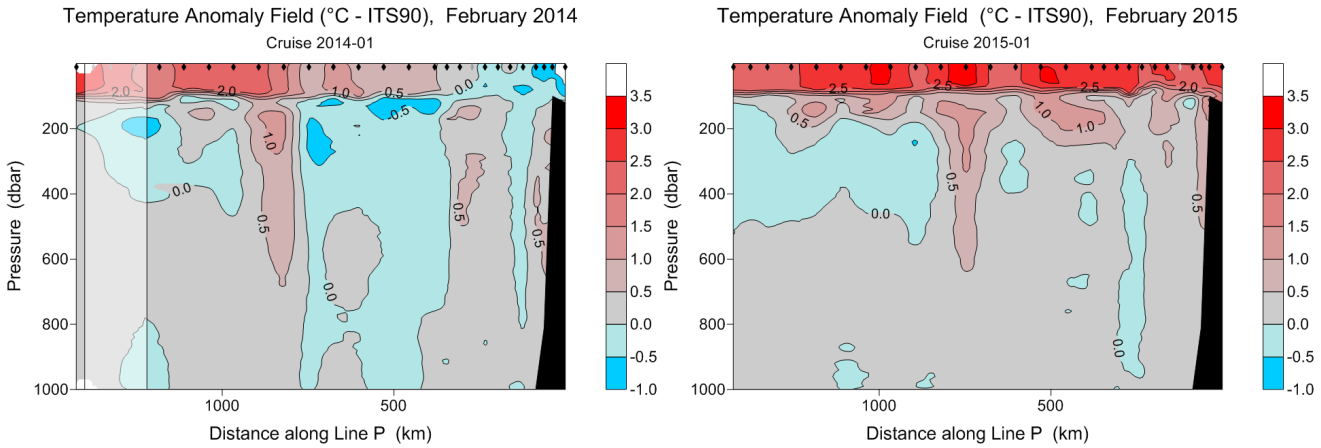


Figure 1: Temperature anomaly field with respect to the 1956 – 1991 averages for February 2014 (left panel) and February 2015 (right panel).

Although the temperature field seems to possess an “eddy-like” signature (Figure 1 right panel for temperature anomaly field and Figure 2 for temperature field) in the vicinity of station P17, the altimetry data show no sign of an eddy at that specific location (Figure 3).

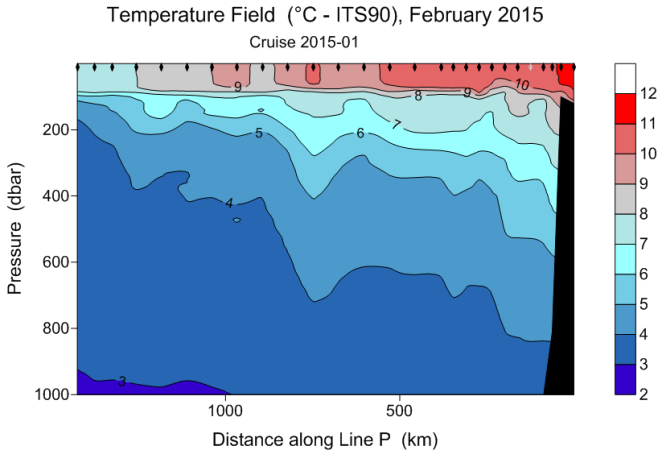


Figure 2: Temperature field, February 2015

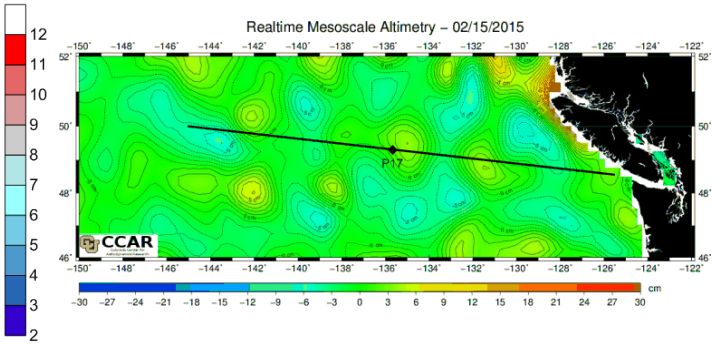


Figure 3: Altimetry on 15 February 2015.

Iron/Trace metal Sampling JP Tully 2015-01 – Kyle Simpson, DFO/IOS.

The HEPA hood and TraceMetal Clean (all Teflon) sampling pump were set up in the wetlab and all sampling equipment (pump and X-Niskins) were deployed from the Kevlar line at the Chains - The clean hood/pump setup was used for all surface samples (Stations P4, P12, P16, P20, P26 (10-40m). All samples, both unfiltered and filtered (0.2u Durapore Opti cartridge), were collected into TM cleaned 250ml LDPE bottles and acidified to pH~ 1.7 by adding 1ml of 6N Seastar Baseline HCl. – Bulk water was collected at Station Papa (P26) from 40m depth, for our colleagues from UBC. 3x 25 ℓ carboys and 3x10 ℓ cubitainers, as well as 2x 500 ml bottles for ligand analysis (one at the beginning of pumping and one at the end were filled with 0.2u filtered seawater, using TM techniques. The TM pump was problematic especially at the 10m, and 20m depths, likely because of kinks in the tubing resulting in increased pressure. This increased pressure seems to have ruptured the seals on the main pump leading to air-leaks. The spare pump was brought online for station P26 and worked well. Depths below 40m were collected using TM clean Niskin-X bottles (P12, P16, P20, P26), P4 was sampled on the way back to avoid contamination due to expected high Fe concentrations from coastal waters. Depths collected were 50m, 75m, 125m, 175m, 200m, 400m, 600m, 800m. No samples were lost due to winch problems, but there were problems the winch's brake. The crew engineered a temporary fix that allowed them to open and close the solenoid valve that controls the brake, but will require a new part or parts. The new RBR_Solo pressure sensor worked really well for determining actual depths of each bottle deployed to within 0.7m. All sampling was completed in the wet lab and sample processing was completed in the IOS trace metal container.

The Zodiac was not deployed for trace metal surface water sampling; as such no true surface samples were collected.

Many thanks to all of the crew and scientists that helped with the deployment and recovery of gear!

Carbonate Studies: pCO2, Dissolved Inorganic Carbon (DIC), Alkalinity (TA), pH – Kyle Simpson and Glenn Cooper, DFO/IOS.

We observe/measure four aspects of the carbonate system on expeditions to OSP. Both pH and underway pCO2 are measured onboard the Tully. Samples collected for DIC and TA are preserved and returned to the shore-based laboratory for analysis.

1) pCO2

The pCO2 analyzer was setup in main lab next to the seawater loop and was running from shortly after leaving IOS. The system seemed to work well for the duration of the trip. There were a few problems with the initial install of the system. It will be important for users of the loop system to sit down together and complete a proper design of the area, in order to maximize the space and the utility of its operations. Its current configuration is undesirable, for initial set up as well as for adding or removing gear.
In order for smooth operations and transition between operations, this area needs to be cleaned up and redesigned.

2) DIC/TA sampling

DIC/alkalinity samples were collected in 500ml bottles and preserved with 100ul of $HgCl_2$ at all major stations on line P, including Haro59, JF2, P1, P2, P4, P12, P16, P20, P26, and a calibration cast at P23 (P4 was skipped on the way out to station Papa and was collected on the way back). Ground glass stoppers were greased with Apeizon M grease and held closed with electrical tape. One duplicate was collected at each station between 1000 and 3500m as well as a duplicate bottle tripped at one of the deeper depths. A full set of duplicates was collected at Station P26.

3) Seawater pH was determined using the spectrophotometric method developed by Clayton and Byrne (Deep Sea Research, 1993). Seawater was collected directly from the rosette niskins into 10cm path length glass cuvettes. Meta-cresol purple (m-CP) was used as the indicator dye and was validated prior to the cruise at IOS. The following stations were sampled: Haro59, JF2, P1, P2, P4, P12, P16, P20, and P26. One set of triplicate samples were taken at stations P1 and P2, whereas all other casts had two sets of triplicates which will be used to determine precision for the entire cruise. A calibration cast was performed at P23 where triplicates were taken from 5 niskins which were closed at all the same depth of 2005m.

Dissolved neodymium concentrations and isotopic composition from the Strait of Georgia to Station Papa and Cr Isotopes and Speciation Sampling – Maureen Soon and Kohen Bauer, UBC

Scientific report: Line P 2015-01 (February 2015)

Neodymium(Nd) concentrations and isotopic composition are used to study the continental weathering processes and past ocean circulation. We speculate that the Pacific water circulating in the Strait of Georgia alters its neodymium isotopic composition as a result of post depositional dissolution of suspended sediment from the Fraser River. This isotopic alteration could be used to produce an estimate for the "local continental weathering rate" and improve our understanding of the oceanic neodymium cycle. Sampling along Line P will allow us to examine whether the isotopic alteration is indeed expressed as contrasting isotopic signatures between the water circulating inside the strait and the water outside, in the Pacific.
We hope to see that the lower inflowing layer from the Strait of Georgia to the Pacific has a different Nd isotopic composition from the upper outflowing water layer.

In this cruise, we collected 20 ℓ samples from the niskins on the rosette at Haro 59, P2, P3, P14, P17, and P26. Each sample was filtered through a 0.45 micron in-line filter cartridge and acidified to pH 2 with 6N HCl. Further sample processing will be done at UBC.

20L rosette samples for Neodymium

Location	Depth, m
Haro 59	5, 50,75,100,150, 215
P2	5, 25,50,75,100,106
P3	5,50,100,175,225,300,375,425,525,626,795
P14	50,200,400,600,800,1000,1500,2000,2500,3000,3306
P17	50,200,400,600,800,1000,1500,2000,2500,3000,3693
P26	5,50,200,400,600,800,1000

Large Volume Pumping (LVP) at P3 for neodymium

Sinking particles were collected by in-situ pumps to determine the amount Nd sank to the deep ocean. 7 pumps were deployed at 5, 50, 100, 300, 425, 625, and 750m.

Cr Isotopes and Speciation Sampling

During the Line P cruise seawater samples were collected for analyses of chromium speciation (Cr III, Cr VI) and chromium isotopes. All water was collected from niskins off the rosette directly into plastic cubitainers. Full depth profiles were sampled at stations JF2, P2, P4, P20 and P26. At stations JF2, P2, and P4 three litres of seawater was sampled at each depth. 2ℓ of this was filtered (0.45 um filter) into clean HDPE plastic bottles and stored for isotope analysis on land. Two 140 ml samples were filtered into separate 500 ml clean HDPE bottles for speciation analyses. In the on-board lab 1ml of $Fe(OH)_3$ reagent was added to one of the 140ml samples for Cr(III) analyses and 1ml of $(NH_4)_2Fe(SO_4)_2$ reagent was added to the other 140ml sample for Cr(tot) analyses, both to be performed on land. At station P20, only 1ℓ of water was collected for isotope analysis and no speciation samples were collected. At station P26, only 1ℓ isotope samples were collected along with a full profile of speciation samples.

Large volume pump sampling at P26 for Chromium

Pump #	Depth, m (cast 1/cast 2)	Volume, L (cast 1/cast 2)
1	5/1500	200/725
2	50/1750	2/2
3	100/2000	553/637
4	150/2500	638/0
5	500/2750	13/500
6	750/3000	397/380
7	1000/3500	0/363

We would like to thank the Officers and crew of this trip. Everyone has been so helpful. We would like to thank the Chief Scientist and the IOS gang for giving us time to accomplish our goal on this successful trip. Thank you ALL.

Cruise Report – Glenn Cooper, DFO/IOS.

1) Tully Direct Q5 water system:

This was the first cruise for the new Tully Millipore Direct Q5 water system. We have also added a 2 stage pre-filter system composed of a 1 micron pre-filter and activated carbon filter cartridge, providing pre-filtered feed water to the Direct Q5. The hope is this will increase the longevity of the system and the consumable filter cartridges which are costly. The unit now has a 30L reservoir tank providing large amounts of RO water to the scientific staff. The unit was installed a day before departure and flushed several times. Although producing 18 Mohm*cm water, Mike Arychuk would occasionally detect levels of a sulfur containing compound 3 times higher than normal background. In order to remedy the issue the tank was sanitized with 0.01% sodium hypochlorite for 2 hours. All lines were flushed with the same solution. Tank and lines were fully flushed with 3 volumes of RO water. Subsequent analysis of the water by Mike Arychuk found it to be within acceptable background levels. It is now recommended that prior to each cruise, the system will be sanitized as outlined above and test before being installed upon the ship.
Also a meeting occurred with Ryan Braidwood (Chief engineer), Marie Robert (Chief scientist), Dave Veldman, and Glenn Cooper on the placement and construction of bracket to mount the new water system to the main science lab bulkhead. We would like to thank the crew for assisting with this endeavor.

2) RINKO Oxygen Sensor.

Dissolved oxygen (DO) sensors traditionally have a considerably slower response time compared to CTD sensors. The presently used Seabird SBE43 can have a response time as long as 28 seconds in waters with temperature < 3.5 ^{o}C, which are typically found along Line P sampling line at depths below 800 meters (see Seabird Application Note #64). JFE Advantech Co. Ltd. has developed an optode based DO sensor and state that their sensor response time is 3.5 seconds in 5 ^{o}C water (see RINKO Tech. note Ver. Oct. 24, 2011).
Rockland Scientific allowed us to borrow one of their RINKO oxygen sensors (Serial # 62, Film# 150002A) so we can compare it to the presently used SeaBird SBE43 oxygen sensor. The sensor was attached to the IOS sampling rosette, and voltage data were logged by the SeaBird 911 CTD. Voltage channels 3 and 4 are DO and temperature outputs, respectively, from the RINKO sensor. The data obtained from the RINKO sensor will be compared to Winkler bottle chemistry analysis and to the outputs of the SBE43 DO sensor. The end goal is to ascertain if the claims by the manufacture are true and if the RINKO DO sensor better fulfills our applications and operational needs and requirements.

Prior to the cruise the RINKO sensor was calibrated by Fabian Wolk of Rockland Scientific (Victoria, B.C.). It was connected to the rosette at IOS and tested to ensure proper communication and data logging with the Seabird 911 CTD. The calibration was further validated by Glenn Cooper by reading the voltage values in 100% oxygen saturated fresh water and in 0% saturated water (0.4 M Sodium sulphite solution). Values obtained were within the stated manufactures specifications so the sensor was deemed operating properly and sent out for testing.

Seabird and marine mammals observations – Luke Halpin, EC/CWS

During my time aboard the *CCGS John P. Tully* my principal responsibility was to conduct at-sea transects for seabirds, and also to record observations of marine mammals. I conducted seabird surveys during daylight hours and during transit between stations. When weather conditions permitted, I conducted these transect surveys from the dodger station outside on monkey island. During poor weather I conducted the surveys from inside the bridge. Unfortunately on some days either the swell was too large or we experienced thick fog, which prevented me from surveying. My most notable sighting during this trip is what has been confirmed as almost certainly BC's first ever recorded Loggerhead Turtle (Caretta caretta) between stations P4 and P5. Experts from DFO and NOAA are working to confirm this. When the ship was on station I conducted a watch between 12pm and 6pm, assisting with DFO's water sampling programs. Whenever I was unable to survey birds I assisted with other tasks on the ship where possible, or entered my transect data.

It was a pleasure to work with the entire science and CCG crews, the food was excellent, and I look forward to sailing on the *CCGS J. P. Tully* in the future.

Cs-137 and I -129 Sampling - Rick Nelson, DFO/BIO

An earthquake triggered tsumani on March 11, 2011 caused extensive damage to the nuclear generating station at Fukushima Japan resulting in the discharge of large amounts of Cs-137 and other radionuclides directly to the Western North Pacific ocean during the months following the accident. The radioactivity plume was transported northeastward under the influence of the Kuroshio Current and was expected to approach the Canadian coastline several years after the accident. A Canadian monitoring program was established to detect the arrival of Fukashima radioactivity in the water columns of the eastern North Pacific and the Arctic oceans.

Water samples were collected at stations occupied on the "Line P" missions on the *CCGS J P Tully* in June of 2011, 2012 and 2013, as well as in February 2014, August 2014 and on this cruise – February 2015.

Sampling 2015-01:

Five depth profiles were collected at stations P-4, P-10, P-16, P-21 and P-26. Depths 500, 400, 300, 200, 150, 100, 50 and 5 meters for P-4, P-16 and P-26 and 4 depths at P-10: 300, 150 50 and 5 meters. Sixty liter samples were collected at all depths.
In addition 60 liter surface samples were collected from the underway loop system after the ship was on station at P-1, P-2 P-6, P-8, P-12, P-14, P-18, P-19, P-23, P-24, and P-25. A total of 43 samples were collected.
In addition 500 millilitre samples were collected for 129 analyses from the rosette at Station P-4, P-16 and P-26. A total of 24 samples were collected.
The samples for Cs were extracted onto KCFC (potassium cobalt ferrocyanide) ion exchange resin at flow rates of approximately 300 ml's per minute, rinsed with 100 mls of milli Q water and then sealed for return to the Bedford Institute of Oceanography.

The resin samples were then dried, placed in appropriate counting geometries and the Cs-137 and Cs-134 radionuclides were determined by Gamma ray Spectroscopy using HPGE (high purity Germanium) detectors.

Thanks to the crew and officers of the CCGS John P. Tully for the work to make this a successful cruise. Special thanks to Marie Robert for all of the wire time and all those who helped carry the 24 l carboys.

Line-P report Crowe lab – Céline Michiels and Katharine Thompson, UBC.

We sampled for the N-cycle at P4 and P26. We will generate a profile for the N-species (NO3-, NO2-, and NH4+) at P4 and P26. Three depths from the Oxygen minimum zone (600m, 1000m and 1500m from P4 and P26) were chosen to test for the presence of NO3- reduction and anaerobic ammonium oxidation via 15N-labeled incubations.

We sampled 30mL glass syringes (gas-tight) at the same OMZ depths as the 15N-labeled incubations to test for potential sulfide oxidation at P4, P12 and P26.

We collected 1L samples in order to measure respiration rates for different depths of the water column for P4 and P26. Due to calibration issues of the Oxygen probes, we decided to perform the measurements back in the lab at UBC.

All samples for radioactive work were collected from the rosette and experiments performed only in the RadVan. We wipe tested the RadVan at the beginning, the middle and the end of the cruise.
Bacterial production samples were collected at P4, P12 and P26. We incubated the samples at 4˚C with tritiated thymidine and leucine. From this, we will be able to calculate rate of thymidine and leucine incorporation once counted, therefore estimating rate of bacterial division and growth.
We sampled for dark carbon fixation for P2, P4, P8, P12, P16, P20 and P26 throughout the water column. We performed incubations during 48 hours with 14C-bicarbonate to observe the rates of chemoautotrophic bacteria at different depths and distances from shore.
Both bacterial production and dark carbon fixation samples will be measured back in the lab at UBC.

We would like to thank Marc for his great help during our long sampling from the rosettes, especially on P4 (;-)) as well as Marie to accommodate as best as she could our samples. We would also like to thank Mike and Kyle for their assistance with the RadVan. The scintillation counter was a challenge and they graciously offered up quite a few hours to make sure that everything was in order.

Line P – February 2015 – Sam Kheirandish; UBC.

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

Sampling summery:
At 5 Stations (P4, P12, P16, P20 and P26)

1) 50 ml seawater samples were taken per depth to count the numbers of cell per milliliter using Flow Assisted Cytometry and single cell DNA analysis. Samples were aliquated and preserved using glutaraldehyde and Glycerol +TE respectively.
2) 2 ℓ seawater samples (at 16 depth) for high resolution bacterial DNA and sequencing were filtered

Additionally, at 3 major stations (P4, P12 and P26) the following were sampled at four depths:10, 500, 1000, 2000/or bot-10 (whichever comes first) across the oxygen minimum zone.

1) Large volumes (20 ℓ) per depth were filtered to create genomic libraries of the bacterial communities
2) After adding of iron chloride to the filtered water, the samples were filtered again for later virus analysis
3) For viruses, TEM and FCM samples were taken and preserved using *glutaraldehyde.*
4) 50 ml seawater samples were taken per depth to count the numbers of cell per milliliter using Flow Assisted Cytometry and single cell DNA analysis. Samples were aliquated and preserved using glutaraldehyde and Glycerol +TE respectively.
5) Additionally, water was taken for salinity and nutrient analysis

Comments:

All our lab objectives for this cruise were successfully fulfilled. The work area distribution was very convenient for our sampling needs and we will try to use the same setup once again in future cruises.

We wish to thank the captain and 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. A special thanks to the great chef on-boar for the amazing quesadillas. A special thanks to Marie for bringing extra gear for us.

I really appreciated the time on board with the crew. Great evenings of playing games and the great idea of dart championship to interact with people you normally don't get to meet.

I would minimize the 10 minutes of "anger" to none. It's very uncomfortable to work around people who are angry. We are all adults and we should be able to control our temper.