CCGS Amundsen 2010 Field Program
ArcticNet / BP Partnership
Met/Ocean Data Report

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ArcticNet
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Executive Summary

This document details datasets collected by researchers based at the Centre for Earth Observation Science (CEOS), University of Manitoba, under the Met/Ocean and Sea Ice component of the ArcticNet / Industrial Partnership during the 2010 field season. Our group is actively involved in research that revolves around improving our understanding of coupled processes between the ocean, sea ice, and atmosphere, as well as how this coupling impacts the ecology of the sea ice, and the waters immediately beneath. We employ a large ensemble of ship-based sensors, and physical sampling equipment that collect large volumes of data from the atmosphere, ocean, and sea ice. Our data collection efforts are driven by many interlinked objectives. Objectives relevant to our partnership with BP Exploration Operating Company Ltd. (hereafter referred to as 'BP'), and corresponding data collection during 2010 are as follows:

1) **Ocean:** Describe the nature of currents, salinity, temperature, and associated physical variables in the southern Beaufort Sea, and over the BP lease blocks (Pokak).

2) **Sea Ice:** Describe the aerial concentration, type, growth history, strength and periodicity of sea ice in the southern Beaufort Sea, and over Pokak.

3) **Atmosphere:** Describe the magnitude and variability of key meteorological variables over the ocean and relative to adjacent land stations.

4) **Coupling:** Provide data on the key coupling mechanisms across the ocean-sea ice-atmosphere (OSA) interface with a particular emphasis on fluxes of mass, energy and momentum.

Field research and data collection activities relevant to these objectives were conducted from the Canadian Coast Guard research icebreaker *Amundsen* (hereafter referred to as "CCGS *Amundsen*"), from 12 August to 07 October 2010, our group conducted a variety of sampling activities in the Southern Beaufort Sea, and within the Pokak Block including, but not limited to: aerial ice thickness surveys passive and active microwave scanning of sea ice, buoy deployment (one surface buoys, one ice mass balance buoy, 13 position-only drift buoys), synoptic meteorology (22 weather balloons, atmospheric profiling, cloud type and coverage), and micrometeorology (radiation, *in situ* meteorology), and ocean sampling (roughness, currents, conductivity-tempearture-density profiling).

ArcticNet 2010 Data Use Policy

All data described in the document hereafter was collected during the 2010 ArcticNet / BP partnership field season. The Centre for Earth Observation Science shall make all datasets available upon request to BP, pending resolution of quality-assurance related issues. Updates to datasets will be made available to BP as they become available.

All other data access requests shall be addressed to Dr. David Barber at the Centre for Earth Observation Science, University of Manitoba (dbarber@cc.umanitoba.ca). CEOS retains exclusive rights to all data collected during the field season. Field members have first rights to the data for a period of 2 years, followed by non-field participants. Please reference use of any material in this report as follows:

Section 5.4. Cloud Base Height, *in* Asplin M. and Galley, R., (Eds.) *CEOS-TEC-2011-01-31. pp. 84 - 86.*

Acknowledgements

First and foremost, we would like to acknowledge the support and expertise of the hardworking crews of the Research Icebreaker CCGS *Amundsen*. Our sincere gratitude is extended to Captains Stéphane Julien, and Marc Thibault. Their patience and expertise was paramount to the success of the 2010 partnership field season.

We would like to acknowledge BP for graciously providing funding for the 2010 ArcticNet Cruise, and for the Met/Ocean team's operations and equipment. This represents an ongoing successful and productive Arctic research and discovery partnership between industry and ArcticNet.

We are indebted to Keith Levesque, ArcticNet's shipbased research coordinator, for his tireless efforts, dedication and investment in the preparation of this very challenging 2010 expedition. From community consultations, to research licensing, to planning workshops, to ship mobilization, crew changes, security clearances and the numerous needs of dozens of demanding research groups rotating onboard the ship, a colossal amount of work is involved in the preparation of such an expedition. Thanks to Keith and all who helped him with the preparation of this 2010 expedition.

We would also like to thank Martin Fortier, executive director of ArcticNet, for his dedication to ArcticNet, and in particular for the support and energy that he extended toward the planning and implementation of the 2010 field season. Last but not least, we would also to acknowledge his contributions to the field season overview in this data report (section 1.1).

Several government agencies contributed to the success of the 2010 ArcticNet / BP partnership field season in the Southern Beaufort Sea. These include the Natural Sciences and Engineering Council (NSERC), the Canada Research Chairs Program (CRC), the Networks of Centres of Excellence Program (NCE), Northern Scientific Training Program (NSTP), Department of Indian and Northern Affairs Canada (INAC), the Canadian Ice Service (CIS), the Canadian Space Agency (RADARSAT-1, RADARSAT-2), the European Space Agency (ESA), the National Aeronautics and Space Administration (NASA), Environment Canada (EC), the Meteorological Service of Canada (MSC), the Department of Fisheries and Oceans (DFO), and the Canadian Coast Guard Service (CCGS).

Title page photo credit: *Travis Hamilton, University of New Brunswick Ocean Mapping Group*

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SECTION ONE: INTRODUCTION

1.1 Preface

The Beaufort Sea/Mackenzie Shelf region of the Arctic Ocean has witnessed major changes in recent years, with decreasing sea ice cover and major shifts in sea-ice dynamics. Although major inshore research activities were conducted in the 70's and 80's in large part due to the Oil & Gas interest in the regions, much less is known about the offshore region of the Mackenzie Shelf, shelf slope and Beaufort Sea. Recent interest in the Beaufort Sea has resulted in major bids from industry on offshore exploration licenses (EL) located in the 50 – 1500 m depth range of the shelf and shelf break. Of particular relevance to the 2010 expedition is EL449 (called Pokak) which is owned by BP (see Figure 1).

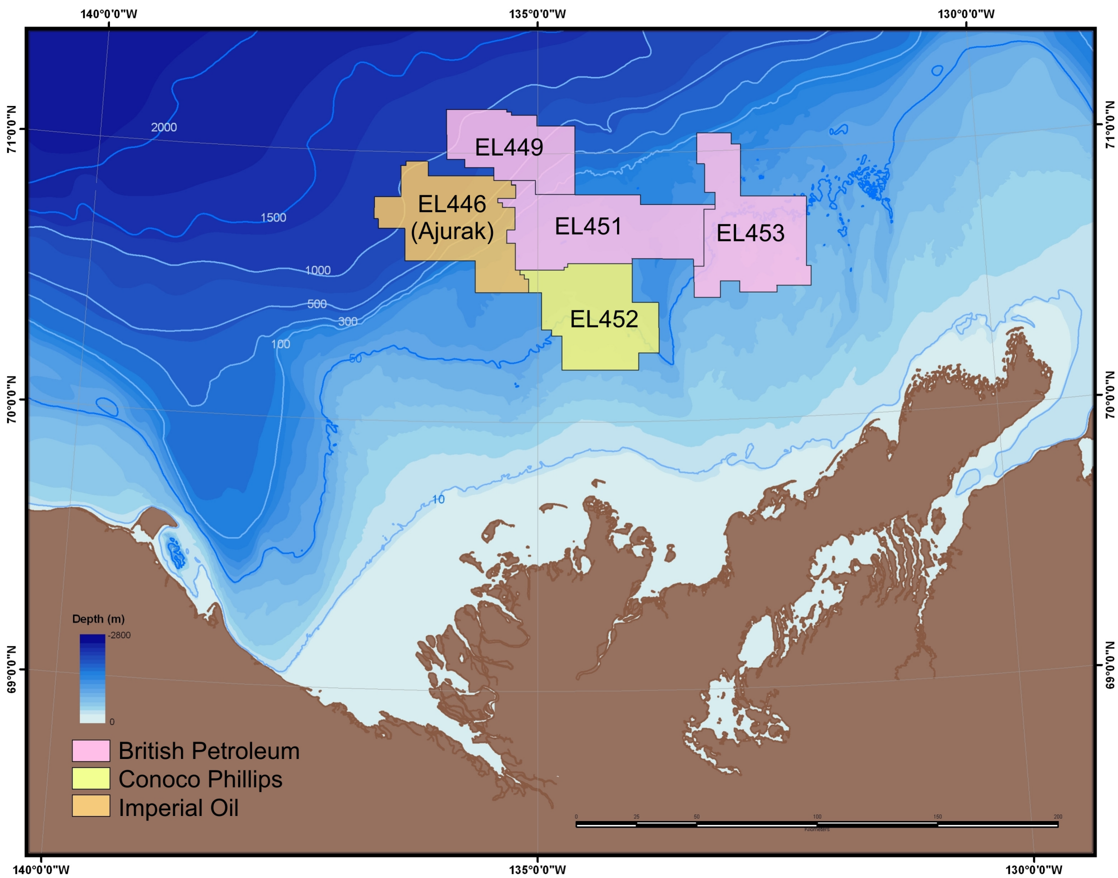

Figure 1: *Map of offshore Exploration Licenses (EL) awarded by the Department of Indian and Northern Affairs in 2007 and 2008 (modified from image courtesy of Geological Survey of Canada).*

Since 2002, ArcticNet has been conducting extensive multidisciplinary research programs in the area. In addition to an annual fall sampling program, ArcticNet researchers have led two major international overwintering research programs conducted onboard the CGGS *Amundsen* in 2003-2004 (CASES program) in 2007-2008 (CFL program) (Barber et al., 2010), and for the 2009 survey of the Ajurak Block (EL452, Figure 1), a lease owned by Imperial Oil Ltd. A marine observatory of a minimum of 5 oceanographic annual moorings (from 5 to 17 moorings) has been deployed and retrieved annually in the area by ArcticNet researchers since 2002.

During the summer of 2010, the CCGS *Amundsen* was the platform for field research conducted under ArcticNet, and the partnership between BP and Imperial Oil Resource Ventures Ltd (IORVL). This partnership not only forms an important link between industrial and scientific initiatives, but also has enabled continued monitoring and sampling activities in the Western Canadian Arctic.

The Partnership has been established as the result of the concurrent need for resources and research within the offshore Northern Oil and Gas lease regions. Under the agreement, BP will provide operating and logistic financial support for the CCGS *Amundsen,* and will allow for the consolidation of environmental and risk-assessment research efforts. Active ArcticNet sampling programs, such as ice geophysics and dynamics, ice distribution and thickness and bottom mapping, are of particular interest to BP for the reasoning and development of potential future offshore drilling platforms in the Southern Beaufort Sea. The CCGS *Amundsen* cruise sampling timeline for 2010 is organized into segments, referred to as 'legs.' A summary of the legs is provided in Table 1.

Table 1: *Summary of CCGS Amundsen 2010 Legs.*

LEG	Start	Finish	Program	Sampling Area
Leg 1a	03 July	02 Aug	ArcticNet	Hudson Bay ArcticNet Program
Leg 1b	02 Aug	12 Aug	ArcticNet	Baffin Island, NW Passage Transit
Leg 2a	12 Aug	26 Aug	ArcticNet / BP Partnership	Southern Beaufort Sea (Pokak Block)
Leg 2b	26 Aug	23 Sept	ArcticNet / BP Partnership	Southern Beaufort Sea (Pokak Block)
Leg 3a	23 Sept	07 Oct	ArcticNet / BP Partnership	Beaufort Sea (transect into the pack ice)
Leg 3b	07 Oct	22 Oct	ArcticNet	NW Passage, Baffin Bay, Iqaluit
Leg 3c	22 Oct	02 Nov	ArcticNet	Labrador Fjords

As part of a collaborative agreement between ArcticNet and BP, one of the major goals of the 2010 ArcticNet expedition to the western Arctic was to increase the level and spatial coverage of sea-ice, geological and environmental data collected by the ArcticNet network in the Beaufort Sea/Mackenzie Shelf/Amundsen Gulf region (regional context) with a special focus placed in and around the Pokak lease area.

As designed jointly by ArcticNet and BP, the research elements of the collaborative work are divided into three major research components:

1) Met/Ocean & Sea Ice Component: The overarching goal of this component is to provide data that describe the variability of met/ocean and sea ice variables within the Pokak exploration block relative to the larger area of the southern Beaufort Sea continental shelf. The objective is to provide data on the ocean-sea ice-atmosphere (OSA) interface over a range of time and space scales, focusing on spatial and temporal variability over diurnal, seasonal and interannual time scales.

2) Environment & Marine Resources Component: The general goal of this component is to quantify and map the summer-fall distribution and contamination of the main compartments of the pelagic and benthic food webs along the slope of the Mackenzie Shelf, from the inner shelf (50 m) to the margin of the deep basin (approx. 1200 m), and from the Mackenzie Trough to the west to Cape Bathurst to the east with special focus on specific areas in Pokak.

3) Geology/ Bathymetry Component: This component will conduct an investigation of seabed stability conditions to meet engineering design and regulatory requirements for exploration drilling. Seabed mapping and bottom sediment characterization research is required to investigate seafloor stability conditions at the outer shelf/upper slope area of the central Beaufort Sea with special focus on specific areas in Pokak. Foundation conditions, slope stability, seabed features and ice scouring are also key issues to be addressed.

This data report is intended to describe and summarize datasets collected by the scientific team based at the Centre for Earth Observation Science, University of Manitoba (herein the "Met/Ocean Team") for field activities conducted between 12 August and 07 October 2010, which spans Leg 2A, 2B and 3A of the 2010 cruise of the CCGS *Amundsen*.

1.2 The Met/Ocean Team

The Principal Investigators of the Met/Ocean team are:

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The Met/Ocean team is comprised of multi-disciplinary research associates, technicians, and graduate students who are based at CEOS, University of Manitoba. These individuals were dedicated to one (or more) of the eight disciplinary Met/Ocean teams: Surface Buoys, Ocean and Sea Ice Optics, Surface Roughness, Helicopter Electromagnetic Induction Surveys (HEMI), Remote Sensing, Sea Ice Physics, Micrometeorology, and Synoptic Meteorology. Team members were tasked with sampling activities, based upon sampling priorities established for each leg of the cruise. Table 2 provides a summary of the sampling priority for each of the disciplines for the cruise schedule, as some legs will favor some groups over others depending on data collection priorities and sea ice conditions.

Table 2: *Met/Ocean science priorities by leg*

Leg	**GROUPS**
2A	HEMI Ice Surveys, Surface Buoys, Micrometeorology, Meteorology
2B	Micrometeorology, Meteorology
3A	HEMI Ice Surveys, Micrometeorology, Meteorology, Remote Sensing, Sea Ice Physical Sampling, Ice Mass Balance Buoy deployment

1.3 Data Report Outline

Section 1 provides a brief introduction to the partnership between ArcticNet and BP, and sets the context for the report.

Section 2 summarizes the mobilization, crew changes, transit, and science activities of the CCGS *Amundsen*'s 2010 field season as conducted.

Sections 3, 4 and 5 present a detailed summary of ocean, sea ice, and meteorology datasets respectively. Datasets are organized into instrument-specific sub-sections and include descriptions of instrumentation, data collection methodology, and data files. Datasets that involved continuous sampling (e.g. basic meteorological data) are inventoried by date range, and site-specific datasets are inventoried in tabular format.

Section 6 provides information on other available datasets, such as navigation and science logs.

Appendix A contains the science activities log, including information on stations, positions, sampling activities, and observed weather and ice conditions (as monitored by the watch officer). Since time at a particular station can vary from hours to days, we refer the reader to Appendix B for station-specific information.

Appendix B summarizes the temporal coverage of all Met/Ocean datasets in chart-form in**.**

Dates are presented in international format (07 July 2010).

Times are presented are UTC (HH:MM:SS) unless otherwise noted as local standard time (LST).

Geographic positions within the dataset may be recorded in either degrees, decimal-minutes (DD°MM.MMM'), or decimal-degrees (DD.DDDDD°). Although decimal-degree format is highly preferred (mapping, analysis, etc), geographic positions in this report will appear as recorded in the field.

SECTION TWO: CRUISE SUMMARY

2.1 Mobilization

Mobilization of the ship commenced on 21 June 2010. The majority of instrumentation and supplies were placed and secured on the ship prior to launch from Quebec City, QC on 03 July 2010. All required equipment for the field season was loaded onto the ship at Canadian Coast Guard Depot 18, Quebec City, with the exception of the ice mass balance (IMB) buoy systems. The IMB buoys were were shipped to Churchill MB as cargo and were loaded aboard during a mid-leg crew change on 21 July 2010. 24 Oceanetics ice drift beacons were also shipped to Churchill and loaded onto the ship during this crew change.

2.2 Ship Berths and Personnel

Met/Ocean data collection activities were staffed by CEOS personnel appropriate to the eight discipline-specific Met/Ocean sub-teams (Table 3).

Table 3: *Met/Ocean Berth Allocations by Sub-Discipline*

PRIORITY	**LEG 2A** **POKAK**	**LEG 2B** **POKAK**	**LEG 3A** **POKAK / ICE TRANSECT**	**LEG 3B***
Chief Scientist	Martin Fortier	Keith Levesque	Keith Levesque	Jean-Eric Tremblay
SEA ICE	Kerri Warner Dave Babb Ryan Galley	X	Kerri Warner Dave Babb Ryan Galley	Matt Asplin
SYN. MET	Kerri Warner Dave Babb	Dave Babb	Matt Asplin	Matt Asplin
REM. SENS.	Kerri Warner	X	Kerri Warner	x
HEMI	Ryan Galley	X	Ryan Galley Dave Babb	x
Micromet. Tower	Emmelia Stainton Bruce Johnson	Bruce Johnson X	Kyle Swystun	Kyle Swystun Matt Asplin
Surface Buoy	Emmelia Stainton Bruce Johnson	X Bruce Johnson	X	x

*Note: Meteorological Data from leg 3B is available upon request

2.3 Crew Changes

Full crew changes occurred at the end of each 6-week period, and involved full rotation of the Canadian Coast Guard Crew and a number of science personnel. A mid-leg crew change occurred once in each leg, and were for science personnel only. During full crew changes, a Boeing 737 was chartered from Quebec City, to Inuvik for Canadian Coast Guard crew and researchers. For mid-leg crew changes, researchers traveled commercially to Inuvik or Iqaluit. Arrangements were made by ArcticNet for smaller aircraft charters to get people from Inuvik to Paulatuk for all crew changes (Table 4). Personnel were then shuttled to and from the ship via helicopter or by launch vessel.

Table 4: *Summary of science rotation travel*

Date	Transport to and from the CCGS *Amundsen*
03 July 2010	Fly commercially to Quebec City to board the ship
02 August 2010	Churchill MB; No Met/Ocean Personnel Boarded the Ship on this change
12 August 2010	ArcticNet charter between Quebec City and Inuvik, small aircraft charters between Inuvik and Paulatuk
26 August 2010	Small aircraft charters between Inuvik and Sachs Harbour. Commercial flight from Inuvik to Winnipeg
23 September 2010	ArcticNet charter between Quebec City and Inuvik, small aircraft charters between Inuvik and Paulatuk
07 October 2010	Small aircraft charters between Inuvik and Sachs Harbour. Commercial flight from Inuvik to Winnipeg
22 October 2010	Fly commercially from Iqaluit day after crew change
02 November 2010	Ship returns to Quebec City (No Met/Ocean personnel on board)

2.4 Cruise Summary by Leg

Each Leg was comprised of a series of science sampling station (hereafter referred to as 'stations'). The duration of each station depended on the sampling regime. A set number of anticipated stations were outlined for each leg and form the basis of the sampling strategy for the 2010 cruise. Sampling operations at a given station vary by leg, research program, and environmental conditions (i.e. sea ice cover, sea state) but a general description can be found below:

- "CTD" **(C)** stations, the shortest in duration, traditionally involve one CTD (profile with the ship-mounted Rosette). The duration will depend on the depth, and by the inclusion of nutrient sampling, where bottles on the Rosette are closed at specific depths to obtain water for analysis.
- "Basic" **(B)** stations include a CTD profile plus nutrient sampling, box coring, plankton net tows, and vertical turbulence profiles, and typically require eight hours of sampling. On-ice sampling activities can be conducted if ice is present.
- "Full" **(F)** stations require anywhere between 18-24 hours and builds onto the Basic sampling activities. On-ice sampling activities can be conducted if ice is present.
- "Mooring" **(M)** stations entails a Full station plus the recovery and deployment of a mooring and possibly the Remotely Operated Vehicle (ROV).

2.4.1 Leg 1A – Transit: Quebec City to Churchill (03 July – 02 August 2010)

No partnership science activities were conducted during leg 1A. Meteorological data was collected throughout the cruise as per our group's normal ArcticNet sampling strategy and is available upon request.

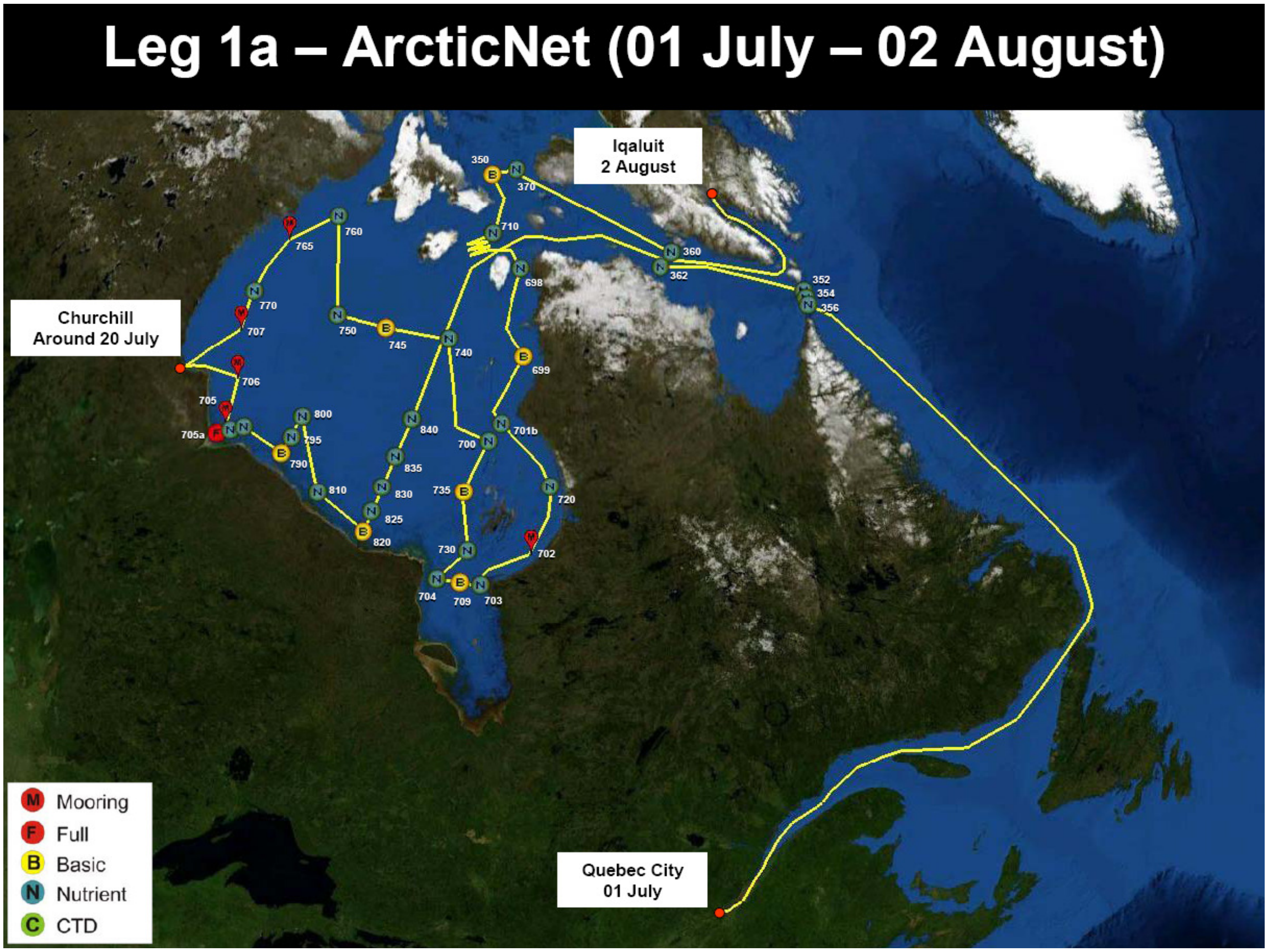


Figure 2: *Leg 1A of the 2010 CCGS Amundsen Cruise.*

2.4.2 Leg 1B – Churchill to Beaufort Sea (02 – 12 August 2010)

No partnership science activities were conducted during leg 1B. Meteorological data was collected throughout the cruise as per our group's normal ArcticNet sampling strategy and is available upon request.

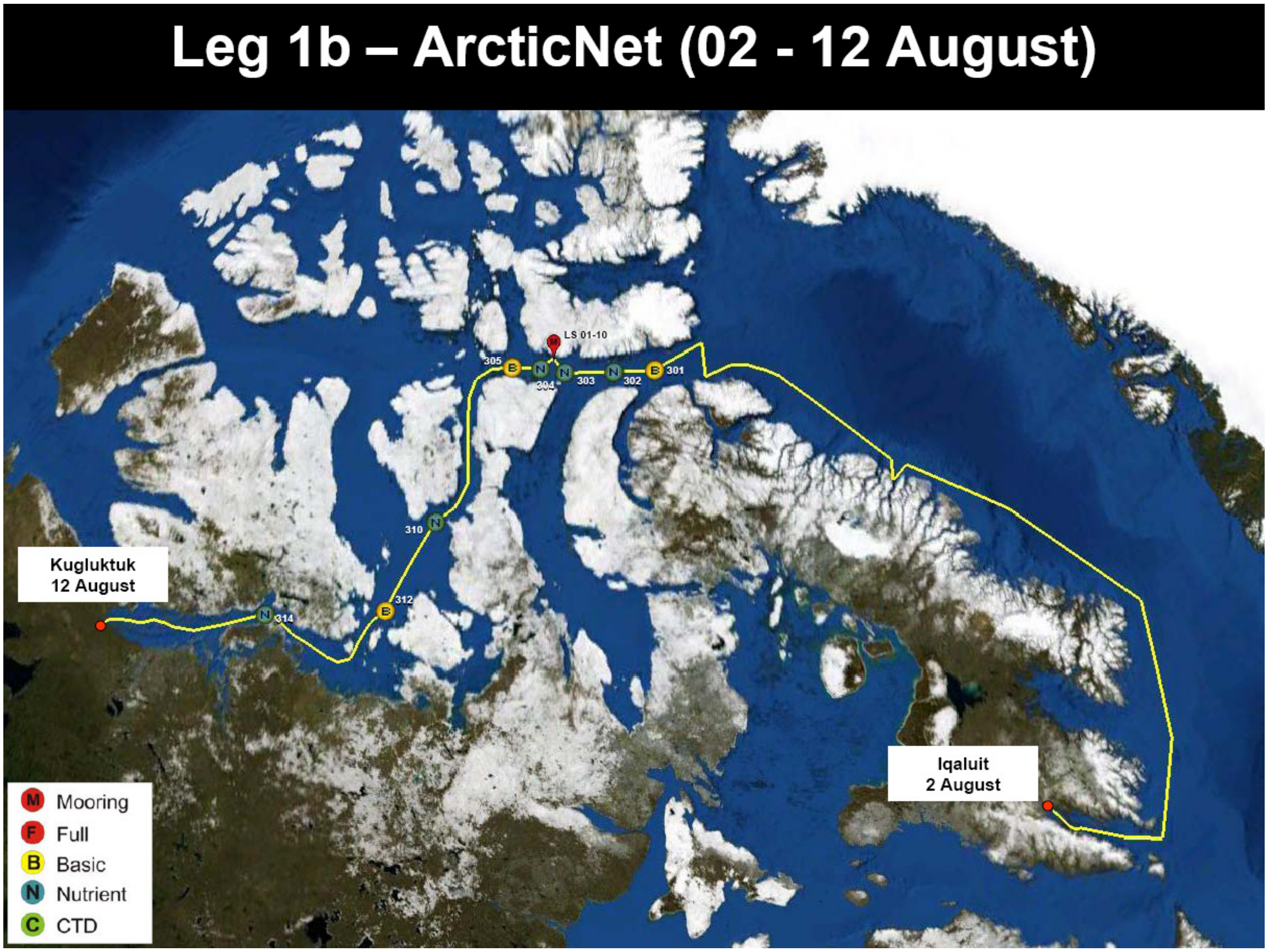


Figure 3: *Leg 1B of the 2010 CCGS Amundsen Cruise.*

2.4.3 Leg 2A – ArcticNet/BP Partnership (12 – 26 August 2010)

2.4.3.1 Overview of Ship Operations

Leg 2a started from Kugluktuk on 12 August (figure 4A). Between 12 August 2010 and 26 August 2010, the CCGS *Amundsen* carried out sampling operations in the EL449 and EL451 exploration acreages (BP lease blocks). ArcticNet and BP researchers sampled the planktonic and benthic ecosystems at 18 stations distributed ocean sampling activities n the BP acreages, deployed one moored surface MetOcean buoy and 12 bottom anchored Marine Autonomous Recording Units (Figure 4B). Mooring operations also included servicing and redeploying 4 subsurface moorings deployed in EL449 and EL451 in 2009. The ship sailed back to Sachs Harbour for the mid-Leg science crew change of 26 August 2010.

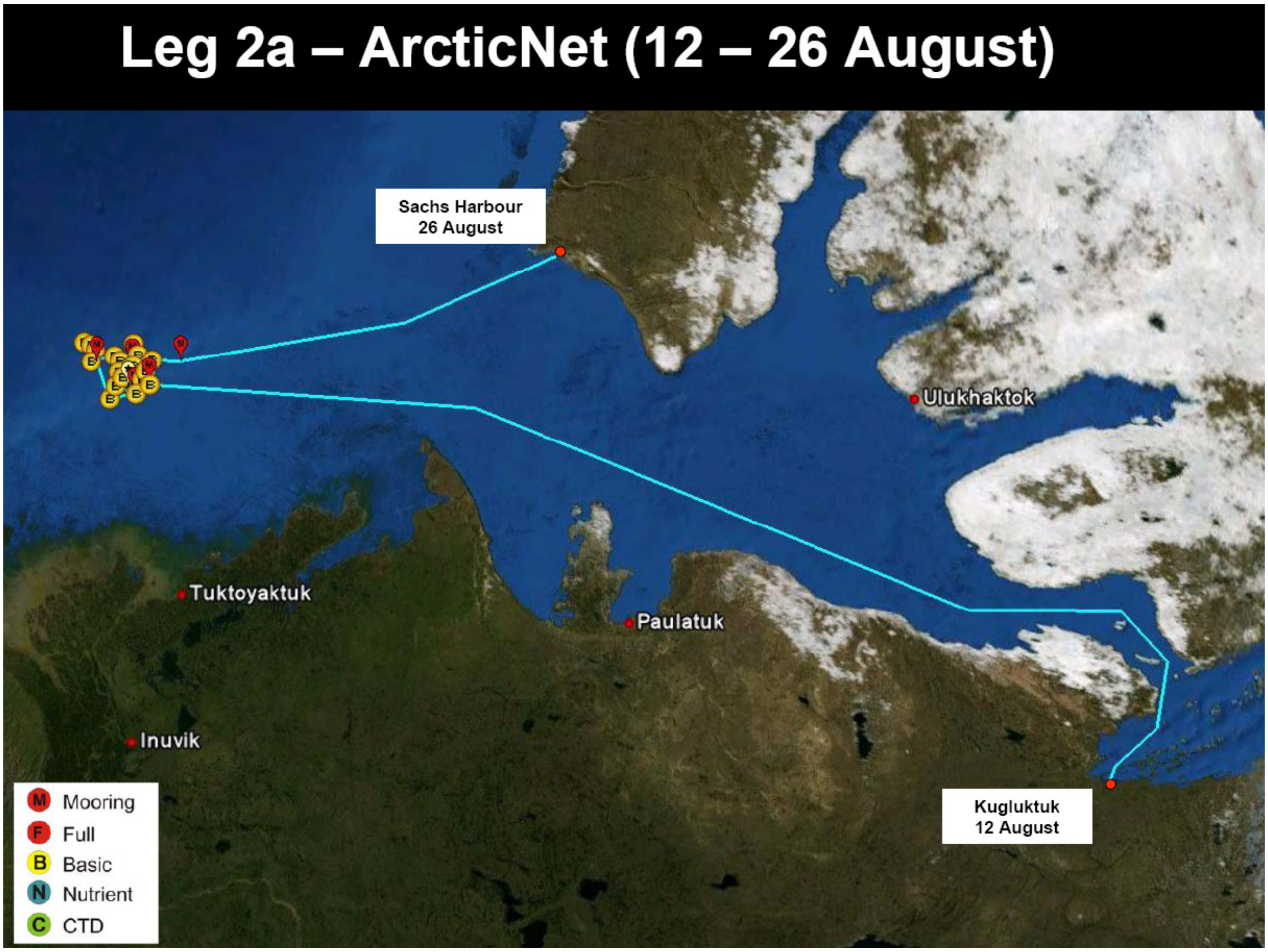


Figure 4A: *Leg 2A of the 2010 CCGS Amundsen Cruise.*

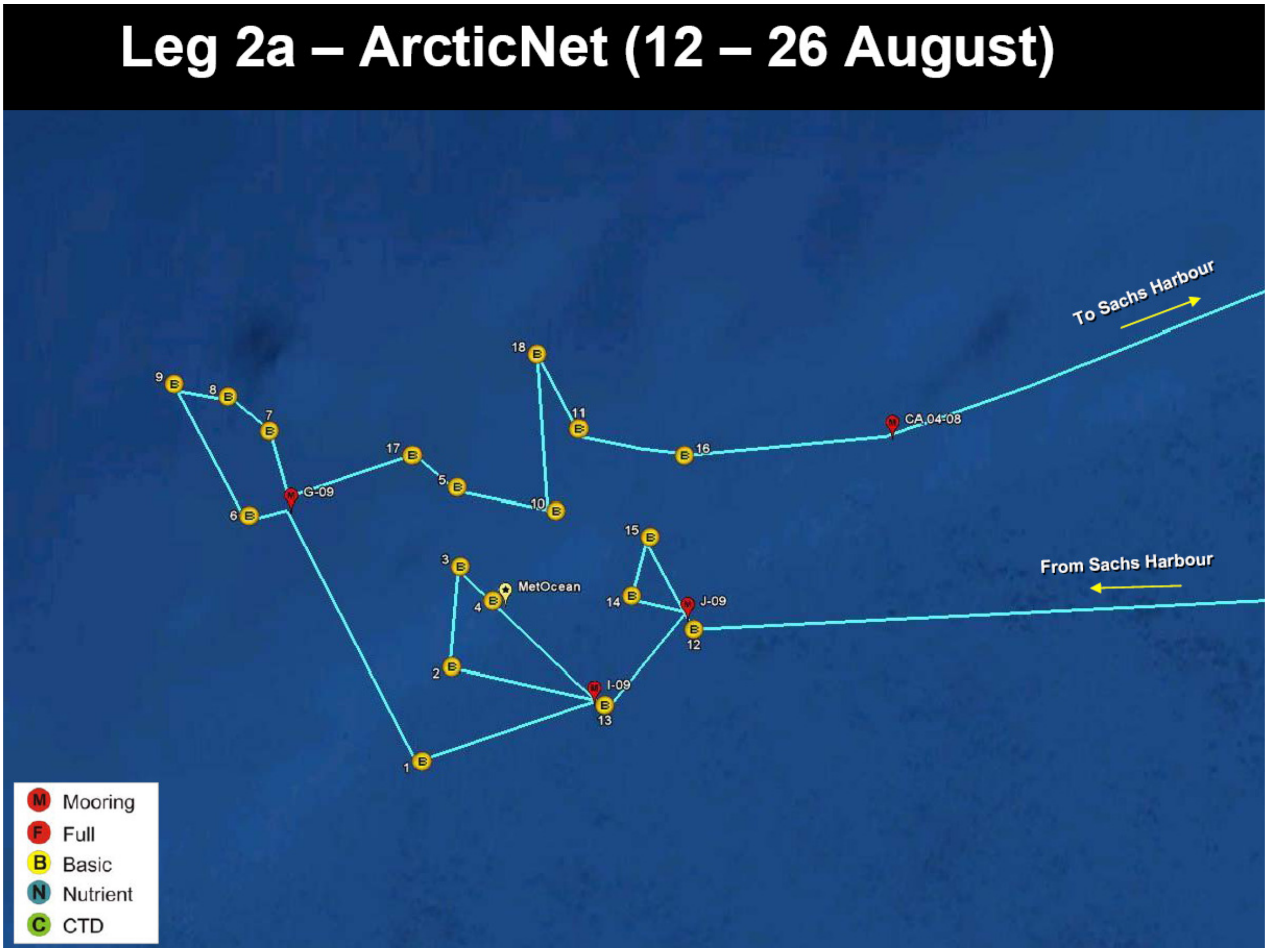


Figure 4B: *Leg 2A Pokak Block science stations.*

2.4.3.2 Overview of Met/Ocean Operations

HEMI surveys were conducted during Leg 2A to derive sea ice thickness and surface roughness for mobile first-year and multi-year ice. The Canadian Ice Service digital chart for the area flown for the date and location of the flights undertook this leg shows that the ice over-flown was 9+/10ths in concentration, made up of 7/10ths old ice (vast floes) and 3/10ths thick first-year sea ice (big floes)(figure 5).

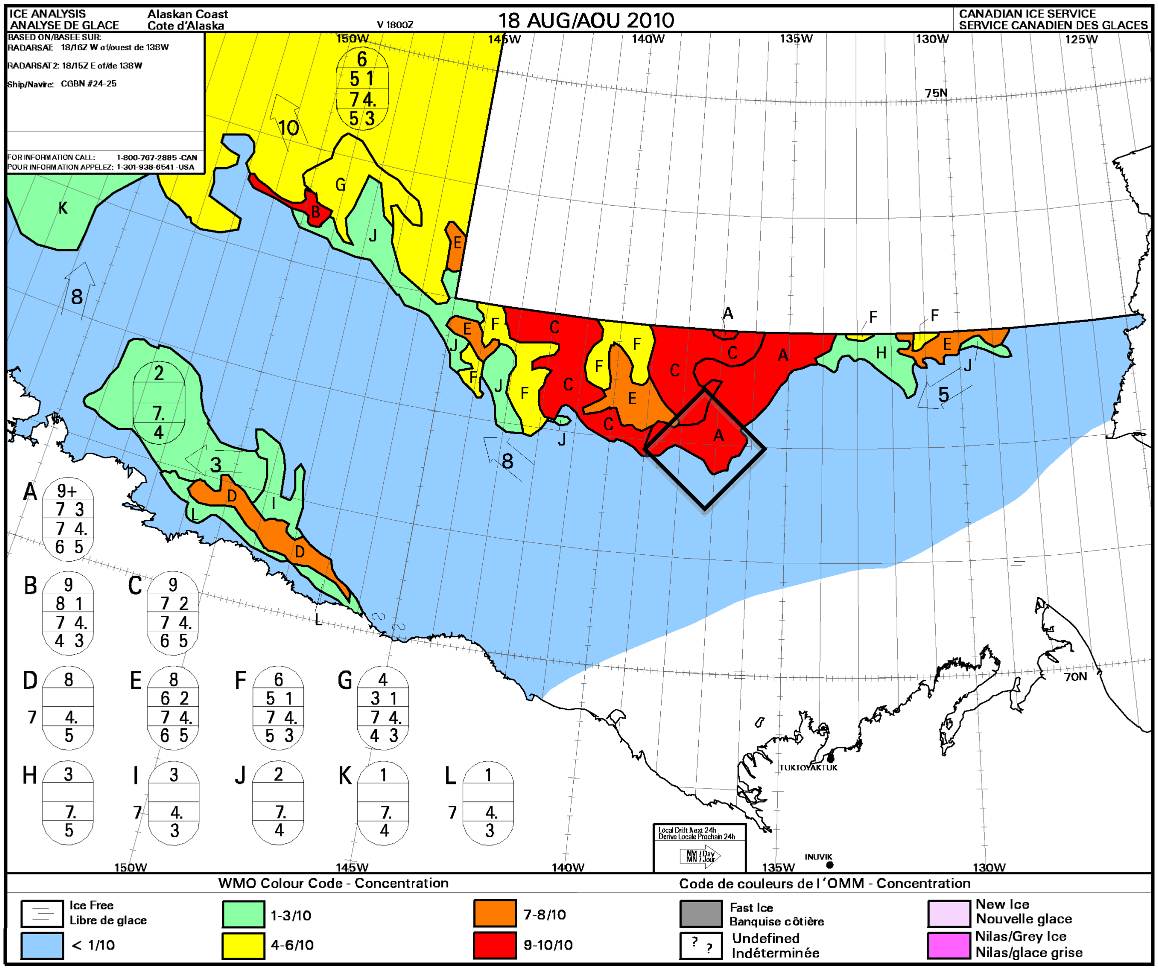


Figure 5: *Canadian Ice Service digital analysis for the 'Alaska' region on 18 August 2010. The area in which we flew the IcePic is approximately denoted by the black triangle.*

The system worked as it should have for two (2) flights on 18 August 2010 in the Southern Beaufort Sea centered about 72N, 137W (Figure 6). These flights were made under 'new' pilot guidelines for the BO-105 Nose Stinger Ice Probe Operations, which did not seem to affect the data quality at first glance. Three oceanetics position-only beacons were also deployed during HEMI operations on 18 August 2010. It should be noted that many meltponds were present on ice floes in the survey area (figure 6). Water at the surface sometimes creates specular reflection in the laser data making it impossible to determine the sea ice thickness at these points.

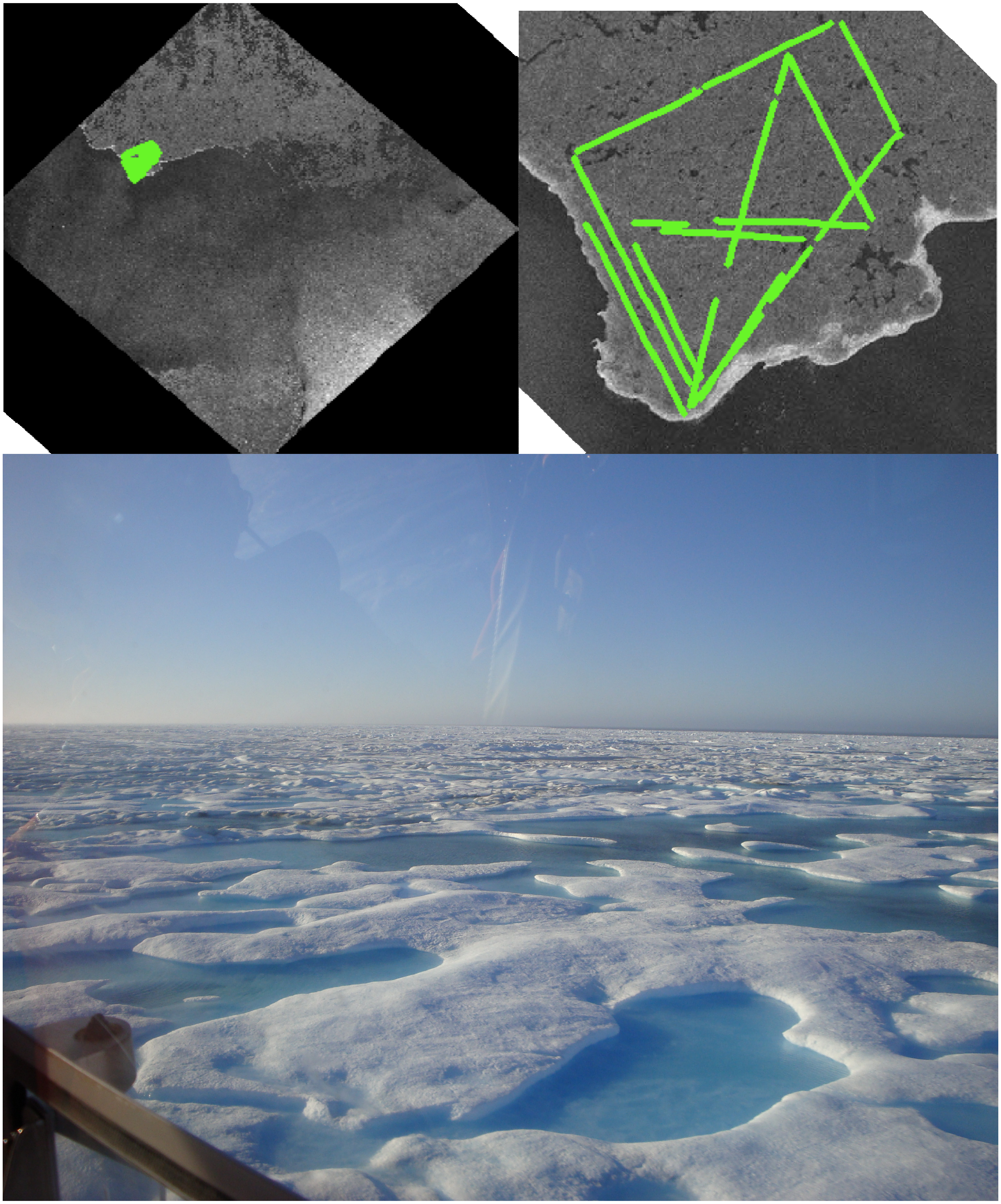


Figure 6: *[Top] Radarsat-2 geotiff showing the position of the sea ice and the flight lines made on 18 Aug 2010, noting the position of Cape Bathurst in the bottom right corner (R2 Scene shows only uncalibrated DN's). [Middle] A blow-up of the top image – approximate distance from side to side is 45nm (Picture by : David Babb) [Bottom] a digital picture of the area taken from the helicopter during flight. Note the amount of water at the ice surface.*

EM measurements using a C-Band Scatterometer were conducted on 18 August 2010 in order to observe the interaction of electromagnetic radiation with various ice conditions. The collected data will be used in electromagnetic modeling studies and for calibration of satellite remote sensing data. The results of this study will allow for us to improve our knowledge of the temporal evolution of sea ice physical, thermodynamic, and electrical properties during the late summer, and early ice formation season (Late August, September, October). One (1) site (71.47N, - 136.43W) was scanned using the C-Band scatterometer 18 August 2010. Coincident measurements of sea ice temperature and salinity at 5cm intervals were made.

2.4.4 Leg 2B – BP / ArcticNet (26 August - 23 September 2010)

2.4.4.1 Overview of Ship Operations

As part of the ArcticNet/BP work, Leg 2b was spent in the industry exploration acreages (EL446, EL449 & EL451) to conduct geotechnical work (piston and box coring) and a bathymetric survey (figure 7). Mooring operations were also carried out and included servicing and redeploying the 4 subsurface moorings deployed in EL 446 in 2009. The surface MetOcean buoy was retrieved at the end of Leg2b. The Vessel returned to Sachs Harbour for the full crew change of 22 - 23 September 2010.

It should be noted that the CCGS Amudnsen was dispatched to a significant search and rescue operation from 27 – 30 August 2010. The ship returned to Pokak and resumed scientific sampling activities on 31 August 2010.

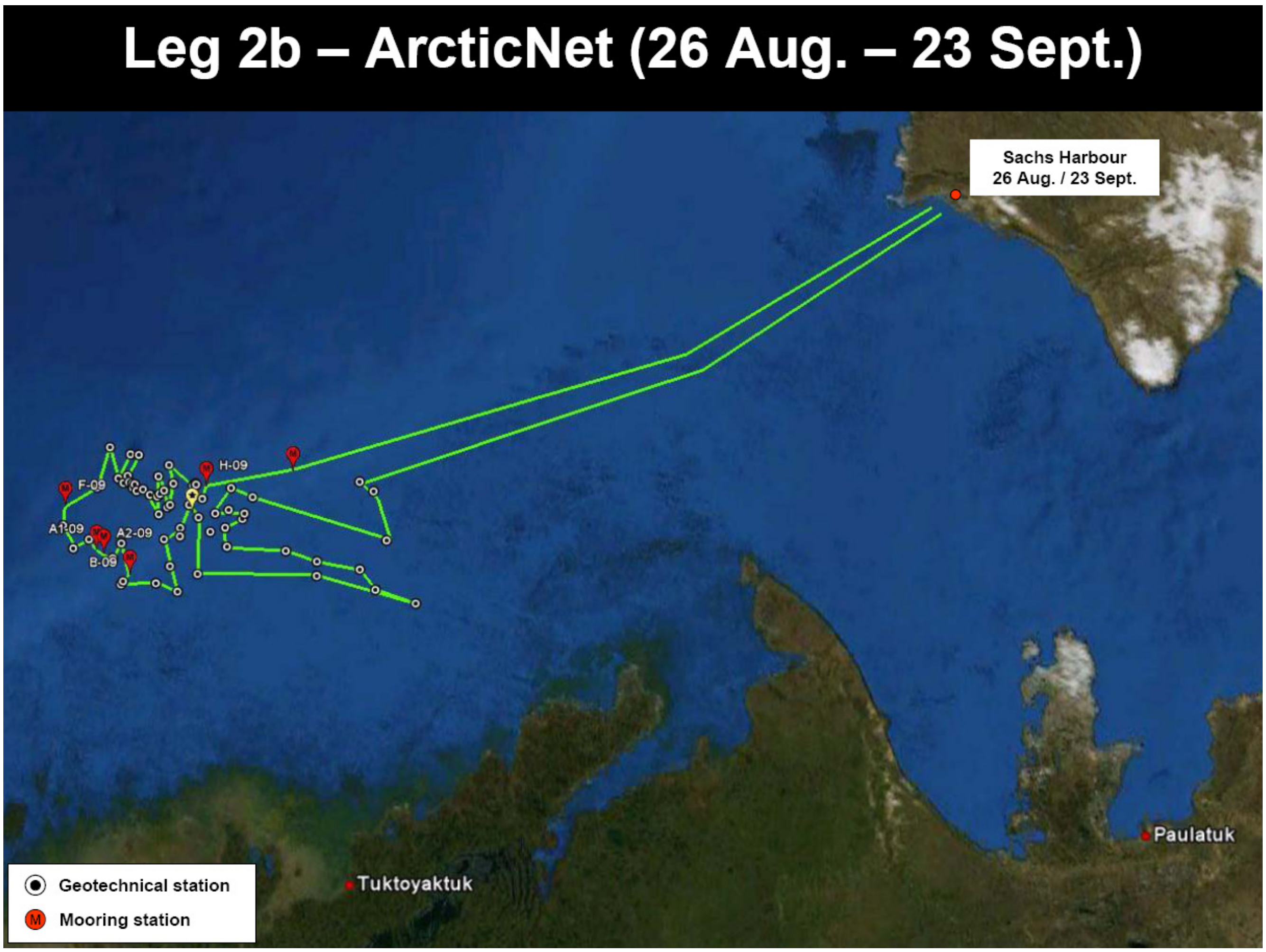


Figure 7: *Leg 2B of the 2010 CCGS Amundsen Cruise.*

2.4.4.2 Overview of Met/Ocean Operations

The Met/Ocean team was assigned two scientific berths for this leg. We focused on maintaining our underway meteorology, and micrometeorology (Met. tower) programs during this leg. The ship remained in the Pokak block for piston coring and bottom mapping operations. Seas were ice free at this time, and therefore no opportunities were available to collect data on sea ice.

2.4.5 Leg 3A – BP / ArcticNet (23 September – 07 October 2010)

2.4.5.1 Overview of Ship Operations

Leg 3A was a two-week sampling program that included different objectives and study areas.

The major objectives of Leg 3A were as follows:

1) Recover the 12 bottom-anchored marine autonomous recording units (MARU) that were deployed on 15 August 2010 in the Pokak lease block.
2) Recover three ArcticNet subsurface oceangraphic moorings and deploy 5 new moorings in Amundsen Gulf.
3) Complete the bathymetric survey of priority areas in the Pokak lease block.
4) Conduct ice thickness and roughness surveys using the helicopter-mounted EM induction system, deploy position-only sea ice motion beacons on large ice floes, and deploy ice mass balance buoys.

Leg 3A started in Sachs Harbour on 23 September 2010 coinciding with a full Coast Guard crew change (Figure 8). Participants and crew members joined the ship using a chartered 737 jet going from Quebec City to Inuvik and then by chartered twin otter aircrafts from Inuvik to Sachs Harbour. The crew change on 23 September 2010 went long into the evening. Not all luggage and science cargo made it on board that day because diminishing daylight prevented the helicopter from completing the transfers. The Amundsen stayed at anchor for the night and the luggage and cargo were brought on board the next day around 9:00 AM. The *Amundsen* then departed Sachs Harbour and transited towards the first of three ArcticNet subsurface oceanographic moorings located in Amundsen Gulf. On 24 September, the three ArcticNet moorings were successfully recovered. On 25 and 26 September 2010, 11 out of the 12 MARUs deployed in the BP Pokak lease block were recovered.

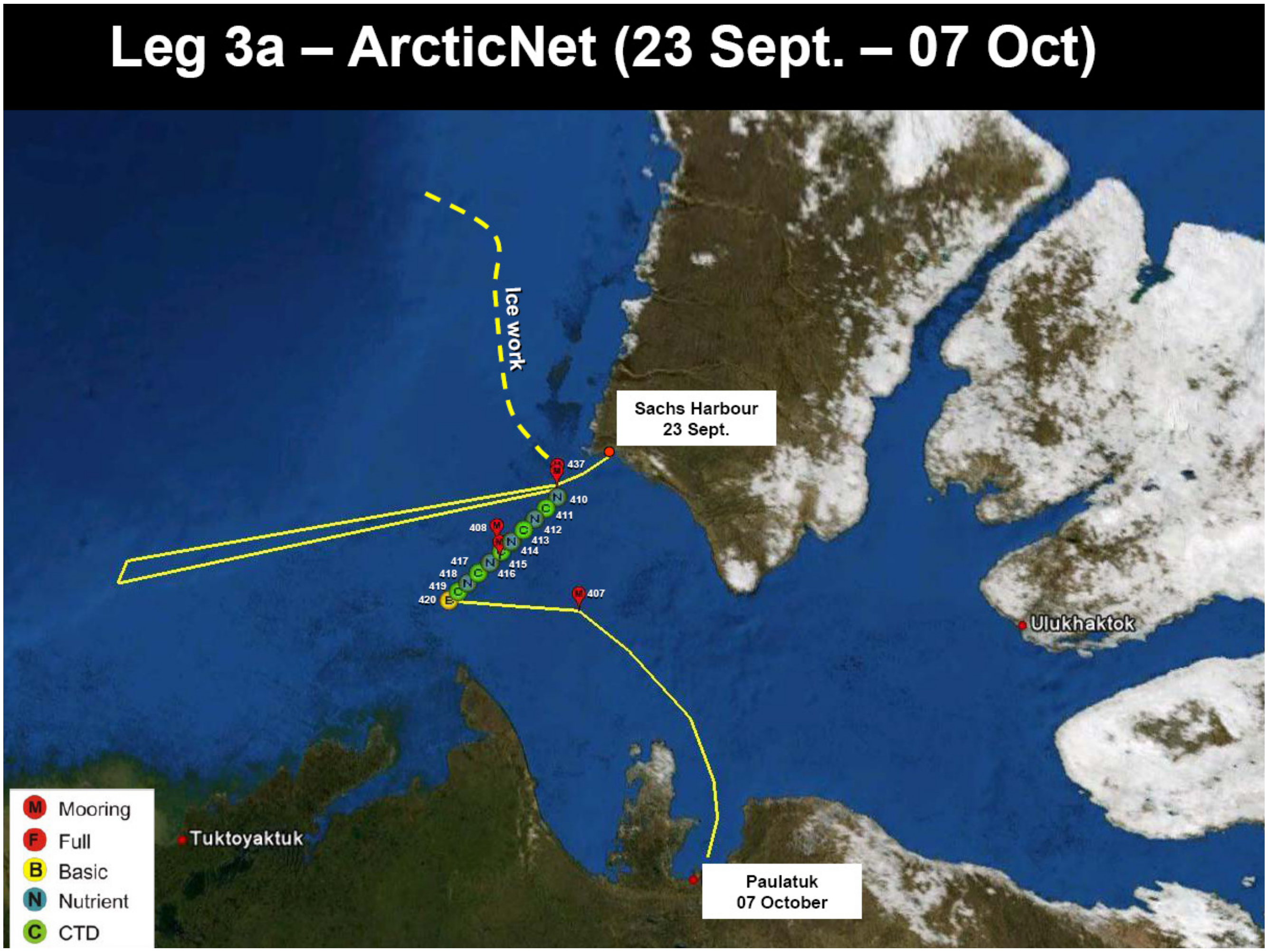


Figure 8: *Leg 3A of the 2010 CCGS Amundsen Cruise.*

2.4.5.2 Overview of Met/Ocean Operations

The helicopter-based EM induction system (IcePic) was used during Leg 3A to derive sea ice thickness and surface roughness for mobile first-year and multi-year ice. The system worked as it should have for two flights on 27 September 2010, three (3) flights on 28 September 2010 and one flight on 29 September 2010 in the southern Beaufort Sea centered about 74.5N, 129W. As per leg 2A flights, helicopter-based EMI flights were made under 'new' pilot guidelines for the BO-105 Nose Stinger Ice Probe Operations, which did not seem to affect the data quality at first glance. Preliminary data indicates that water at the surface sometimes creates specular reflection in the laser data making it impossible to determine the sea ice thickness at these points.

The Canadian Ice Service digital chart for the area flown for the date and location of the flights undertook this leg shows that the ice over-flown was 9+/10ths in concentration, made up of 7/10ths old ice (vast floes) and 2/10ths grey sea ice (Figure 9).

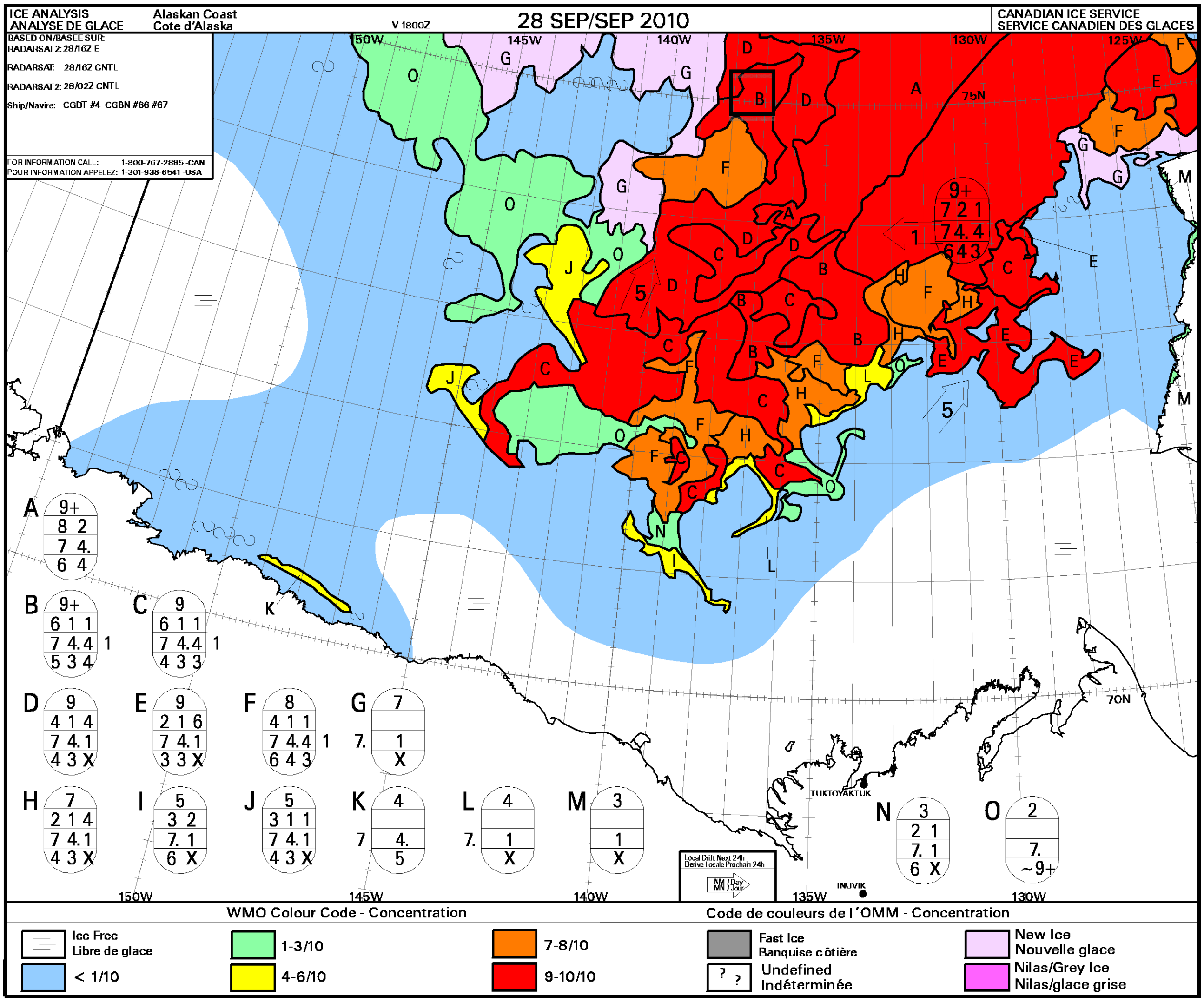


__Figure 9:__ Canadian Ice Service digital analysis for the 'Alaska' region on 28 September 2010. The general area Amundsen operated in on 27, 28, 29 September is denoted by the black square.

Fourteen (14) Oceanetics position-only beacons were installed during operations on 27-29 September 2010. Each beacon was verified to intially be transmitting data to Winnipeg after deployment.

On 27 September 2010, a CEOS ice mass balance system (IMB04) was installed on a multi-year sea ice floe at 74 14.990N, 128 49.025W (NAD83). The ice floe was 237cm thick at the point where the temperature string was installed. There was 7cm of snow on the floe. The instrument mast, temperature string and underwater sounder were installed successfully and a successful transmission has been confirmed in Winnipeg since the system's installation.

EM measurements using a C-Band Scatterometer were conducted on various occasions between 27 September 2010 and 29 September 2010 to observe the interaction of electromagnetic radiation with various ice conditions. The collected data will be used in electromagnetic modeling studies and for calibration of satellite remote sensing data. The results of this study will allow for us to improve our knowledge of the temporal evolution of sea ice physical, thermodynamic, and electrical properties during the late summer, and early ice formation season (Late August, September, October).

A calibration scan for the C-Band Scatterometer was conducted on 27 September 2010 at 74° 21.4751' N, 128° 27.9062' W. A total of six sites were scanned using the C-Band Scatterometer. Coincident measurements of sea ice temperature and salinity at 5cm intervals were made. Three ice cores were collected at each station for post processing in the lab to analyze density and microstructure.

2.4.6 Leg 3B – ArcticNet Western Beaufort to Iqaluit (07 – 22 October 2010)

2.4.6.1 Overview of Ship Operations

Leg 3b started on 08 October following a crew change in Sachs Harbour. No partnership met/ocean activities were planned for Leg 3B, however, meteorological data was collected throughout the cruise as per our group's normal ArcticNet sampling strategy.

cruise plan (figure 9).

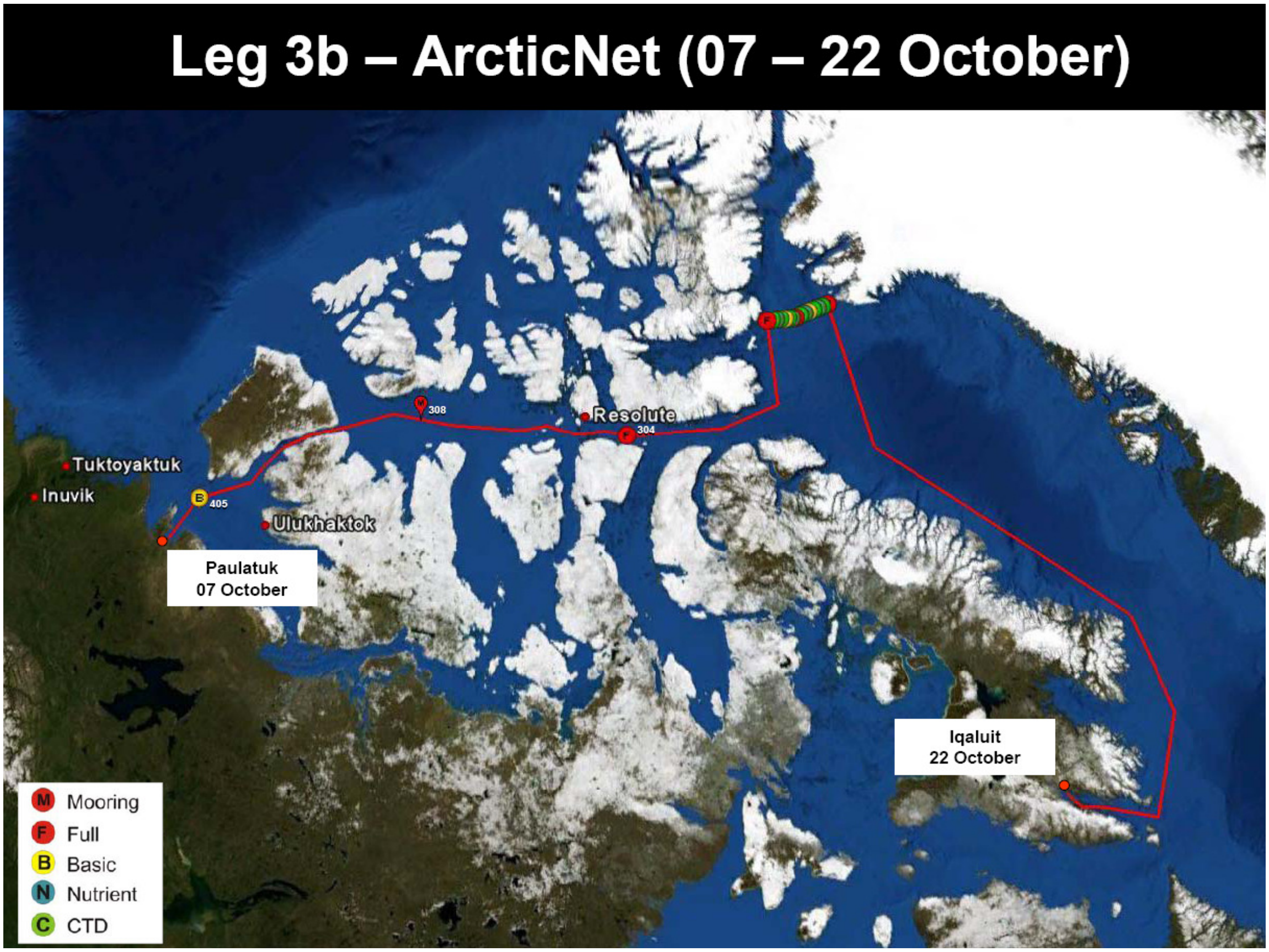


Figure 10: *Leg 2b of the 2010 CCGS Amundsen Cruise.*

2.4.6.2 Overview of Met/Ocean Activities

Met/Ocean activities during leg 3B were limited to ongoing maintanence of the micrometeorology tower, and boundary layer meteorology programs. All remaining Met/Ocean sampling ceased on 19 October 2010, as the ship transited along the east coast of Baffin Island towards Iqaluit.

2.4.7 Leg 3C – ArcticNet: Iqaluit to Quebec City (22 October – 02 November 2010)

With our 2010 sampling program complete, no CEOS personnel were on board for leg 3C.

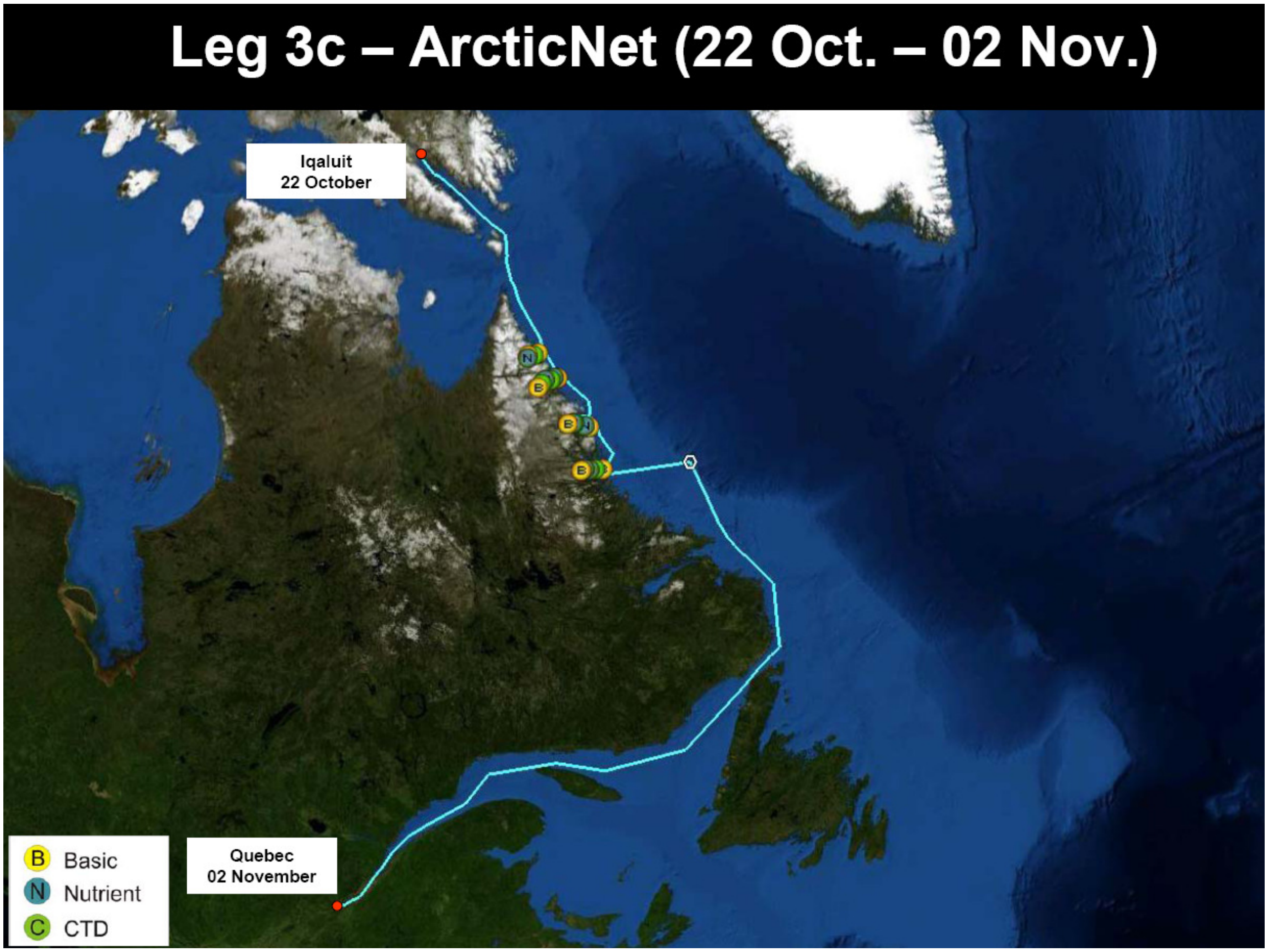


Figure 11: *Leg 2b of the 2010 CCGS Amundsen Cruise.*

SECTION THREE: OCEAN DATA

3.1 Mixed-Layer Buoy Program

3.1.1 Instrumentation

One buoy (hereafter termed the 'mixed layer buoy' or 'MLB') was deployed during Leg 2A to obtain data on the characteristics of the water column's upper 45 m. The MLB suspends a 50 m string of sensors within the upper mixed layer of the water column (Figure 12). Details on the instrumentation and variables collected are provided in Table 5.

Figure 12: *Mixed-Layer buoy subsurface instrumentation. [Left] JFE ALEC© compact CT sensor. [Middle] Aquadopp current profiler.*
[Right] JFE ALEC© PAR sensor.

Table 5: *Variables and equipment associated with the Mixed-Layer and Met/Ocean Buoys.*

Variable	Buoy	Sensor, Mode	Ht. to Water	Units	Specifications
near-surface curren (u,v)	MLB	JFE ALEC©, model AEM-USB	-4.4, -21.4 (-4.4, -21.4)	cm/s velocity, direction	± 01 cm/s or 2% veloc ±2º direction
conductivity, temperature (CT)	MLB	JFE ALEC©, model ACT-HR Compact (	-3.4,-6.4,-9.4,-12.4,-15.4,-20 30.4,-45.4 (-3.4,-6.4,-9.4,-12 15.4,-20.4,-30.4,-45.4)	mS/cm, ºC	±0.05ºC, ±0.05 mS/cm
light intensity (PAR)	MLB	JFE ALEC©, model MDS MkV-L	-3.4,-6.4,-9.4,-12.4,-15.4,-20 30.4,-45.4 (-3.4,-6.4,-9.4,-12 15.4,-20.4,-30.4,-45.4)	µmol/m²/s¹	±4% full scale
surface sea water properties: DO, pH, CTD, FL	MLB	RBR®, model XR-420CTD+DO+pH+F	(-5.5)	% sat.,pH,mS/c ºC, dBar, µg/L	±2% DO, ±0.1 pH, ±0.003 mS/cm, ±0.002ºC, ±0.05% fu scale, ±2%

3.1.2 Mixed-Layer Buoy Deployment

The mixed-layer buoy, suspending a 45 m string of sensors, was deployed at 250m (70° 56.948N, 134 44.593W), at 24:00 GMT on August 24. Eleven PAR (light intensity) sensors (JFE ALEC©, model MDS MkV-L) and temperature/conductivity sensors (JFE ALEC©, model ACT-HR Compact CT) were attached at 3, 6, 9, 12, 15, 20, 25, 30, 35, 40, and 45 m. Two current profiles (Nortek Aquadopp) were positioned at 3 and 45 m. The buoy was recovered on 19 September.

3.1.3 Data Summary

The mixed-layer buoy system data is stored at the following location in the database:

\OCEAN

Instrument specific data are organized into sub-folders:

...\ADCP

...\CT

...\PAR

Header information is provided in the *.xls data files for each instrument in this report.

SECTION FOUR: SEA ICE DATA

4.1 Electromagnetic Induction System Sea Ice Thickness Surveys

4.1.1 Instrumentation

Sea ice thickness and surface ice roughness were measured with a helicopter-borne electromagnetic (HEMI) system, called the “IcePic”, consisting of a cigar-shaped sensor package fix-mounted on the nose of a BO105 Canadian Coast Guard helicopter. The white and red “POD” fixed to the helicopter skid-gear houses the video and the second laser (Figure 13).

Figure 13: *The IcePic, a fix-mounted helicopter-borne electromagnetic is shown mounted on a BO105 CCG helicopter. The red pod fixed to the helicopter skid-gear houses the video and the second laser.*

The overall weight of the fixed-mount sensor package is 44 kg and consists of the laser, an EM transmitter, and an EM receiver mounted inside a cylindrical tube that is fitted to the nose of the helicopter. The EM induction system uses 4 frequencies: 1.67, 5.02, 11.7, and 35.1 KHz, to measure the distance to the ice-seawater interface. The coil separation is 1.2 m and the footprint is about 2.5 times the sensor altitude above the seawater surface. The sensor altitude above the pack-ice surface is 1.1 m when the helicopter skids are on the ice. The laser measures the distance to the ice surface. The difference between the two measurements gives the snow-plus-ice thickness.

The system can be used to "spot sample" by soft-landing and averaging the incoming 10 Hz data, or it can be used to profile floes by slowly flying at low altitude. The Ice Pic console runs on 28-volt helicopter power, and, in addition to the EM laser data, it logs GPS position and radar altimeter data derived from the helicopter's avionics. The real-time outputs are snow and ice thickness, ice conductivity, and the laser altitude.

VGPS (define) sampling was conducted following HEMI transects, following the same approximate transect line but at an altitude of ~100 m. Video images are collected with a video-laser system, which captures image frames from a downward-looking video camera in a pod mounted on the helicopter skids. Consecutive video frames can form mosaics, which are used to monitor ice conditions such as ridging, ice concentration, and floe size along the flight path. At times they capture pictures of seals along with their seal holes and occasionally polar bear tracks.

(For more detailed information on this system, and to obtain software please visit: http://www.geosensing.com)

4.1.2 Data Summary

HEMI data collection flights conducted between 12 August 2010 and 07 October 2010 are summarized by flight (Table 6). The ship was positioned far from the ice edge for much of the cruise, and weather conditions were not optimal for low-altitude flight (fog, blowing snow). The majority of flights occurred from 27 – 29 September 2010 (Leg 3a), when the ship moved into areas of high ice concentration for 60 hours to conduct dedicated ice operations. It should be noted that this is far less time than was originally planned for operations in ice. As a result of this combination of factors, it was only possible to conduct EMI. There were no HEMI operators on board from 26 August – 23 September 2010 (Leg 2b) as this leg was predonomantily dedicated to open-water activities within the Pokak block.

Within each of the flights, the actual locations of the HEMI and VGPS transects were dependent on the surrounding ice and weather conditions at flight time. Many of the flights consisted of a series of transects conducted over a given region 0(particularly during leg 3a). These transects are summarized in Table 6.

Table 6: *HEMI data and video lines summary.*

START DATE	START TIME	START LAT.	START LONG.	END DATE	END TIME	END LAT.	END LONG.
8/18/2010	14 hr 53	71.80899	-136.71107	8/18/2010	18 hr 51	71.799158	-136.7247
9/27/2010	20 hr 48	74.386997	-128.53248	9/27/2010	21 hr 07	74.26059	-128.82816
9/27/2010	23 hr 31	74.26059	-128.82816	9/27/2010	23 hr 59	74.281827	-128.67798
9/28/2010	1 hr 09	74.378678	-128.87901	9/28/2010	2 hr 27	74.436655	-129.27966
9/28/2010	15 hr 46	74.348638	-129.36614	9/28/2010	17 hr 20	74.355767	-129.18064
9/28/2010	19 hr 34	74.437977	-129.12326	9/28/2010	21 hr 15	74.519413	-128.98223
9/29/2010	1 hr 06	74.519413	-128.98223	9/29/2010	2 hr 08	74.494265	-128.7291
9/29/2010	19 hr 35	74.646245	-128.19013	9/29/2010	21 hr 23	74.752843	-127.93183

HEMI Data is stored in the database at:

\SEA ICE\HEMI

All data has been processed into a comma-delimited text file, and is accompanied by a header and a readme file.

4.1.3 EMI Data Visualizations

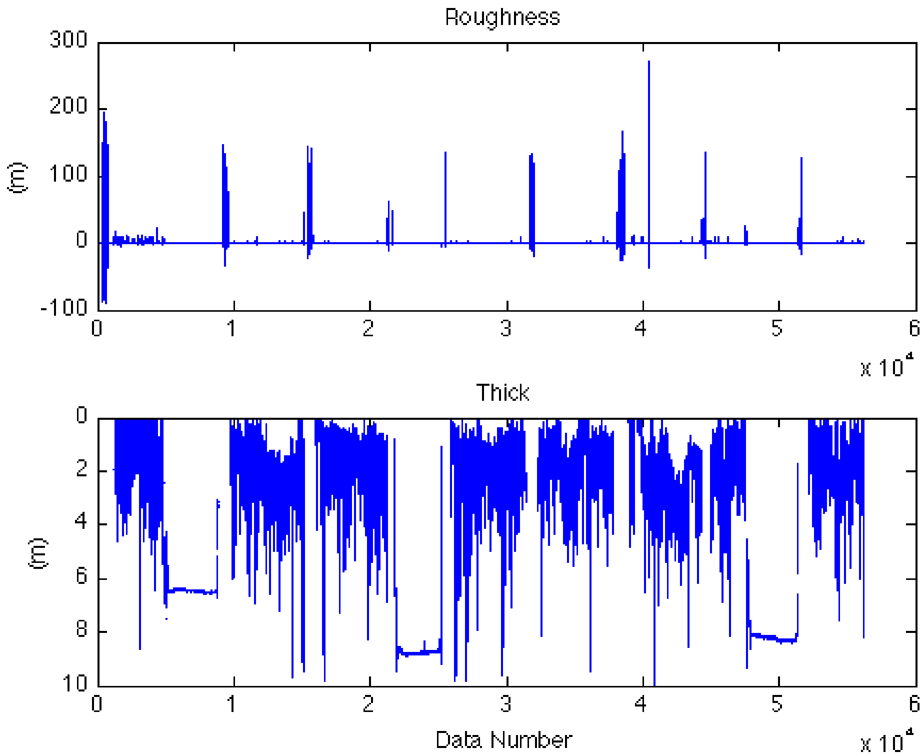


***Figure 14**: A sample of raw (Not quality checked, completely unfiltered) HEMI data for surface roughness (top) and ice thickness (bottom), collected during the 2010 field season.*

4.2 Active Microwave Measurements (C-Band Scatterometer)

4.2.1 Instrumentation: C-Band Scatterometer

The ProSensing Inc. C-Band scatterometer is a fully polarimetric active radar system developed by ProSensing Inc (Figure 15). The transmit signal is a linear FM modulated pulse, or in other words, a chirp pulse. Its operating frequency is in C-band, with a centre frequency of 5.5 GHz and a bandwidth of 500 MHz. It is capable of measuring the full polarimetric response of the region of interest in terms of the combinations of linear polarizations: VV, HH, HV, and VH. Using proprietary software specific to the device and an internal calibration loop, it calculates the normalized radar cross section (NRCS), defined as !o, which is an averaging of the radar return over the region. From a system perspective, the radar cross section is dependent upon the frequency, polarization, and angle of incidence. From a physical perspective, the radar cross section is also dependent upon the physical makeup of the target area – its electro-physical description.

Figure 15: *Prosensing C-Band scatterometer*

The scatterometer is used to measure the C-band microwave scattering signatures of a target region. For MY ice, open water, and landfast first year ice a swath at a series of incidence angles will take place. The variation of measurement in the azimuthal direction is neglected as a result of the averaging in this method. Measurements from the ship require a sweep from -30° to 30° in the azimuth, with the 0° reference at a perpendicular line to the ship-side. The variation in elevation is measured with sweeps in the elevation at 5° increments on the range 20° to 60°.

4.2.2 Data Summary

The scatterometer data requires correction before it can be used. In 2009, quality assurance revealed a systematic discrepancy was detected in the processed scatterometer data. Specifically, the data is out of phase by +/- 180, indedendent of surface type, time of year, temperature, etc. Processed files included in the dataset are considered to be of good quality; however if further correction is required, we make any further corrected datasets available. Table 7 summarizes the scatterometer scans conducted during the 2010 cruise:

Table 7: *Scatterometer scan summary*

Date	Lat (N)	Long (W)	Scan Name	Processed	Notes
18-Aug	71.47	136.43	Scan-20100818-083632		no data
			Scan-20100818-083707	Yes	
			Scan-20100818-084454	Yes	
27-Sep	74.35	128.45	Scan-20100927-132257		none – CALIBRATION
			Scan-20100927-132333	Yes	
			Scan-20100927-132835	Yes	
			Scan-20100927-133338		no data
			Scan-20100927-133705		no data
			Scan-20100927-133741	Yes	
			Scan-20100927-134302	Yes	
			Scan-20100927-134822		no data
			Scan-20100927-135022		no data
			Scan-20100927-135103	Yes	
			Scan-20100927-135622	Yes	
			Scan-20100927-140142		no data
			Scan-20100927-140430		no data
			Scan-20100927-140520	Yes	
			Scan-20100927-	Yes	

			141307		
			Scan-20100927-142056		no data
			Scan-20100927-190431		no data
			Scan-20100927-190507	Yes	
			Scan-20100927-191255	Yes	
			Scan-20100927-192043		no data
			Scan-20100927-195814		no data
			Scan-20100927-195849	Yes	
			Scan-20100927-200637	Yes	
28-Sep	74.35016	129.183511	Scan-20100928-085441		no data
			Scan-20100928-085513		no data
			Scan-20100928-085519	Yes	
			Scan-20100928-090309	Yes	
			Scan-20100928-091057		no data
			Scan-20100928-104931	Yes	
			Scan-20100928-105007	Yes	
			Scan-20100928-105756	yes	
			Scan-20100928-110544		no data
			Scan-20100928-165915		no data
			Scan-20100928-165951	yes	
			Scan-20100928-170741	yes	
			Scan-20100928-171530		no data
29-Sep	74.616734	128.333576	Scan-20100929-084243		no data

			Scan-20100929-084318		no data
			Scan-20100929-085234		no data
			Scan-20100929-085310	yes	
			Scan-20100929-090126	yes	
			Scan-20100929-090914	yes	
			Scan-20100929-091703	yes	
			Scan-20100929-092451		no data
			Scan-20100929-133609		no data
			Scan-20100929-133644	yes	
			Scan-20100929-134432	yes	
			Scan-20100929-135222		no data

It should be noted that there was an ongoing date/time synchronization problem in the scatterometer central processing unit. The operators have taken care to record LST, UTC, time on laptop, and the CPU time. The filename of each scan is linked to the CPU time.

A more detailed version of Table 7 is available in the database at:

\SEA ICE\SCAT\2010_SCAT_Summary.xls

Raw scatterometer datafiles are organized by date in the database at:

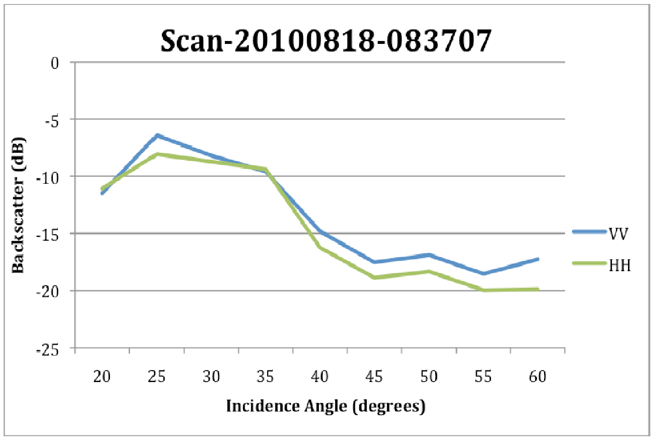
\SEA ICE\SCAT\RAW

The preliminary processed ASCII scatterometer files follow the same naming convention, and are found at:

\SEA ICE\SCAT\PROCESSED

4.2.3 Data Visualizations

A comparison of scatterometer polarization data for different ice types is presented below :



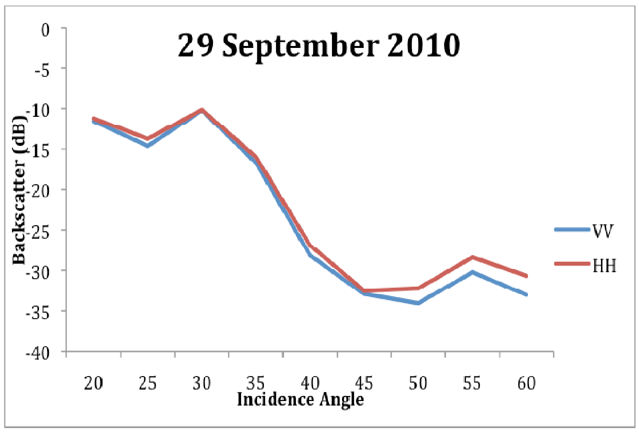


Figure 16: *(Top) VV polarization and (Bottom) HH polarization comparison of FY ice collected during leg 3A*

4.3 Sea Ice Physical Sampling

4.3.1 Methodology

Typical Sea ice physical sampling activities include, but are not limited to:

- Take ice cores from a location with the same snow depth close to were the snow pit is/was done (even at the same spot). Extract one core for temperature, and one for salinity.
- Freeboard (FB): determine FB from a core hole using a ruler.
- Thickness (h_i): determine h_i using an ice thickness gauge.
- Temperature (T_i): Measure at surface or snow/ice interface immediately after removing snow cover. Temperature profiles at intervals in the ice using temperature probe: immediately after extracting core, use drill to make hole to the center of ice core at a known distance from the surface, insert temperature probe to measure temperature. Shade the sensor from direct solar radiation. If T_a is colder than ice temperature, then observe maximum ice temperature. If T_a is warmer than ice temperature, then observe minimum ice temperature. Determine depth interval of temperature measurements depending on ice core thickness. Keep in mind that measuring the profile quickly is better than a high vertical resolution.
- Estimate the length of the ice core thickness (does it match the thickness gauge observation).
- Salinity: Extract an additional core. Cut it in 5 - 10 cm intervals immediately after retrieval and place in whirl-pack bags or buckets. Bring back to ship and allow to melt so that conductivity and salinity can be measured.

An ice team performing physical sampling is depicted in figure 17.

Figure 17: *On-ice team taking an ice core for temperature and salinity profiles.*

At each station, physical properties of sea ice in the vicinity were observed. The temperature at depth within the visited ice floe(s) was determined by coring the floe and drilling holes in it at 10 cm intervals, starting 5 cm from the ice surface. After each hole was drilled a fast-response digital temperature probe was inserted and the result recorded. The surface temperature of the ice surface was also recorded. A second core was pulled at each station and cut in the field at 10 cm intervals in order to determine the salinity profile within the ice floe (Figure 18).

Figure 18: *An ice core being cut into 10cm segments for eventual salinity analysis*

When it was possible for personnel to work on the ice, a no-walk zone was designated along the port side of the CCGS *Amundsen* (semi-circular area with a radius of 30m) to preserve a natural surface for the passive and active microwave measurements On-ice physical sampling activities were conducted in close proximity to this no-walk zone. For ice thicknesses of 0 cm (e.g. grease or frazil ice) to less than 10 cm, the measurement intervals were modified to whatever was possible.

Ice cores are taken using a Kovacs Enterprises Mark II Coring system, which extracts cores with a 9cm diameter (www.kovacsicedrillingequipment.com). Ice temperature profiles (10cm interval) were measured in the field using a drill and a Hart Scientific Model 1522 temperature probe. Additional Ice cores were brought back to the ship for profile measurements (10cm interval) of salinity, by cutting about 10cm core pieces into (nearly) cubical shapes. The pieces, from which all sides that had been subject to drainage or exposed to the atmosphere were removed, were melted for measurements of conductivity using a Hach Sension5 portable conductivity meter (Hach, Loveland USA), with measurement accuracy of +/- 0.01.
By measuring the temperature and salinity of the sea ice it is possible to calculate the brine volume present in the sea ice and thus get an estimate for the ice porosity. The total thickness and freeboard of the ice floe was also recorded.

4.3.2 Physical Sampling Data Summary

Physical sampling activities were generally conducted in concert with scatterometer and SBR EM scans, and were constrained by the presence / absence of sea ice. The ice edge was located 150nm north of the Pokak block, and therefore access to the sea ice was severely limited. A total of seven physical sampling excursions conducted between 12 August 2010 and 07 October 2010 (Table 8).

Table 8: *Physical sampling summary of data collected, and type of ice sampled*

Stn	Date (UTC)	Time (UTC)	Lat (N)	Long (W)	Ice Temp. Profile	Ice Salinity Profile	Densit y	Ice Thickness
N/A	08/18	1400	71.47	136.43	Y	Y	Y	FYI, 1.5m
1	09/27	2200	74 21.4751	128 27.9062	Y	Y	Y	Second year, rotten
12	09/28	1500	74 21.5753	129 11.6379	Y	Y	Y	
2	09/28	1848	74 26.2075	129 06.4522	Y	Y	Y	
3	09/28	0105	74 40.4567	128 15.0214	Y	Y	Y	
1	09/29	1648	74 37.2409	128 20.8738	Y	Y	Y	
2	09/29	2132	74 45.3497	127 56.6796	Y	Y	Y	

Physical sampling data is available in the database at:

\SEA ICE\ICEPHY\Fieldbook_2A.xlsx

\SEA ICE\ICEPHY\Fieldbook_3A.xlsx

The information contained in this file is well-described, and organized by date. Ice core profiles are recorded from the top, down (where surface = 0 cm depth).

4.3.3 Data Visualizations

Figure 19 displays the results of a sampling station on 29 September 2010. The first figure (below left) displays the temperature profile ranging from -2.3℃ at the surface down to -0.96℃ at the 55cm measurement. The second figure (below right) displays the salinity profile for the same floe. The top 60cm of this floe had virtually no saline content due to the fact that this sampling station was on a piece of multi-year ice (MYI). The third figure (bottom center) displays the backscattering signature from the C-Band scatterometer on the same sampling site.

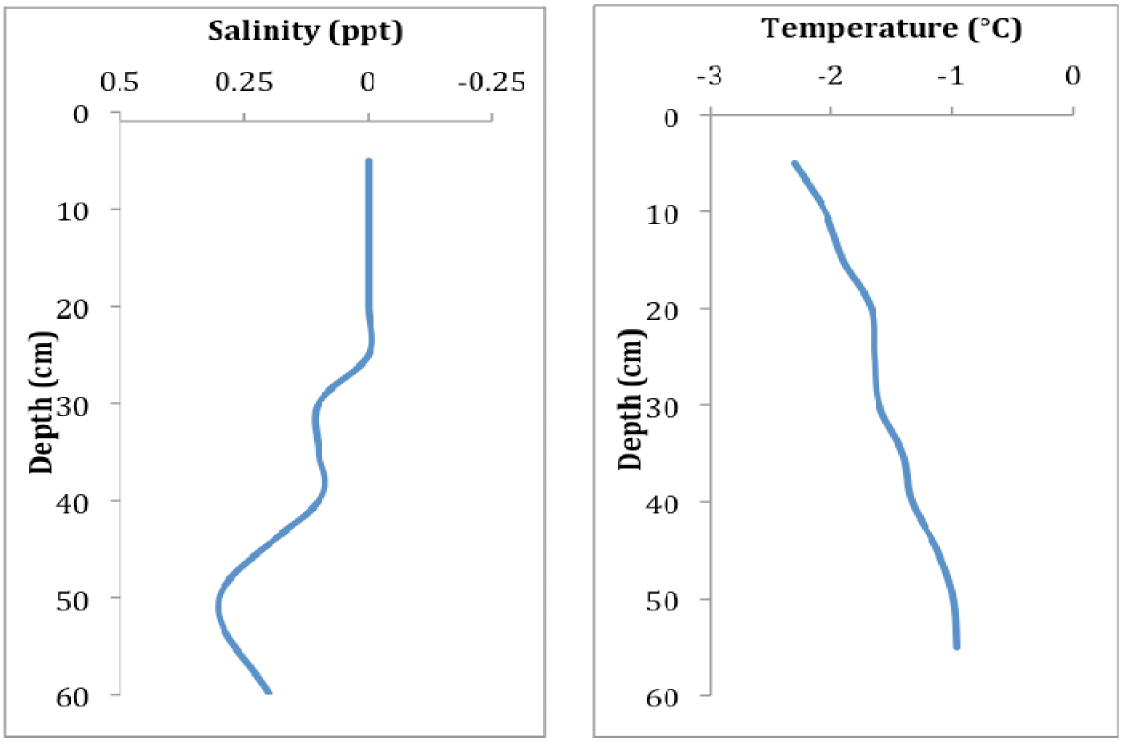


Figure 19: *Salinity (top left), temperature (top right) profiles from the top 60cm of a MY ice floe sampled*

The final three cores taken from each sampling station were shipped back to the University of Manitoba where they will be cut, shaved and processed in the cold lab. These samples will be used to analyze the vertical microstructure and the density of the ice at the various sites. Microstructure and density data can be made as it becomes available in the near future.

4.4 Sea Ice Mass Balance System

4.4.1 Instrumentation

The sea ice mass balance systems remotely measure physical properties of the floe in which they are installed as well as some basic meteorological variables and geographic position. The system consists of a temperature dowel containing thermistors positioned at 10 cm intervals from the top of the floe, upward- (from below) and downward- (from above) looking sonic range finders which measure the change in sea ice volume at the installation site, 2m air temperature, barometric pressure at the surface and GPS position. Each of these instruments is logged to a Campbell Scientific data logger and transmitted to a remote logging computer at CEOS in Winnipeg, MB via iridium satellite modem communication. Instrument specifications and associated variables are presented in table 9.

Table 9: *Summary of sea ice mass balance system sensors.*

Instrument	Variable	Accuracy
YSI 44020 thermistors (n = 45)	sea ice temperature	0.09C
YSI 44020 thermistor	2m air temperature	0.09C
CS 61202V barometer	sea level pressure	1hPa @ -50 to 60C
Benthos PSA-916 sonar altimeter	bottom thickness change	1cm (RS-232 config.)
CS SR50A sonar altimeter	surface thickness change	1cm
Garmin GPS16-HVS	Geographic position	3-5m

4.4.2 Installation procedure

The sea ice temperature dowel (2" O.D.) was installed in the sea ice using a 2" auger. The upward-looking sonic altimeter was mounted to a 2" pipe and installed below the ice on a 5.25m pipe that was installed in the ice using an 8" auger. The downward-looking sonic altimeter, GPS antenna, air temperature sensor, barometer and iridium antenna were installed on an L-shaped mast (1.75m (H) x 0.75m (W)) above the sea ice surface. Each of the three installations was made using a metal tripod base at the sea ice surface. The logging and control system as well as the batteries were housed in a watertight box at the ice surface moored by stainless steel bolts (figure 20).

Figure 20: *CEOS IMB04 installed on 27 September 27 2010 in the Beaufort Sea.*

On 27 September 2010, a CEOS ice mass balance system (IMB04) was installed on a multi-year sea ice floe at 74 14.990N, 128 49.025W (NAD83). The ice floe was 237cm thick at the point where the temperature string was installed. There was 7cm of snow on the floe. The instrument mast, temperature string and underwater sounder were installed successfully and data transmission is ongoing to our office in Winnipeg since the system's installation.

4.4.3 Data Summary

The sea ice mass balance buoy is presently active and regularly transmitting data. A summary of available data to date is presented in Table 10.

Table 10: *Sea ice mass balance buoy data timeline (see appendix 3).*

Variable	CEOS_IMB01
sea ice temperature	27 September – 08 October 2010
2m air temperature	27 September – 08 October 2010
sea level pressure	27 September – 08 October 2010
bottom thickness change	27 September – 08 October 2010
surface thickness change	27 September – 08 October 2010
Geographic position	27 September – 08 October 2010

Data is received intermittently from the buoys via iridium modem. There may be gaps or incomplete data messages in the data corresponding to periods where the iridium telemetry was not strong enough to establish, or maintain a modem link.

A sample complete IMB message is displayed below:


```
RING

CONNECT 9600 V42
--------------------------------------------
CEOS_IMBB01
------------- Parsed GPS Table -------------
"2009-11-29 04:00:00","$GPGGA","040436","7421.6761","N","16247.3826","W","1","10","0.8","-13.1","M","0.1","M","","*7C","","",""
"2009-11-29 03:30:00","$GPGGA","033436","7421.8419","N","16246.5342","W","1","09","0.8","-3.8","M","0.1","M","","*44","","",""
"2009-11-29 03:00:00","$GPGGA","030436","7422.0084","N","16245.6873","W","1","08","0.9","-4.3","M","0.1","M","","*49","","",""
"2009-11-29 02:30:00","$GPGGA","023436","7422.1702","N","16244.8256","W","1","10","0.8","-3.5","M","0.1","M","","*48","","",""
"2009-11-29 02:00:00","$GPGGA","020436","7422.3294","N","16243.9557","W","1","10","0.8","-8.6","M","0.1","M","","*4B","","",""
"2009-11-29 01:30:00","$GPGGA","013436","7422.4845","N","16243.0899","W","1","10","0.8","-12.2","M","0.1","M","","*73","","",""
"2009-11-29 01:00:00","$GPGGA","010436","7422.6377","N","16242.2221","W","1","10","0.9","-16.2","M","0.1","M","","*77","","",""
"2009-11-29 00:30:00","$GPGGA","003436","7422.7859","N","16241.3611","W","2","09","1.0","-10.9","M","0.1","M","","*78","","",""
"2009-11-29 00:00:00","$GPGGA","000436","7422.9272","N","16240.5153","W","1","10","0.9","-11.5","M","0.1","M","","*7E","","",""
"2009-11-28 23:30:00","$GPGGA","233436","7423.0613","N","16239.6929","W","2","11","0.7","-9.9","M","0.1","M","","*46","","",""
"2009-11-28 23:00:00","$GPGGA","230436","7423.1933","N","16238.8899","W","1","10","0.8","-13.2","M","0.1","M","","*71","","",""
"2009-11-28 22:30:00","$GPGGA","223436","7423.3240","N","16238.1049","W","1","09","0.9","-10.1","M","0.1","M","","*7B","","",""
"2009-11-28 22:00:00","$GPGGA","220436","7423.4520","N","16237.3283","W","1","10","0.8","-20.9","M","0.1","M","","*75","","",""
"2009-11-28 21:30:00","$GPGGA","213436","7423.5830","N","16236.5428","W","2","10","0.7","-11.9","M","0.1","M","","*76","","",""
"2009-11-28 21:00:00","$GPGGA","210436","7423.7087","N","16235.7767","W","1","10","0.8","-12.0","M","0.1","M","","*7C","","",""
"2009-11-28 20:30:00","$GPGGA","203436","7423.8309","N","16235.0374","W","1","10","0.9","-13.7","M","0.1","M","","*72","","",""
------------- Output1 Table ----------------
"2009-11-29 04:00:00",2009,11,29,333,4,0,0,-17.3,12.98,-18.82,100.3,"R3.47",3.47,0,0,0
"2009-11-29 03:30:00",2009,11,29,333,3,30,0,-17.35,12.97,-18.72,100.3,"R3.49",3.49,0,0,0
"2009-11-29 03:00:00",2009,11,29,333,3,0,0,-17.46,12.95,-18.61,100.3,"R3.51",3.51,0,0,0
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------------- Therm Table -----------------
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END TRANSMIT
+++
NO CARRIER

The data has been cleaned and organized into a single excel file:

\SEA ICE\IMB\IMBB_04_2010.xls

The IMB dataset provides sea level pressure, air temperature, bottom thickness change, and surface thickness change. A header summary is presented in Table 11.

Table 11: *Header information*

Header	Description
Date - Time	Date – time (excel)
$GPGGA	GGA NMEA Message
LAT	Latitude
N/S	North / South Latitude Flag
Lon	longitude
E/W	East / West Longitude flag
yy	GPS Year
mm	GPS Month
dd	GPS Day
doy	Day-of-year
hh	GPS Time: Hours
mn	GPS Time: Minutes
ss	GPS Time: Seconds
T-logger	Data logger temperature
Signal_quality	Data Logger Signal quality
Voltage	Data logger battery voltage
T-air	Air temperature
Atm pr (kpa)	Barometric pressure
Raw – UW	String (underwater sonar)
UW	Underwater sonar
Raw-SR50	Raw Snow sounder raw distance (m)
Quality	Snow sounder signal quality
SR-50	Snow sounder raw distance (m)
Therm_1…38	Thermister Chain

The 'Therm1 to 38 provides half-hourly 10 cm resolution sea ice temperature profile data (°C). Values where data is not available are marked with NAN (not a number).

4.5 Ice Motion

4.5.1 Instrumentation

Ice motion data was recorded from the Oceanetic (1989) model 703 Iridium Ice tracking beacons, or 'ice drift beacons' (Figure 21), which are 20 cm in diameter and 54 cm in height, with a weight of 11.6 kg.

Figure 21: *An Oceanetics model 703 Iridium Ice tracking buoy. The number on the front corresponds to the last five (sometimes six) digits of the iridum model ID.*

Beacon life expectancy is on the order of 10 months for continuous operation, although the measurement duration is typically less as the beacons will sink if the ice floe they are installed upon melts or breaks up. Ice motion buoys are deployed using an ice auger to drill a hole that is approximately 25cm in depth. GPS positions and time and date stamps are reported and transmitted through a Short Burst Data (SBD) packet to the Iridium modem system by email. Buoys are equipped with Light Emitting Diode (LED) indicators to determine modem status, and each modem is uniquely identified using an International Mobile Equipment Identity. Software called SatTerm is provided so that commands may be sent to the modem, while data is collected via an email account that receives SBD messages from the modem using a "Server for Trackers" application. The resulting data format is user-defined and selected from a variety of formatting options. In this instance, ice motion data is in comma-delimited text format and includes beacon identification, date, time and position, namely latitudinal and longitudinal coordinates.

Ice drift beacons are deployed manually on MY ice (preferred), or thick FY ice floes (figure 47). The Deployment location is usually selected based upon local ice conditions. Anywhere from one to three ice beacons may be deployed at once. The ice beacons are normally taken via helicopter to a suitable ice floe where a 9" auger hole is drilled to a depth of approximately 20cm. The ice beacons are then placed in the hole and packed with snow, and activated by removing a magnet on the side of the buoy. The deployment time, location, ice type, and buoy ID are recorded and monitored. The beacon data is transmitted via Iridium satellite modem every two hours in encoded messages, which are then translated and processed at the University of Manitoba. Ice velocities and trajectories can then be calculated from this data.

Figure 22: *Ice beacon deployment. A site is selected with good line-of-sight to the horizon, and an 8" 20-cm deep hole is drilled using a gas-powered auger. The beacon is installed upright, and activated.*

4.5.2 Data Summary

14 ice drift beacons were deployed on mobile FY or MY ice during the 2010 field season. Where possible, a triangular deployment plan was implemented so that drift beacon tracks could be compared to identify ice shear and local ice vorticity. Of the 17 ice beacons deployed, 12 of these beacons were deployed in 4 such triangular configurations. Ice beacon deployments are summarized in Table 12.

Table 12: *Beacons deployment summary :*

Serial Number	Date Deployed	Latitude	Longitude
289110	2010 08 18	72°N 52.499	137°W 05.054
285100	2010 08 18	72°N 07.458	137°W 24.673
284100	2010 08 18	71°N 57.506	136°W 42.249
25480	2010 09 28	74°N 37.750	129°W 12.202
96630	2010 09 28	74°N 45.621	129°W 17.889
23490	2010 09 28	74°N 42.637	128°W 49.458
27340	2010 09 28	74°N 27.328	128°W 21.573
22370	2010 09 28	74°N 21.025	129°W 09.127
24350	2010 09 28	74°N 29.664	128°W 44.408
21490	2010 09 29	74°N 44.230	127°W 54.229
21350	2010 09 29	74°N 50.572	127°W 38.244
27480	2010 09 29	75°N 01.491	127°W 02.534
20350	2010 09 29	74°N 50.105	128°W 14.388
23340	2010 09 29	74°N 43.068	128°W 03.940
29340	2010 09 29	74°N 43.981	127°W 46.057
27350	2010 09 29	74°N 33.195	128°W 08.174
28330	2010 09 29	74°N 35.697	129°W 16.227

The datum for the above-mentioned positions was NAD83.

Drift buoy data collection has ended, and all available data from the 2010 field season is available in the dataset at:

\SEAICE\IDB\IDB_2010.XLS

Data file header description is as follows:

Iridium modem ID
Date: (dd/mm/yyyy)
Month
Day
Year
Hour
Minute
Seconds
AM/PM
Latitude (decimal degrees)
Hemisphere (N/S)

Longitude (decimal degrees)
Hemisphere (E/W)
Speed (m/s).
direction (degrees).

It should be noted that ice beacon deployment lifespans were considerably shorter than in previous field seasons. We attribute this outcome to several operational and environmental factors that were beyond our control. For further information, please review the report on ice beacon deployment lifespans, which is found at:

\SEAICE\IDB\sea_ice_tracking_beacon_longevity_report.pdf

4.6 Surface Temperature

4.6.1 Instrumentation: Infrared Transducer

A downward-looking Infrared temperature sensor (Model Everest 4000.4ZL), mounted at 30° from the vertical, took surface temperature measurements at a 15 second sampling interval. The instrument is installed on the starboard gunwale on the foredeck, facing the ocean surface (Figure 23). It operates at 8 - 12 microns wavelength of the electromagnetic spectrum. The data collected from this instrument is typically used to characterize the surface temperature during C-Band scatterometer scans.

Figure 23: *Everest 4000.4ZL mounted on the starboard gunwale of the CCGS Amundsen at 30° from the vertical.*

The infrared transducer was deployed during 2010 as part of the micrometeorological tower and data is available in the daily processed MET files.

\ATMOS\TOWER\MET

4.7 Ice Thickness Images

4.7.1 Instrumentation

A downward-looking AXYS NETCAM camera monitored ice thickness where ice breaking was necessary. The camera was mounted on the port side of the ship, at a height of ~8m above the sea (Figure 24). When breaking through ice, some of the broken ice floes will turn on their side. Estimates of ice thickness can be processed from this imagery, and geoencoded using the time stamps. It should be noted that this technique of monitoring sea ice thickness performs poorly during the summer months, as heavily-decayed, thick old ice floes tend to be pushed away from the ship, rather than turn on their side. Some of the images are also useful for determining stage of ice development.

Figure 24 : *Sample IceCam image from 29 September 2010.*

4.7.2 Data Summary

Ice thickness camera images were collected during the following dates:

27 September 2010
28 September 2010
29 September 2010
30 September 2010
09 October 2010
10 October 2010
11 October 2010
12 October 2010
13 October 2010
15 October 2010

The images are available in the database at:

\SEA ICE\ICECAM\YYYY-MM-DD

4.7.3 Data Visualizations

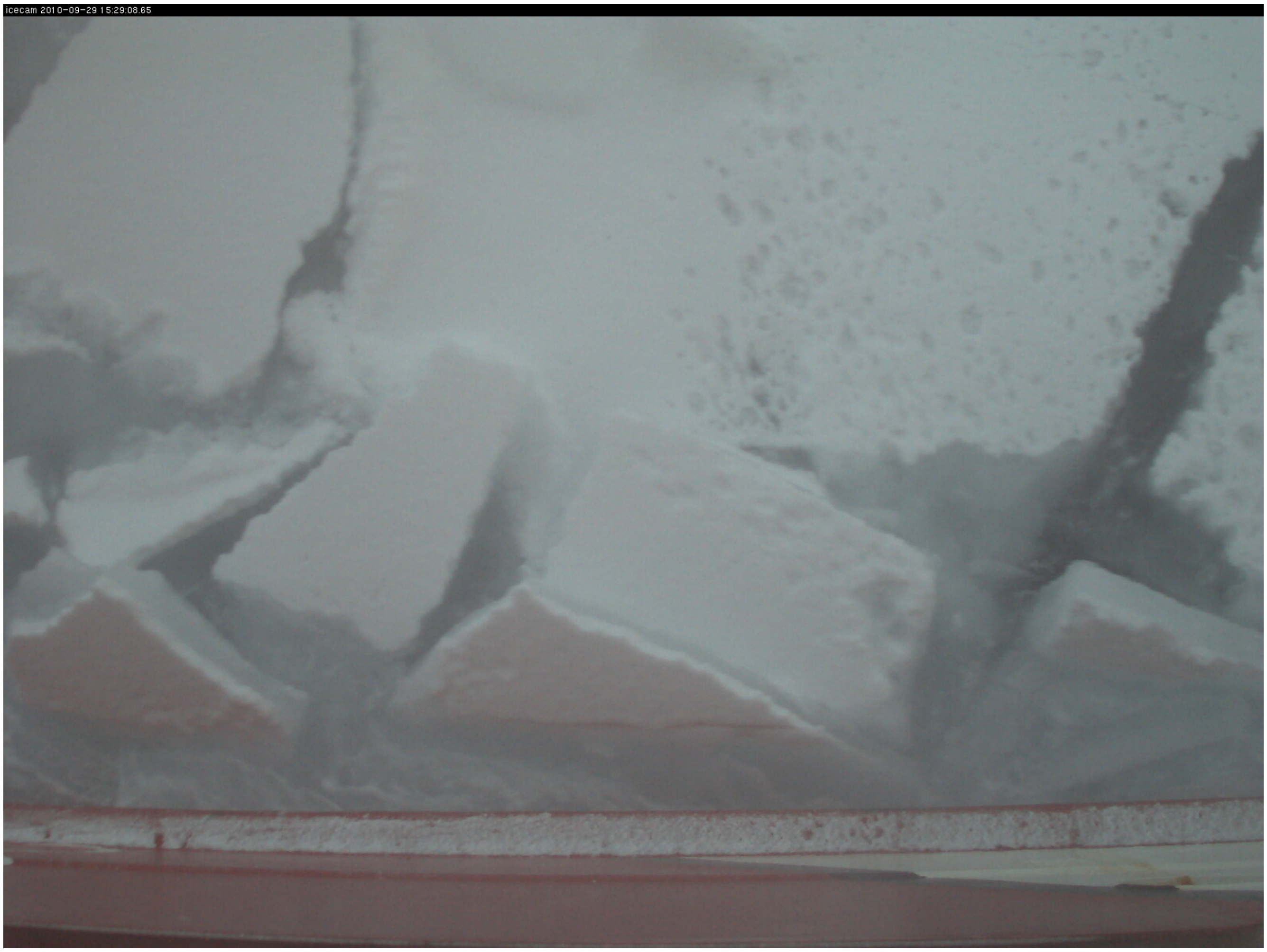

Figure 25: *Sample ice thickness photo*

SECTION 5: METEOROLOGICAL DATA

5.1 Micrometeorology Tower Program

5.1.1 Introduction

The motivation for this work stems from the general poor understanding of the processes that exchange nutrients, heat and momentum between the near ocean surface and atmosphere in the Arctic Ocean and peripheral seas. The group's focus is the exchange of CO_2, heat and momentum, and in particular to achieve a better understanding of the role of sea ice (full and partial ice cover) and surface surfactants on the transport and exchange of the respective entities.

Specific objectives relate to the development of tools (observation, model, and remote sensing) to assist with regional budgeting of (primarily) heat, CO_2, and momentum, and in the longer term, to develop the necessary process-level understanding of the exchange processes, to forecast how the ocean's response to climate change and variability will affect the atmosphere-ocean cycling of CO_2.

The surface meteorology and flux program of the CCGS *Amundsen* is designed to record basic meteorological and surface conditions, and to study exchanges of momentum, heat and mass across the atmosphere-sea ice-ocean interface in support of the objectives described above.

Novel to our air-sea studies is the ship-based application of the eddy covariance technique for the direct measurement of heat, CO_2 and momentum. Eddy covariance represents the lone local scale (100s m to km) direct micrometeorological measurement of the respective fluxes.

Our group's 2010 ArcticNet monitoring and sampling program was expanded to accommodate the monitoring requirement of BP within the Pokak block of the southern Beaufort Sea. The emphasis of the expanded program is on site specific time-series monitoring of near surface meteorology, surface wave parameters and near surface water currents, and upper ocean light, temperature and current profiles using moored buoys.

5.1.2 Methods

The micrometeorological tower located on the front deck of the CCGS *Amundsen* (Figure 26) provides continuous monitoring of meteorological variables and eddy covariance parameters. The tower consists of slow response sensors that record bulk meteorological conditions (air temperature, humidity, wind speed/direction, surface temperature) and fast response sensors that record the eddy covariance parameters (CO_2/H_2O concentration, 3D wind velocity, 3D ship motion, air temperature) (Table 13). In addition, radiation sensors (Figure 27, Table 13) were installed on the roof of the wheelhouse to provide information on incoming long-wave, short-wave, ultraviolet, and photosynthetically active radiation. All data was logged to Campbell Scientific dataloggers; a model CR3000 logger was used for the eddy covariance data, a CR1000 logger for the slow response met data, and a CR23X for the radiation data. All loggers were synchronized to UTC time using the ship's GPS system as a reference. Ship heading and location (lat., lon.) were measured to compensate measured apparent wind information for ship direction and motion.

The eddy covariance system on the tower makes use of two separate gas analyzers and a single 3D sonic anemometer. The dual gas analyzers system allows us to make use of both closed path and open path eddy covariance systems. The open path gas analyzer has the benefit of making measurements concurrently with the sonic anemometer, but the closed path gas analyzer is not as easily disturbed by adverse weather conditions.

In order to make sure that the two systems are comparable, careful calibrations are performed on both instruments. The closed path system is based on a LI-7000 gas analyzer which employs two optical cells, one of which was used to monitor the drift of the instrument by constantly passing a stream of ultra-high purity N_2. In addition, the sample cell of the instrument is calibrated daily using the ultra-high purity N_2 to zero the CO_2 and H_2O measurements, and a reference gas of known CO_2 to span the instrument. Occasionally, a span calibration of the H_2O sensor is performed using a dew point generator (model LI-610). The open path gas analyzer (LI-7500) cannot be calibrated as conveniently, and so it is calibrated approximately every three weeks. In general, we find that this is effective for this particular instrument, which does not drift significantly over time.

The ship motion correction necessary for the application of the eddy covariance technique requires accurate measurement of ship motion (3-axis measurement of angular acceleration and rate), heading and location. Rotational motion is monitored using a multi-axis inertial sensing system. Data related to heading and location is available from the ship's GPS and gyro. Using these data yaw, pitch and roll, in addition to translational motion is calculated, and collectively this information is used to correct our 3D wind measurements.

In addition to the eddy covariance solution to air-sea fluxes, data are collected for the more commonly used bulk approximation. Note however that the bulk approximation is unable to deal with ice in the flux footprint. This last point is a central research theme.

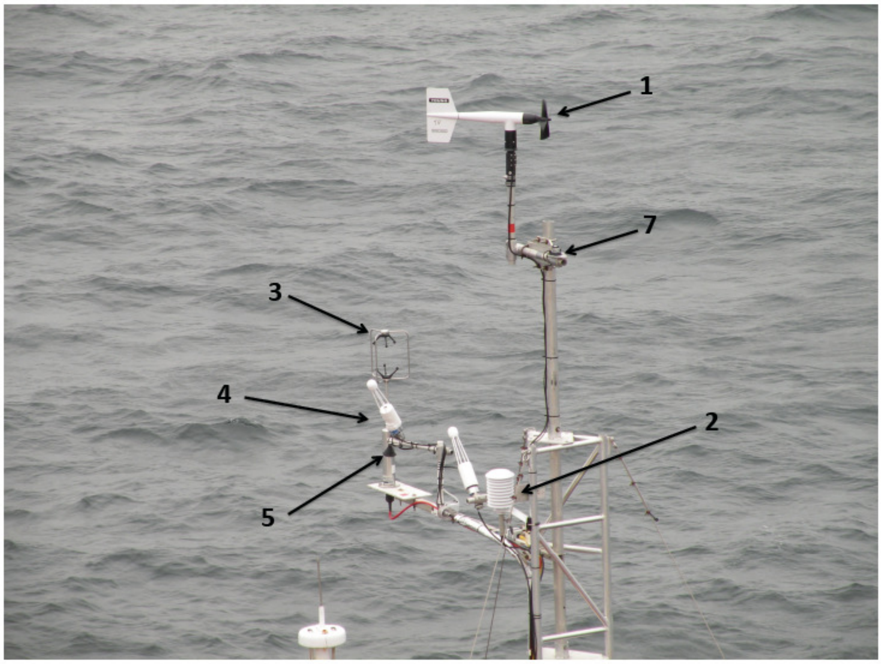

Figure 26: *Meteorology and flux program instrument setup. See Table 13 for description of instruments based on the numbers.*

Figure 27: *Meteorology and flux program instrument setup. See Table 13 for description of instruments based on the numbers.*

5.1.3 Dataset Details

Much of the flux tower was fully operational on 3 July 2010. The slow sequence, largely meteorological variables, are scanned at 1s intervals and saved as 1 min averages. Data screening and ship motion correction to wind speed and direction is applied during post-processing. Wind data are screened for times when the apparent wind direction is forward of the ship's wheelhouse. Heavy rime will affect the measurement of wind speed and these periods are also removed from the data set.

The high frequency variables associated with the eddy covariance system are scanned at 0.1 s intervals and are stored as raw data and as 1-minute averages. The raw data are used to compute the fluxes (heat, mass and momentum) over time intervals that can range from 10 min. to 60 min. Frost, rime and aggressive sea spray affect our high frequency measurements of 3D wind and gas concentrations. Periods associated with these events are evident in the data, and need to be removed prior to processing. Fluxes are post-processing computed.

Table 13: *Description of instruments shown in figure 26.*

Figure 1	Sensor	Variables	Units	Ht fron deck (r	Scan (s) / Ave (min)	Specs
1	wind monitor (RMYoung 05103)	ws-2D, wd-polar	m/s; º	8.11	1/1	±0.6 m/s ±3º deg
2	temperature/relative humidity probe (Vasailla HMP45C212)	Ta, RH	ºC; %	7.2	1/1	Humidity ±2% 0-90% @ 20ºC ±3% 90-100% @ 20ºC 0.05% RH/ºC Temperature ± 0.1 ºC
3	3D wind velocity (Gill Windmaster Pro ultra-sonic anemometer)	u,v,w, Ts	m/s; ºC	6.36	10 Hz	RMS noise <1% offset <0.01 m/s SOS < 0.5% accuracy
4	LI7500 open path gas analyzer	ρ_v /ρ_c	μmol/m³ mmol/m	6.82	10 Hz	RMS noise ±0.1 μmol/mol zero drift 0.1 μmol/mol/ºC gain drift 0.1%/ºC
5 (inlet)	LI7000 closed path gas analyzer	ρ_v /ρ_c	μmol/mc mmol/m	inlet at 6.49	10 Hz	RMS noise ±0.1 μmol/mol zero drift 0.3 μmol/mol/ºC gain drift 0.2%/ºC
Not showr	multi-axis inertial sensor (MotionPak, Systron Donner)	rx,ry,rz accx,accy,ac	º/s; g	4.59	10 Hz	rate <0.004º/s acc <10 μg
6	pyranometer (Eppley, model PSP)	SW_in	W/m²		2/1	~±5%
7	quantum sensor (Kipp & Zonen, PARLite)	PAR	μmol/m²		2/1	~±5%
8	pyrgeometer (Eppley, model PIR)	LW_in	W/m²		2/1	~±10%
Not showr	surface temperature (Apogee SI-111 precisio infrared radiometer)	Tsfc	ºC	1.6 m	1/1	±0.2 ºC accuracy @ -10 to 65 ºC ±0.5 ºC accuracy @ -40 to 70 ºC
Not showr	pressure transducer (RM Young, 61205V)	Patm	kPa		2/1	±0.5 hPa accuracy
9	UV radiation (Kipp & Zonen model UV-S-AB-T)	T_UV, UV_A UV_B	deg C W/m2		2/1	Daily uncertainty <5%
Not showr	GPS Receiver (Garmin GPS16X-HVS)	lat, lon, SOG COG	º,kts, º		1	Position: <15m, velocity, 0.1 kno

Not shown	Digital compass (Ocean Server OS5000)	H, pitch, roll	º		1	Precision: 0.5 deg (heading) <1 deg (roll/pitch)

The Micrometeorology datasets are available at:

\ATMOS\TOWER\MET

Where daily files are named using the following convention:

proc_MET_YYYY_JDXXX_MMDD.dat

Radiation datasets are available at:

\ATMOS\TOWER\RAD

Where daily files are named using the following convention:

proc_RAD_YYYY_JDXXX_MMDD.dat

For both MET and RAD files, the naming convention corresponds to date information:

YYYY = year
JDXXX = julian day of year
YYDD = month, day of year

Header information for the MET files is presented in Table 14, and the RAD files in Table 15.

Table 14: *Header information for the MET files.*

Header	Units	Description
Year		
Month		
Day		
Hour		-DATES/TIMES IN UTC
Min		
Sec		
ProgVer		Datalogger program version used (e.g. foredeck_met_2010_v1.1)
batt_volt_min	V	Minimum datalogger battery voltage, useful for identifying poor datalogger performance
panel_temp_avg	deg C	Temeprature of data logger, useful for identifying poor datalogger performance
batt_volt_std		Standard Deviation of battery voltage over 1 minute averaging period, useful for identifying poor datalogger performance
panel_temp_std	V	Panel temperature standard deviation over 1 minute averaging period, useful for identifying poor datalogger performance
t_hmp_avg	deg C	Atmospheric temperature, measurement height ~14m above sea level
rh_hmp_avg	%	Atmospheric relative humidty, measurement height ~14m above sea level
Tsrfc_avg	deg C	Surface skin temperature measured from infrared radiometer
Patm_avg	kPa	Atmospheric pressure
Raw_W_Vel	m/s	Raw wind velocity, uncorrected for ship motion
Raw_W_Dir	deg	Raw wind direction (0/360=wind blowing into front of ship)
Raw_W_std	deg	Raw wind direction standard deviation
t_hmp_std	deg C	Atmospheric T standard deviation over 1 minute averaging period
rh_hmp_std	%	Relative Humidity standard deviation over 1 minute averaging period
Tsrfc_std	deg C	Surface temperature standard deviation over 1 minute averaging period
Patm_std	kPa	Atmospheric pressure standard deviation over 1 minute averaging period
Lat	deg	Latitude of observation (obtained from Ship GPS system)
Long	deg	Longitude of observation (obtained from ship GPS system)
SOG	kts	Speed over ground of ship (obtained from ship GPS system)
COG	deg	Course over ground of ship (obtained from ship GPS system)
Heading	deg	Heading of vessel relative to true north (obtained from ship Gyro system)
SOG_std	kts	Speed over ground of ship standard deviation
COG_std	deg	Course over ground of ship standard deviation
True_W_Vel	m/s	True wind velocity corrected for ship motion, measurement height ~14m above sea level
True_W_Dir	deg	True wind direction relative to true north, measurement height ~14m above sea level
Diag		Diagnostic code word for data processing. If 'NaN', data is ok: 1=tower down, 2=faulty conventional anemometer, 3=faulty infrared radiometer, 4=faulty T/RH probe, 5=faulty P sensor
Pitch	deg	Pitch angle of the tower relative to sea surface (for diagnostic purposes)
Roll	deg	Roll angle of the tower relative to sea surface (for diagnostic purposes)

Table 15: *Header information for the RAD files.*

Variable	Units	Description
Year		
Month		
Day		
Hour		
Minute		
Second		
Batt_avg	V	Average battery voltage of datalogger (used for some diagnostics)
Panel_T_avg	deg C	Temperature of datalogger
Kdown_avg	W/m2	Incoming shortwave radiation
Thermopile_avg	W/m2	Thermopile measurement of long wave radiation sensor (intermediate value for calculating incoming LW)
Tcase_avg	K	Temperature value of long wave radiation sensor (intermediate value for calculating incoming LW)
Tdome_avg	K	Temperature value of long wave radiation sensor (intermediate value for calculating incoming LW)
LWin_avg	W/m2	Incoming longwave radiation
PARmd_avg	umol/m2/s	Incoming photosynthetically active radiation measured on top of wheelhouse
T_UV_avg	deg C	Temperature of UV radiation sensor
UV_B_avg	W/m2	Incoming UV-B radiation
UV_A_avg	W/m2	Incoming UV-A radiation
PARft_avg	umol/m2/s	Incoming photosynthetically active radiation measured on the flux tower
Batt_stdev	V	Standard deviation of battery voltage over 1 min averaging period
PanelT_stdev	deg C	Standard deviation of datalogger temperature over 1 min averaging period
Kdown_stdev	W/m2	Standard deviation of incoming shortwave radiation over 1 min averaging period
Thermopile_stdev	W/m2	Standard devaiation of Thermopile over 1 min averaging period
Tcase_stdev	deg C	Standard deviation of Tcase over 1 min averaging period
Tdome_stdev	deg C	Standard deviation of Tdome over 1 min averaging period
LWin_stdev	W/m2	Standard deviation of incoming longwave radiation over 1 min averaging period
PARmd_stdev	umol/m2/s	Standard deviation of incoming PAR measured on top of wheelhouse over 1 min averaging period
T_UV_stdev	deg C	Standard deviation of UV sensor temperature over 1 min averaging period
UV_B_stdev	W/m2	Standard deviation of incoming UV-B over 1 min averaging period
UV_A_stdev	W/m2	Standard deviation of incoming UV-A over 1 min averaging periiod
PARft_stdev	umol/m2/s	Standard deviation of incoming PAR measured on the flux tower over 1 min averaging period
Latitude	deg	Latitude at time of measurement (from ship GPS data)
Longitude	deg	Longitude at time of measurement (from ship GPS data)

5.2 Passive Microwave Temperature and Water Vapour Profiles

5.2.1 Microwave Profiling Radiometer

A Radiometrics temperature and water vapour 3000A profiling radiometer (TP/WVP3000A) is used to measure the temperature and water vapour within the atmosphere up to 10km using passive microwave radiometry at 22 – 29GHz, and 51 – 59GHz. The TP/WVP3000A is installed on a mount attached to the white container laboratory (the 'Met Shack') located directly behind the ship's wheelhouse, approximately 19m above sea level. The instrument is suspended away from the roof of the shed to ensure that the field-of-view (approximately 15° above the horizon to the left and right to the zenith) is clear of any obstruction (figure 28).

Figure 28: *TP/WVP 3000A mounted on the roof of the CCGS Amundsen 'met shack.'*

The radiometer sequentially views atmospheric radiances from the zenith direction in 12 channels - seven in the oxygen band (51-59 GHz) provide information on the temperature profile, and 5 between 22-30 GHz provide information on the humidity profile. The instrument set-up included sensors for surface pressure, temperature and humidity, and a zenith-pointing infrared radiometer (9.6-11.5 μm), which provides cloud-base altitude. The radiometer system rejected periods when the profiles may be erroneous due to precipitation scattering, and/or due to emissions from moisture on the radome filter.

The instrument generates a vertical profile of upper-level air variables including temperature, water vapour density, relative humidity, and liquid water from the surface to an altitude of 10km (Figure 29). The resolution of the measurements varies with height. The resolution of the instrument is 50 m from the surface to an altitude of 500 m, then increases to 100 m from 500 m to 2 km altitude, and is 250 m for measurements from 2 km to 10 km (Note: the height given for 50 m is actually 69 m as the instrument assumes it's at sea level when it's mounted 19m above sea level). In addition, the instrument also measures concurrent basic surface meteorology variables, including pressure, relative humidity, and ambient temperature. A skyward-looking infrared sensor measures the temperature of the sky. A rain-sensor detects the presence of any precipitation. It should be noted that the fog registered as precipitation during much of the field season. The instrument also calculates integrated column water vapour, and liquid water content. The sampling frequency for all data is approximately one complete profile per minute.

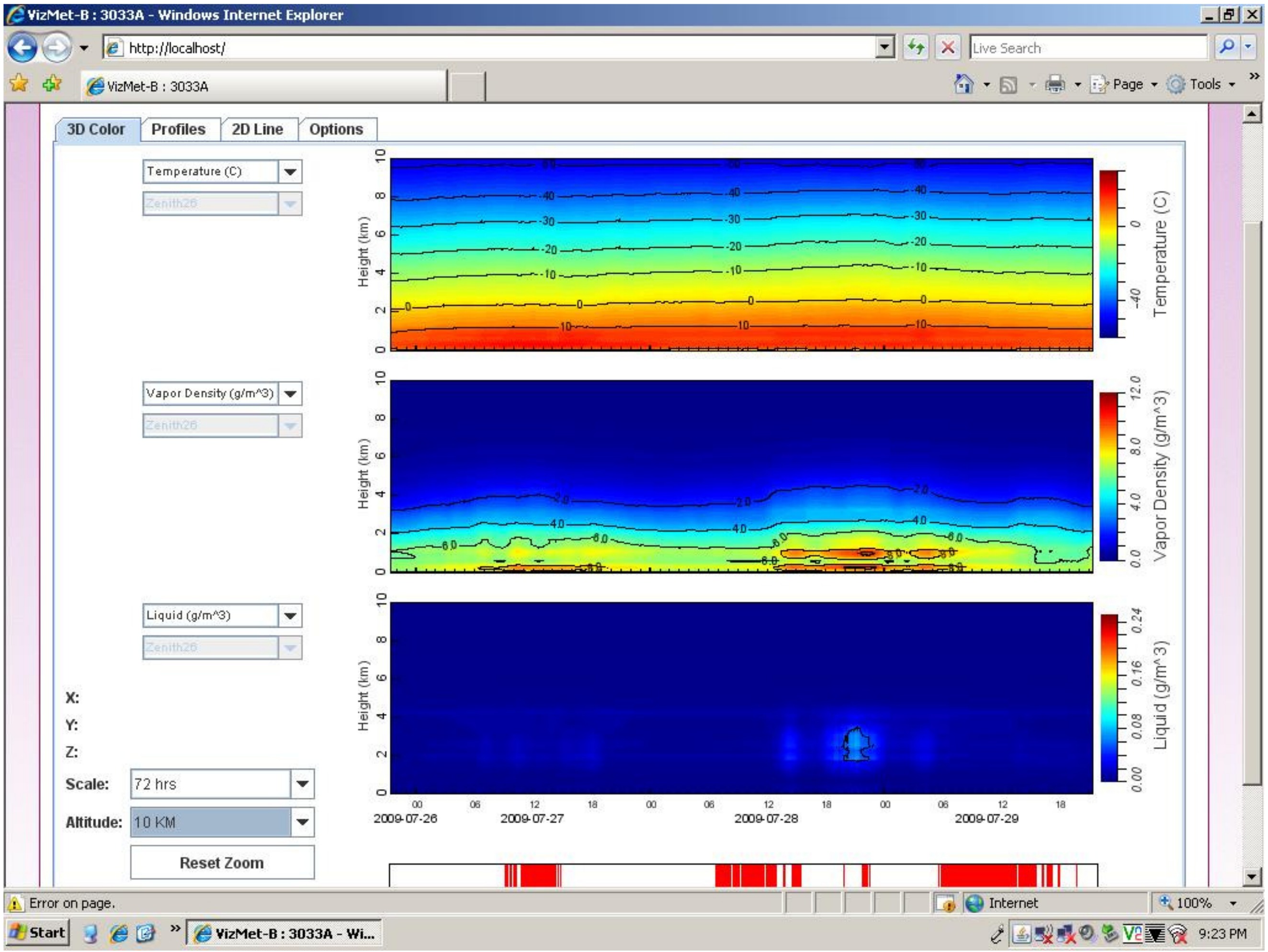

Figure 29: *TP/WVP3000A Data example: Temperature (top), water vapour density (middle) and atmospheric liquid content (bottom) are shown. The bar at the bottom shows whether rain was detected or not (red bar).*

The calibration of the water vapour profiling process was continuously maintained by hourly tip curves. An external liquid-nitrogen-cooled blackbody was used to intermittently calibrate the temperature profiling process. All channels also viewed an internal black body target every 5 minutes for relative calibration. Temperature and humidity values (0 to 200 m at 50 meter intervals, 500 to 2000 m at 100 meter intervals, and 2000 to 10,000 m at 250 meter intervals) were derived from microwave brightness temperatures using the manufacturer's neutral network retrievals that had been trained using historical radiosonde measurements, and a radiative transfer model (Solheim et al., 1998). Historical radiosonde data from Inuvik N.W.T. was used to develop neural network coefficients for the Southern Beaufort Sea Region.

5.2.2 Data Summary

The TP/WVP 3000A was not operational until the beginning of Leg 3. There was an ongoing problem from previous issues regarding an error message “server not ready.” It was determined that the problem was related to a corrupt windows service (cryptography) which the profiler software depends upon to run the profiler server software as daily scheduled task in windows task scheduler. The problem was corrected, and no further problems were noted with the software or hardware. A liquid nitrogen calibration was performed on 27 September 2010, and the operations configuration file was updated.

Datafiles are organized by date into folders named by year and month (yyyy_mm), and are found in the database at:

\ATMOS\MWP

Datafiles follow the naming convention:

YYYY-MM-DD_HH-MM-SS_tip.csv
YYYY-MM-DD_HH-MM-SS_lv0.csv
YYYY-MM-DD_HH-MM-SS_lv1.csv
YYYY-MM-DD_HH-MM-SS_lv2.csv

Header information for these files is included in the first 6 lines of each data file.

Files with “*.Lv0, *.Lv1, and *.Lv2” are the raw, first-order processed, and second-order processed datafiles. The “*.tip” files are the daily TIP calibration files used by the radiometer, and are included for reference. The “Lv2” files are the files of interest to the end-user. Records marked 401 – 404 are the key records as they describe the vertical atmospheric profiles of temperature, water vapour density, liquid water, and relative humidity as post-processed by the TP/WVP3000A.

The variable abbreviations are described in Table 16.

Table 16: *Microwave Profiling Radiometer “Level 2” file header.*

MWP File	Units	
Tamb	K	Surface Ambient air temperature
Rh	%	Surface relative humidity
Pres	Mb	Barometric pressure
Tir	K	Sky temperature (Infrared thermometer)
Rain	n/a	Rain sensor (1 or 0)
Vint	Cm	Vertically integrated water vapour (0 – 10km column total)
Lqint	Mm	Vertically integrated liquid wanter (0 – 10km column total)
Cldb	km	Cloud base height
Record 401	K	Atmospheric profile temperatures for 0 – 10km
Record 402	g/m^3	Atmospheric integrated vapour profile for 0 – 10km
Record 403	g/m^3	Atmospheric liquid water profile for 0 – 10km
Record 404	%	Atmospheric relative humidity profile for 0 – 10km

5.3 Weather Balloon Temperature and Water Vapour Profiles

5.3.1 Vaisala RS-92G Radiosondes

Balloon launches (figure 30) are conducted to profile low-pressure systems, periods of significant warm or cold-air advection aloft, and for comparison / validation of our TP/WVP3000A microwave profiling radiometer. If a significant cyclone is affecting the region, the sampling interval will be increased to 3-hourly. Due to a limited supply of radiosondes, we constrained our launches to coincide with passing storms, and low pressure disturbances only.

Figure 30: *A weather balloon with attached radiosonde, launched from the helicopter deck.*

Vertical profiles of temperature, pressure, relative humidity, wind speed and wind. direction were obtained using Vaisala RS92G GPS wind-finding radiosondes. The sonde was flown by 300 gm and 200 gm helium-filled balloons at a target ascent rate of 2 to 5 m/s to ensure a good vertical resolution through the boundary layer. An 8-channel uncoded GPS receiver in each sonde automatically detects all satellite signals in visible range. Raw wind vectors are transmitted to the ground station every 0.5 seconds during the flight via digital 1200 baud downlink. All wind computation is done within the ground equipment. Temperature is measured with a THERMOCAP® Capacitive bead, which has a +60.0 C to -90.0 C range, resolution of 0.10C and accuracy of 0.20C up to 50 hPa (most launches terminated before this level). The sensor also has a lag of less than 2.5 seconds in 6 m/s flow at 1000 mb. Pressure is measured with a BAROCAP® Capacitive aneroid. Its measuring range is 1060 mb to 3 mb with a resolution of 0.1 mb and accuracy of 0.5 mb. Humidity s measured with a

HUMICAP® thin film capacitor. Its measuring range is from 0 to 100% relative humidity, with a resolution of 1% relative humidity and accuracy of 3%.

More information on the RS-92G radiosondes is available at:
(http://www.vaisala.com/weather/products/rs92.html)

The sensor also has lag of 1 second in 6 m/s flow, 1000 mb pressure and +200C. The temperature, pressure and humidity sensors are collectively sampled at 7 times per 10 seconds. All raw data from the sonde are processed at the ground station through a DigiCORA/MARWIN processor. The DigiCORA is connected to a computer, where data can be viewed in real time throughout the launch and where the data is archived. PILOT and TEMP codes are also produced after the launch terminates. PILOT and TEMP codes, as well as raw and edited measurements were archived for each launch. The edited data is stored in a text file in delimited columns.

Before launch, the radiosonde's temperature, pressure and humidity sensors are calibrated using the Vaisala ground station calibration unit. Surface meteorological observations are also noted and recorded for each launch. Starting meteorological conditions are input into the sounding including: sea level pressure, air temperature, relative humidity, and wind speed and direction.

5.3.2 Data Summary

There were 13 balloon launches from 12 August to 07 October 2010 (Table 17).

Table 17: *Balloon launch summary for 2010.*

Date (GMT)	Time (GMT)	Tair ℃	RH (%)	P (mb)	Wind speed (kts)	Wind dir. (°true)
20100925	0600	-0.2	89	1008.1	14	020
20100925	1800	1.0	71	1000.77	23	190
20100926	0600	0.0	66	1003.13	5	320
20100926	1800	0.8	78	1005.22	9	265
20100927	0600	-1.6	79	1006.10	11	040
20100927	1800	-5.2	99	1003.18	8	207
20100928	0600	-3.6	96	1000.73	7	165
20100929	1800	-2.7	89	1000.16	5	154
20100930	1800	-0.8	68	1008.99	20	287
20101001	1800	0.7	87	1013.75	7	265
20101002	1800	0.0	98	1000.60	28	066
20101004	1800	-3.9	74	1016.41	33	087
20101005	1800	-6.3	74	1006.40	27	080

Data is transmitted at a rate of one message per second via VHF radio (~400.00MHz). Each data message reports a value for pressure, temperature and humidity data (raw PTU data). GPS strings are also transmitted, and are used to calculate upper-level wind speed and direction. All raw PTU and GPS data is used to generate an ensemble of time series data with variables and information information presented in Table 18.

Table 18: *Variable denotation header found within radiosonde data files.*

Record Name	Unit	Divisor	Offset	Description
Time	sec	1	0	Time
Pscl(ln)	Ln	1	0	(internal)
T(K)	K	10	0	Air Temperature
RH(%)	%	1	0	Relative Humidity
v(m/s)	m/s	-100	0	North-south orthogonal wind component
u(m/s)	m/s	-100	0	East-west orthogonal wind component
Height(m)	m/s	1	30000	Height above ground
P(hPa)	hPa	10	0	Barometric Pressure
TD(K)	K	10	0	Dewpoint temperature
MR(g/kg)	g/kg	100	0	Mixing ratio
DD(dgr)	dgr	1	0	Direction of wind
FF(m/s)	m/s	10	0	Wind speed
AZ(dgr)	dgr	1	0	Bearing to sonde from ground station
Range(m)	M	0.01	0	Range to sonde from ground station
Lon(dgr)	dgr	100	0	Longitude of sonde
Lat(dgr)	dgr	100	0	Latitude of sonde
puKey(bitfield_	bitfield	1	0	Internal
UsrKey(bitfield)	bitfield	1	0	Internal
RadarH(m)	m/s	1	30000	Radar reflector range to sonde (not used).

21 radiosonde profiles were flagged with quality assurance issues. The 20 that passed quality assurance are organized into folders by date, and are available In the database at:

\ATMOS\SONDE\yyyy_mm

5.3.3 Data Summary

A data visualization sample for an atmospheric sounding (Figure: 31).

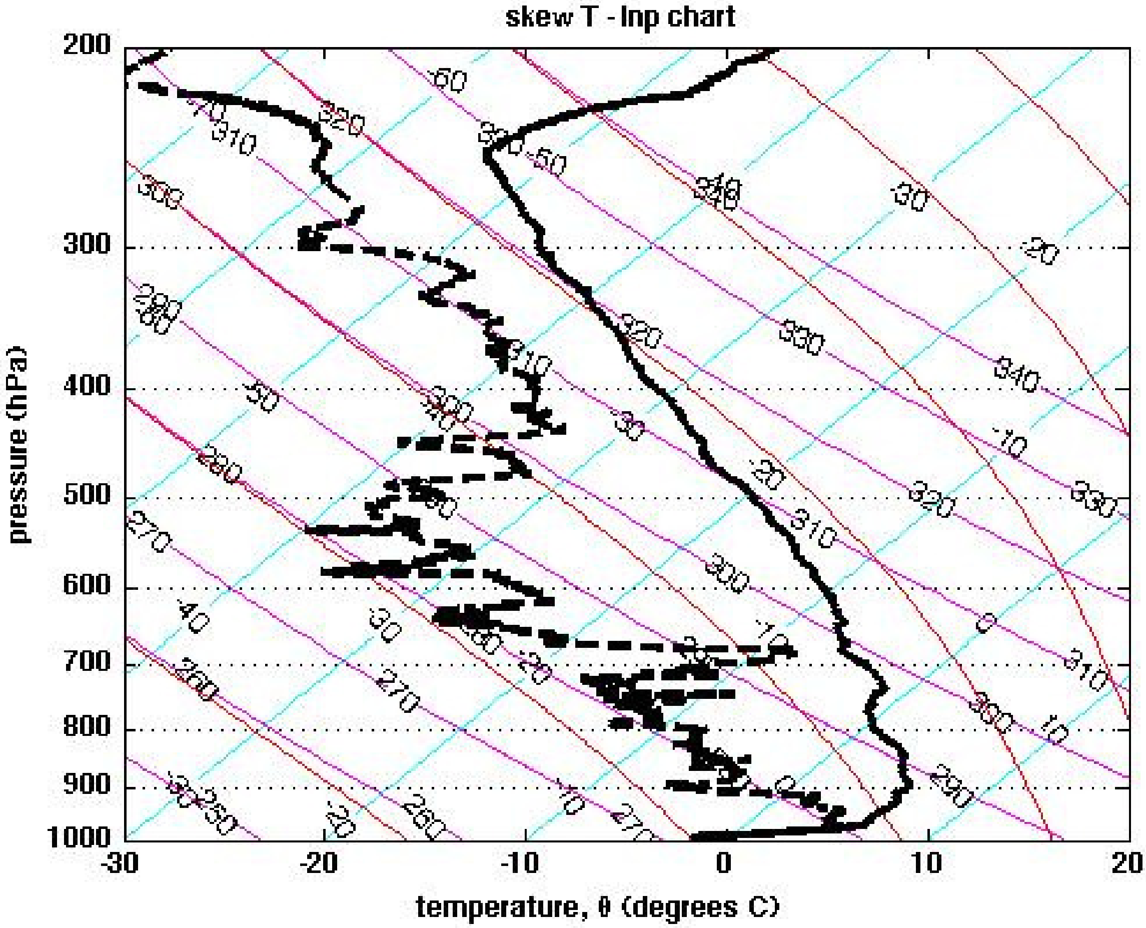

Figure 31: *Air temperature (solid) and dewpoint temperature (dashed) are presented on a SkewT-lnp chart.*

5.4 Cloud Base Height

5.4.1 Vaisala CT25K Ceilometer

The Vaisala CT25K laser ceilometer (figure 32) measures cloud heights and vertical visibilities using pulsed diode laser LIDAR (Light Detection And Ranging) technology, where short powerful laser pulses are sent out in a vertical or near-vertical direction. The laser operates at a centre wavelength of 905 ± 5 nm, a pulse width of 100 ns, beamwidth of ±0.53 mrad edge, ±0.75 mrad diagonal and a peak power of 16 W. The manufacturer suggested measurement range is 0 – 25,000ft (0 – 7.5 km), however, it has been found that high, very visible cirrostratus cloud (~18-20 kft) are consistently undetected by the unit (Hanesiak, 1998). The vertical resolution of the measurements is 50 ft, but decreases to 100 ft after ASCII data file conversion. The reflection of light backscatter caused by haze, fog, mist, virga, precipitation, and clouds is measured as the laser pulses traverse the sky. The resulting backscatter profile (i.e., signal strength versus height) is stored, processed and the cloud bases are detected. Knowing the speed of light, the time delay between the launch of the laser pulse and the backscatter signal indicates the cloud base height. The CT25K is designed to detect three cloud layers simultaneously, given suitable conditions. Besides cloud layers, it detects whether there is precipitation or other obstruction to vision. No adjustments in the field are needed. Output files were created hourly by the system and are in ASCII format. The ceilometer measurements were made in conjunction with all-sky camera measurements throughout the entire observational period. Ceilometer data was collected continuously throughout the entire 2010 cruise of the CCGS Amundsen.

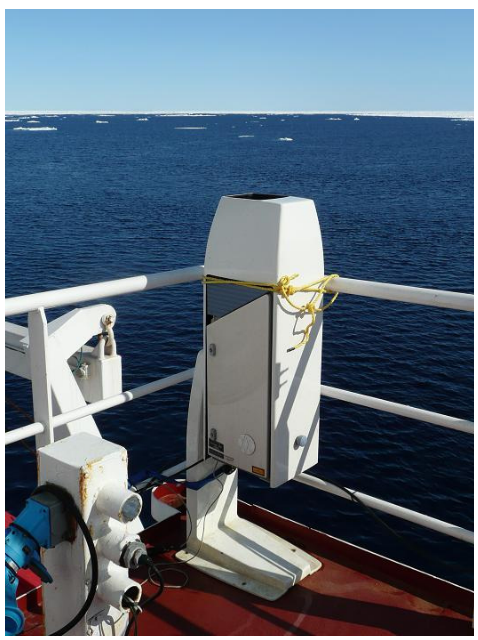

Figure 32: *Vaisala CT25K ceilometer mounted at 90° behind the wheelhouse.*

5.4.2 Data Summary

The ceilometer was running continuously from 01 July 2010 – 19 October 2010, and daily data files are available for the entire period.

Ceilometer files are available as processed ASCII daily files.

The Processed files are available at

\ATMOS\CEIL\PROCESSED

Daily filenames follow the naming convention:

CEIL_YYYY_MM_DD.csv

The file header information is defined in Table 19:

Table 19: *Ceilometer *.CSV file header*

Header	Description	Units
J_day	Julian day of year	n/a
Year	Year	n/a
Month	Month	n/a
Day	Day	n/a
Hour	Hour	n/a
Min	Minute	n/a
Sec	Seconds	n/a
Lat	Latitude	decimal deg (DD.DDDDD)
Lon	Longitude	decimal deg (DDD.DDDDD)
SOG	Speed over ground	Nm / hr
COG	Course over ground	Degrees (°)
Layer1	Cloud layer base height 1	Ft
Layer2	Cloud layer base height 2	Ft
Layer3	Cloud layer base height 3	Ft

5.4.3 Data Visualization

Ceilometer data for September 2010 is visualized in figure 33.

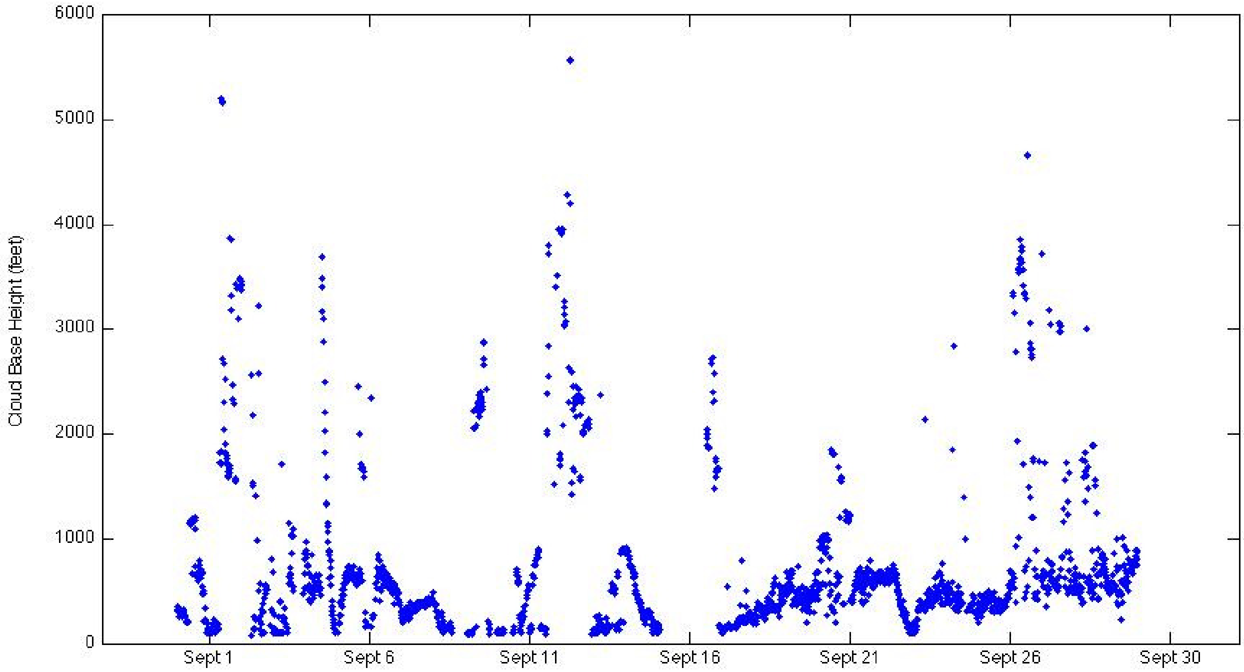

Figure 33: *Detected ceilometer cloud-base heights for September 2010.*

5.5 All-Sky Camera Imagery

5.5.1. Instrumentation

The all-sky camera system takes images of the sky and cloud cover. The system consists of a Nikon D-90 camera outfitted with fish-eye lenses with a viewing angle of 160 degrees, mounted in a heated weather-proof enclosure. The camera is programmed to take pictures using an external intervalometer set at 15-minute intervals, or 96 images per day. The system is mounted in a small 'crow's nest' immediately above the ship's wheelhouse (figure 34).

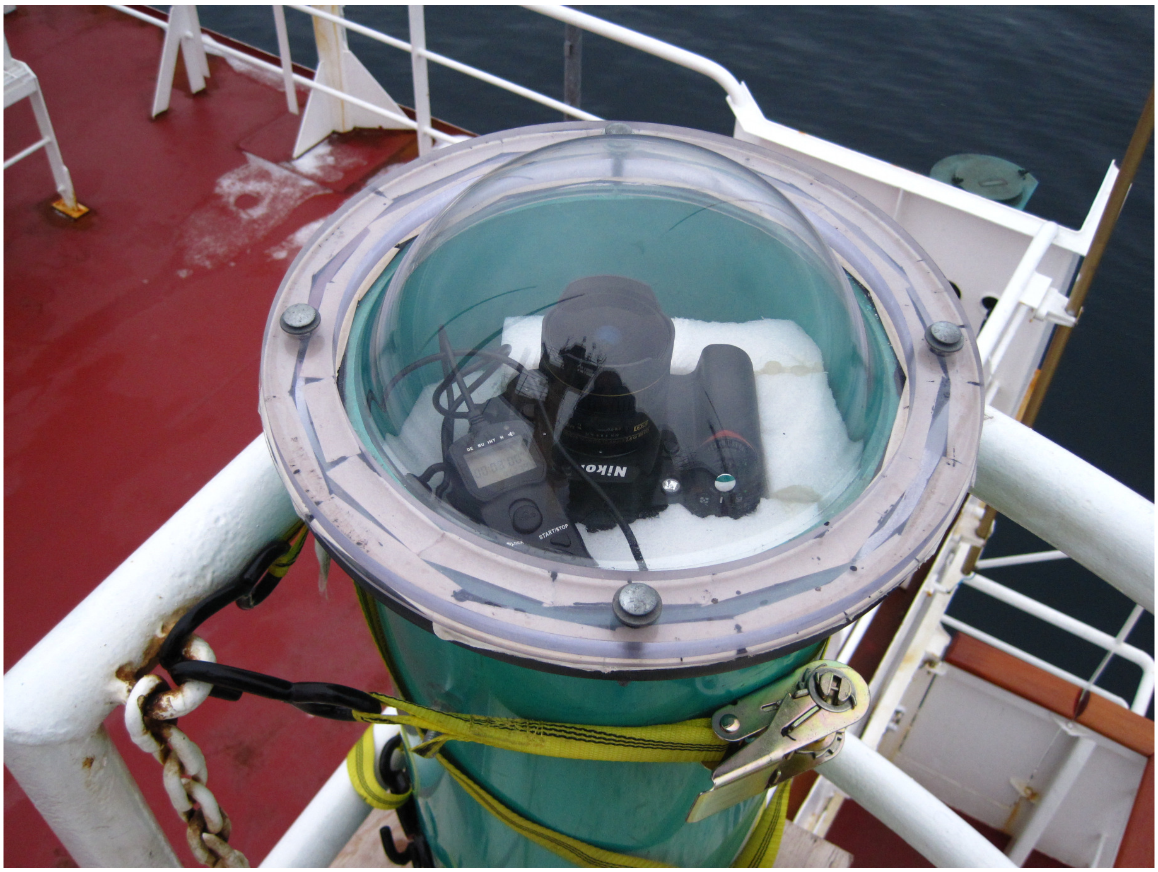

Figure 34: *Nikon D-90 Camera with fisheye lenses attached in a weatherproof enclosure.*

Imagery collection started on 04 July 2010, and was continuous through to 22 October. Gaps in the data are due to routine maintenance and setting adjustments due to the changing light. The camera was set to have an aperture of f-12 with a variable exposure time. This allowed for low light or night time images to be taken.

All-sky imagery is found in the database at:

\ATMOS\ALLSKY\YYYY-MM-DD

5.5.2 Data Visualization

A example all-sky image showing 6/8 broken cloud cover is shown in figure 35.

Figure 35: *An all-sky camera image showing partial cloud coverage.*

5.6 Manual Meteorological Observations

5.6.1 Instrumentation

Manual meteorological observations were conducted at 3-hour intervals throughout the entire 2010 field season, except for at night when observers were sleeping. There is a gap in observations starting from 26 August to 22 September 2010 due to no observers onboard at the time. Observations included current conditions with relation to precipitation type and intensity, visibility, cloud cover (octets), and sea ice coverage (tenths). Basic meteorological values were read and recorded from the onboard weather station, which is owned and operated by the Meteorological Service of Canada. Visibility, cloud octets, sea ice concentration, and precipitation type and intensity observations are subjective based on the observer. If the cloud coverage was not 100% it was not recorded at 8/8, similarly if the coverage has even 1% of clouds the cloud fraction was not recorded as 0/8.

The CCGS *Amundsen* is equipped with an AXYS Automated Voluntary Observation Ship (AVOS), with all sensors located on the roof of the wheelhouse. The AVOS is an interactive environmental reporting system that allows for the hourly transmission of current meteorological conditions to a central land station via Iridium satellite telemetry. Temperatures (air and sea surface), pressure, relative humidity (RH), wind speed, wind direction, and current GPS location are updated every ten minutes and displayed on a computer monitor located in the wheelhouse of the ship. The AVOS deploys a Rotronics MP 101A sensor for temperature and RH, with a resolution of 0.1ºC and an accuracy of ± 0.3ºC, and a 1% ± 1% accuracy for temperature and RH, respectively. Atmospheric pressure was obtained from a Vaisala PTB210 sensor with a 0.01mb resolution and an accuracy of ±0.15 mb. Wind speed and direction is collected from an RM Young 05103 anemometer, accurate to ±3º in direction and ±0.3 m/s.

5.6.2 Data Summary

Table 20: *Parameters recorded by the observer.*

Parameter	**Units**
Date	UTC
Time	UTC
Latitude	decimal degrees
Longitude	decimal degrees
Temperature	ºC
Relative Humidity	%
Wind Speed	Kts
Wind Direction	º
Precipitation Type	snow, rain etc
Precipitation Intensity	Heavy, moderate, light etc.
Visibility	Nm
Cloud Fraction	Octets
Sea Ice Concentration	Tenths

The manual meteorological observations are available in the database at :

\ATMOS\MANOBS

SECTION SIX: OTHER CRUISE DATA

6.1 GPS Position

NMEA RMC Strings collected by the CCGS *Amundsen's* DGPS system for the entire field season are processed into daily files, at minute and second intervals.

ASCII files (*.dat extension) are found in the database for 1 minute resolution at:

\OTHER\NAV\GPS_RMC\RMC_DAILY_1min

and for 1 second resolution at:

\OTHER\NAV\GPS_RMC\RMC_DAILY_1sec

File naming convention is as follows for 1 minute resolution:

\1min_RMC_2010_JDxxx_MMDD.dat

and for 1 second resolution:

\RMC_2010_JDxxx_MMDD.dat

Where: JDxxx corresponds to the julien day, and MMDD is month and day.

File header:

(Dates and times are in UTC).
Year:
Month:
Day:
Hour:
Min: Minute
Sec: Second
Lat: Latitude (decimal degrees)
Lon: Longitude (decimal degrees)
SOG: Speed over ground (nm / hr)
COG: Course over ground (degrees)
SOG_ST: (standard deviation of speed over ground
COG_ST: (standard deviation of course over ground

6.2 Gyronometer

The CCGS *Amundsen's* Gyronometer provides ship heading.

ASCII files (*.dat extension) are found in the database at 1 minute resolution:

> **\OTHER\NAV\GYRO\GYRO _DAILY_1min**

and at 1 second resolution:

> **\OTHER\NAV\ GYRO\GYRO _DAILY_1sec**

File naming convention is as follows for 1 minute resolution:

> **\1min_ GYRO _2010_JDxxx_MMDD.dat**

and for 1 second resolution:

> **\GYRO _2010_JDxxx_MMDD.dat**

Where: JDxxx corresponds to the julien day, and MMDD is month and day.

File header:

(Dates and times are in UTC).
Year:
Month:
Day:
Hour:
Min: Minute
Sec: Second
Heading: heading (degrees)

6.3 Science Logs

The bridge staff of the CCGS *Amundsen* kept a written log of all science activities. For each science entry in the log, date (LST and GMT), geographic position (degree, decimal-minutes, and decimal degrees), depth, and basic meteorological variables including air temperature, relative humidity, wind speed and direction, and sea ice concentration are recorded. The science logs are also available in this document in Appendix A.

These science logs are also available as digital files in the database at:

\OTHER\SCIENCE LOGS

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APPENDIX A: SHIP SCIENCE ACTIVITY LOGS

Station_ID	Date	Hour	Latitude	Longitude	Cap	Activities	Depth (m)	Winds Dir	T° Air © Speed (kts)		T°water ©	P Baro	Hum (%)	Ice
312 (N)	8/10/2010	01 45	69°09.46N	100°42.06W	45	Contaminents Hg Flux	48.9	50	12	3.70	3.80	1012.20	99	eaux bergées
312 (N)	8/10/2010	01 55	69°09.50N	100°42.11W	51	PNF et Secchi ↓↑	48	50	13	3.20	3.60	1011.90	99	eaux bergées
312 (N)	8/10/2010	02 04	69°09.63N	100°41.78W	38	Rosette 2 ↓	49.5	50	14	3.60	3.60	1012.00	99	eaux bergées
312 (N)	8/10/2010	02 30	69°10.00N	100°41.07W	47	Rosette 2 ↑	55.3	50	11	3.40	3.50	1012.00	99	eaux bergées
312 (N)	8/10/2010	02 37	69°10.08N	100°40.92W	47	Surface Water Pumping ↓	66	50	13	3.40	3.50	1012.00	99	eaux bergées
312 (N)	8/10/2010	03 05	69°10.44N	100°40.11W	37	Surface Water Pumping ↑	52.6	40	13	3.30	3.40	1012.00	99	eaux bergées
312 (N)	8/10/2010	04 25	69°09.736N	100°41.682W	35	Rosette 1 ↓	51.9	51	12	3.20	3.30	1011.80	99	eaux bergées
312 (N)	8/10/2010					Rosette 1 Cancellé								eaux bergées
312 (N)	8/10/2010	04 46	69°09.534N	100°42.046W	27	Contaminents Hg Flux	48	59	12	3.10	3.30	1011.70	99	eaux bergées
312 (N)	8/10/2010	05 05	69°09.572N	100°42.093W	55	Monster Net↓	49	60	12	3.30	3.60	1011.60	99	eaux bergées
312 (N)	8/10/2010	05 10	69°09.592N	100°42.068W	68	Monster Net↑	47	60	12	3.30	3.60	1011.60	99	eaux bergées
312 (N)	8/10/2010	05 31	69°09.45N	100°42.559W	320	Oblique Net ↓	47	65	13	4.00	3.70	1011.50	99	eaux bergées
312 (N)	8/10/2010	05 37	69°09.628N	100°41.997W	300	Oblique Net↑	47	65	13	4.00	3.70	1011.50	99	eaux bergées
312 (N)	8/10/2010	05 48	69°09.715N	100°41.907W	68	Bongo Net ↓	50	65	11	4.00	3.80	1011.50	99	eaux bergées
312 (N)	8/10/2010	05 53	69°09.754N	100°41.843W	67	Bongo Net ↑	52	65	11	4.00	3.80	1011.50	99	eaux bergées
312 (N)	8/10/2010	06 24	69°10.097N	100°41.114W	66	Box Core ↓	58	75	11	3.80	3.80	1011.50	99	eaux bergées
312 (N)	8/10/2010	06 25	69°10.127N	100°41.079W	68	Box Core Fond	62	73	12	3.80	3.80	1011.50	99	eaux bergées
312 (N)	8/10/2010	06 28	69°10.150N	100°41.039W	78	Box Core ↑	66	73	12	3.80	3.80	1011.50	99	eaux bergées
312 (N)	8/10/2010	06 48	69°10.030N	100°41.59W	320	Agassiz ↓	52	73	12	3.80	3.80	1011.50	99	eaux bergées
312 (N)	8/10/2010	06 54	69°10.101N	100°41.903W	300	Agassiz ↑	57	73	12	3.80	3.80	1011.50	99	eaux bergées
314	8/10/2010	18 30	69°00.133N	106°36.343W	280	PNF ↓	115	281	8	17.00	9.10	1006.40	72	eaux libres
314	8/10/2010	18 36	69°00.154N	106°36.351W	267	PNF ↑	115	281	8	17.00	9.10	1006.40	72	eaux libres
314	8/10/2010	18 37	69°00.154N	106°36.351W	264	Secchi ↓	115	281	8	17.00	9.10	1006.40	72	eaux libres
314	8/10/2010	18 40	69°00.168N	106°36.406W	270	Secchi ↑	116	281	8	17.00	9.10	1006.40	72	eaux libres
314	8/10/2010	18 42	69°00.168N	106°36.406W	269	Bongo Net ↓	116	283	8	16.80	9.40	1006.30	69	eaux libres
314	8/10/2010	18 46	69°00.182N	106°36.431W	284.3	Bongo Net ↑	115	283	8	16.80	9.40	1006.30	69	eaux libres
314	8/10/2010	20 04	69°00.17N	106°35.94W	150	Rosette ↓	114	calme	calme	15.40	8.90	1006.20	75	eaux libres
314	8/10/2010	20 27	69°00.22N	106°35.65W	165	Rosette ↑	116	130	5	15.90	9.20	1006.20	74	eaux libres
314	8/15/2010	00 00	70°46.53N	134°23.12W	111	Surface Water Pumping ↓	68	110	9	7.10	10.67	1027.13	96	eaux libres
314	8/15/2010	00 45	70°46.51N	134°23.25W	100.6	Surface Water Pumping ↑	72.3	109.1	9.1	7.10	10.50	1027.30	96	eaux libres
314	8/15/2010	00 52	70°46.52N	134°23.26W	94	CTD Rosette ↓	72.5	109	9.1	7.10	10.50	1027.30	97	eaux libres
314	8/15/2010	01 19	70°46.62N	134°23.32W	73	CTD Rosette ↑	67	110	9.1	7.10	10.50	1027.30	97	eaux libres
314	8/15/2010	01 38	70°46.64N	134°23.29W	130.2	Monster Net↓	71.2	117	9.1	7.10	10.50	1027.10	96	eaux libres
314	8/15/2010	01 42	70°46.65N	134°23.34W	127	Monster Net -	71.2	117	9.1	7.10	10.50	1027.10	96	eaux libres
314	8/15/2010	01 45	70°46.66N	134°23.39W	121	Monster Net↑	71.2	117	9.1	7.10	10.50	1027.10	96	eaux libres
314	8/15/2010	02 04	70°46.70N	134°23.23W	111	Tucker ↓	67.5	116	10	7.80	10.50	1027.10	96	eaux libres
314	8/15/2010	02 17	70°46.93N	134°23.46W	228	Tucker ↑	67.3	115	10	7.80	10.50	1027.10	96	eaux libres
314	8/15/2010	02 59	70°46.74N	134°23.33W	115	Box Core ↓	68.7	121	9.1	7.80	10.60	1027.20	95	eaux libres
314	8/15/2010	03 10	70°46.75N	134°23.30W	144	Box Core -	68.4	122	9.1	7.80	10.60	1027.20	96	eaux libres
314	8/15/2010	03 21	70°46.75N	134°23.30W	152	Box Core ↑	68.3	122	9.1	7.80	10.60	1027.20	96	eaux libres
314	8/15/2010	03 28	70°46.82N	134°23.08W	086	Agassiz ↓	68.8	112	9.2	8.10	10.60	1027.30	94	eaux libres
314	8/15/2010	03 57	70°46.77N	134°23.26W	100	Agassiz ↑	68.7	113	9.2	8.10	10.60	1027.30	94	eaux libres
314	8/15/2010	05 20	70°18.294N	134°19.749W	274		70	117	10	9.00	10.50	1027.40	89	eaux libres
314	8/15/2010	05 55	70°50.80N	134°32.89W	249		78	118	9	8.20	10.40	1027.50	96	eaux libres
314	8/15/2010	06 17	70°52.24N	134°28.40W	005		80	129	12	8.10	10.40	1027.30	97	eaux libres
314	8/15/2010	06 55	70°53.31N	134°46.06W	324		107	118	9	7.10	10.30	1027.40	98	eaux libres
314	8/15/2010	08 07	70°53.393N	135°22.44W	114		525	110	12	7.60	10.00	1027.30	98	eaux libres
314	8/15/2010	08 51	71°00.311N	135°22.549W	115		640	114	11	8.10	9.80	1027.20	93	eaux libres
314	8/15/2010	09 57	70°55.932N	134°58.478W	112		345	105	12	9.10	9.87	1027.30	89	eaux libres
314	8/15/2010	10 24	70°55.855N	134°46.458W	095		228	113	15	9.10	9.82	1027.00	88	eaux libres
314	8/15/2010	10 48	70°55.338N	134°45.986W	112		304	105	14	8.80	9.81	1027.40	90	eaux libres
314	8/15/2010	11 19	70°55.845N	134°32.933W	095		101	117	14	9.00	9.73	1027.28	88	eaux libres
314	8/15/2010	11 51	70°53.271N	134°17.950W	103		79	115	13	8.90	10.19	1027.30	87	eaux libres
314	8/15/2010	13 00	70°54.031N	134°16.550W	109	Rosette ↓	89	118	15	8.90	10.20	1027.80	87	eaux libres
314	8/15/2010	13 05	70°54.06N	134°16.50W	113	Rosette ↑	89	118	15	8.90	10.20	1027.80	87	eaux libres
314	8/15/2010	14 10	70°53.97N	134°15.608W	074	Movillage recupere Debut	89	110	16	9.10	11.48	1027.60	82	eaux libres
314	8/15/2010	14 25	70°53.99N	134°16.02W	065	Movillage recupere Fin	89	110	16.0	9.10	11.40	1027.60	82	eaux libres
314	8/15/2010	14 50	70°50.72N	134°06.99W	110		82	105	17	9.10	12.30	1027.60	84	eaux libres
314	8/15/2010	16 14	70°55.38N	134°26.62W	359	Rosette ↓	96	100	15	9.80	11.12	1027.60	79	eaux libres
314	8/15/2010	16 38	70°55.49N	134°27.06W	340	Rosette ↑	93	120	20	10.70	10.90	1027.50	79	eaux libres
314	8/15/2010	16 59	70°55.44N	134°25.92W	297	Monster Net↓	98	111	18	9.30	10.90	1027.00	83	eaux libres
314	8/15/2010	17 09	70°55.50N	134°25.98W	312	Monster Net↑	98	102	18	9.30	9.30	1027.00	83	eaux libres

314	8/15/2010	17 25	70°55.65N	134°25.22W	273	Tucker ↓	100	124	18	13.00	10.70	1027.00	69	eaux libres
314	8/15/2010	17 40	70°55.40N	134°26.52W	138	Tucker ↑	95	120	17	10.00	10.60	1026.90	83	eaux libres
314	8/15/2010	18 12	70°55.46N	134°26.24W	240	Box Core #1↓	96	113	17	11.00	10.60	1026.70	81	eaux libres
314	8/15/2010	18 20	70°55.52N	134°26.44W	214	Box Core #1↑	103	110	20	9.50	10.60	1026.00	83	eaux libres
314	8/15/2010	18 34	70°55.47N	134°25.84W	229	Box Core #2↓	98	110	17	9.60	10.80	1026.30	83	eaux libres
314	8/15/2010	18 43	70°55.55N	134°25.90W	001	Box Core #2↑	100	110	20	9.60	10.80	1026.40	80	eaux libres
314	8/15/2010	19 01	70°55.76N	134°26.10W	302	Agassiz ↓	101	090	17	10.90	10.70	1026.30	76	eaux libres
314	8/15/2010	19 24	70°55.91N	134°26.32W	266	Agassiz ↑	112	111	19	10.00	10.70	1026.20	77	eaux libres
314	8/15/2010	21 15	70°58.9238N	134°22.75W	306	CTD Rosette ↓	259	93	18	10.90	10.93	1025.54	71	eaux libres
314	8/15/2010	21 56	70°58.94N	134°23.11W	292	CTD Rosette ↑	255	99	22	13.60	11.12	1025.40	65	eaux libres
314	8/15/2010	22 28	70°59.051N	134°23.461W	222	Horizontal Tucker ↓	272	107	23	10.20	11.17	1025.30	73	eaux libres
314	8/15/2010	22 41	70°59.120N	134°23.921W	125	Horizontal Tucker ↑	259	101	21	8.90	11.90	1025.00	77	eaux libres
314	8/15/2010	22 58	70°59.262N	134°23.017W	302	Vertical Monster Net↓	272	96	22	9.00	11.97	1024.85	77	eaux libres
314	8/15/2010	23 17	70°59.305N	134°23.177W	306	Vertical Monster Net↑	273	099	24	12.30	11.83	1025.04	68	eaux libres
314	8/15/2010	23 47	70°59.017N	134°22.913W	305	Box Core↓	260	098	21	9.80	11.54	1024.56	78	eaux libres
314	8/15/2010	23 54	70°59.04N	134°23.00W	308	Box Core Au Fond	260	104	11	10.90	11.80	1024.80	73	eaux libres
314	8/15/2010	23 57	70°59.06N	134°23.05W	310	Box Core↑	260	104	11	10.90	11.80	1024.80	73	eaux libres
314	8/16/2010	00 11	70°59.09N	134°23.05W	306	Box Core↓	263	104	11	10.90	11.80	1024.80	73	eaux libres
314	8/16/2010	00 15	70°59.10N	134°23.09W	310	Box Core -	263	104	11	10.90	11.80	1024.80	73	eaux libres
314	8/16/2010	00 27	70°59.12N	134°23.17W	305	Box Core↑	263	104	11	10.90	11.80	1024.80	73	eaux libres
314	8/16/2010	00 39	70°59.15N	134°23.33W	300	Agassiz ↓	263	103	13	10.90	11.80	1024.90	73	eaux libres
314	8/16/2010	01 30	70°58.56N	134°28.39W	180	Agassiz ↑	266	100.9	13.5	13.10	11.50	1024.50	71	eaux libres
314	8/16/2010	02 15	71°00.58N	134°39.82W	308	Rosette ↓	333	113	19.4	10.30	12.00	1024.30	83	eaux libres
314	8/16/2010	03 10	71°00.64N	134°40.42W	299	Rosette ↑	336	115	13.1	10.20	11.70	1024.90	83	
314	8/16/2010	03 20	71°00.81N	134°41.33W	317	Tucker ↓	342	114	13.1	10.20	11.70	1023.70	83	
314	8/16/2010	03 40	71°00.73N	134°41.99W	232	Tucker ↑	354	115	13.2	10.20	11.70	1023.40	83	
314	8/16/2010	03 55	71°00.53N	134°40.22W	302	Monster Net↓	335	116	19.1	10.50	11.90	1022.80	83	
314	8/16/2010	04 26	71°06.63N	134°40.83W	174	Monster Net↑	343	105	25	10.10	11.80	1022.90	86	
314	8/16/2010	04 58	71°00.54N	134°40.08W	317	Box Core↑	334	103	25	11.00	11.70	1022.70	82	
314	8/16/2010	05 20	71°00.67N	134°40.72W	295	Box Core↓	345	113	24	10.00	11.80	1022.60	85	
314	8/16/2010	05 37	71°00.74N	134°41.07W	329	Agassiz ↓	347	110	24	10.20	11.80	1022.60	89	
314	8/16/2010	06 47	71°02.00N	134°42.64W	351	Agassiz ↑	400	120	25	9.60	11.90	1021.90	89	
314	8/16/2010	08 57	70°53.74N	134°14.9W	337	Rosette ↓	80	111	27	10.60	10.70	1019.00	82	
314	8/16/2010	09 25	70°53.81N	134°15.64W	332	Rosette ↑	81	109	24	10.90	10.30	1021.40	85	
314	8/16/2010	09 37	70°53.81N	134°15.64W	302	Tucker ↓	80	117	19	10.80	10.53	1021.27	84	
314	8/16/2010	09 47	70°53.767N	134°15.684W	269	Tucker ↑	81	125	22	10.60	10.56	1021.05	83	
314	8/16/2010	09 59	70°53.785N	134°15.129W	303	Monster Net↓	81	116	21	10.60	10.54	1021.10	84	
314	8/16/2010	10 05	70°53.813N	134°15.184W	308	Monster Net↑	81	112	23	10.60	10.54	1021.10	84	
314	8/16/2010	10 34	70°53.704N	134°15.080W	302	Box Core #1↑	80	114	25	13.80	10.19	1021.05	73	
314	8/16/2010	10 36	70°53.699N	134°15.095W	306	Box Core #1 -	80	108	23	13.80	10.19	1021.05	73	
314	8/16/2010	10 39	70°53.686N	134°15.093W	309	Box Core # 1↓	79	112	21	13.80	10.17	1020.90	77	
314	8/16/2010	10 55	70°53.671N	134°15.298W	302	Box Core #2↑	80	115	25	12.00	10.27	1020.82	79	
314	8/16/2010	10 57	70°53.667N	134°15.321W	302	Box Core #2 -	79	111	25	12.00	10.27	1020.82	79	
314	8/16/2010	11 00	70°53.667N	134°15.350W	291	Box Core # 2↓	79	111	22	13.60	10.22	1020.81	74	
314	8/16/2010	11 17	70°53.635N	134°15.149W	315	Agassiz Trawl↓ (non completé)	80	103	24	10.90	10.17	1020.68	84	
314	8/16/2010	11 19	70°53.653N	134°15.230W	349	Agassiz Trawl↑ (peite de propolsion (?))	80	114	24	10.90	10.17	1020.68	84	
314	8/16/2010	11 22	70°53.699N	134°15.444W	284	Agassiz Trawl #2↓	80	116	20	12.70	10.15	1020.65	76	
314	8/16/2010	11 35	70°53.752N	134°16.853W	242	Agassiz Trawl #2↑	81	116	23	11.10	10.26	1020.58	84	
314	8/16/2010	14 34	70°53.85N	134°15.65W	290	Mooring\Movilage	82	110	21	12.90	13.00	1017.50	73	
314	8/16/2010	20 15	70°54.0198N	134°16.3286W	303	CTD Rosette ↓	81	102	24	13.70	13.14	1016.99	76	
314	8/16/2010	20 23	70°53.9970N	134°16.3869W	291	CTD Rosette ↑	82	109	24	14.40	13.15	1016.88	71	
314	8/16/2010	23 09	71°09.143N	135°38.359W	301	Water Sampling ↓	962	106	26	11.10	5.80	1014.97	81	
314	8/16/2010	23 55	71°09.04N	135°38.55W	283	Water Sampling ↑	925	108	24	9.20	4.70	1014.70	86	
314	8/17/2010	00 05	71°09.04N	135°38.63W	247	Rosette ↓	925	109	24	9.20	4.70	1014.70	86	
314	8/17/2010	00 49	71°09.82N	135°30.10W	281	Rosette ↑	906	106	26	9.10	4.70	1014.70	85	
314	8/17/2010	01 09	71°09.46N	135°39.27W	302	Tucker ↓	967	112	19	9.40	4.10	1014.20	88	
314	8/17/2010	01 21	71°09.35N	135°40.95W	253	Tucker ↑	953	105	22.9	9.70	3.70	1014.10	85	
314	8/17/2010	01 37	71°09.20N	135°40.83W	264	Monster Net↓	943	104	23	9.00	3.60	1013.90	87	
314	8/17/2010	02 55	71°98.85N	135°41.54W	292	Monster Net↑	944	105	22	8.70	3.50	1013.90	86	
314	8/17/2010	03 05	71°09.32N	135°39.23W	244	Rosette ↓	923	103	26	9.50	3.40	1013.10	86	
314	8/17/2010	04 41	71°09.13N	135°40.33W	285	Rosette ↑	932	117	22	9.40	3.20	1012.98	86	
314	8/17/2010	05 09	71°09.39N	135°39.30W	280	Box Core↓	932	119	26	9.80	3.10	1012.70	84	
314	8/17/2010		71°09.35N	135°39.08W	268	Box Core FOND	945	119	26	9.20	2.30	1012.60	86	
314	8/17/2010	06 02	71°09.37N	135°40.22W	296	Box Core↑	950	121	23	9.50	2.80	1012.00	83	
314	8/17/2010	06 29	71°09.35N	135°33.77W	307	Agassiz ↓	945	108	27	12.20	3.30	1013.04	79	
314	8/17/2010	07 45	71°08.67N	135°44.65W	232	Agassiz ↑	981	114	26	8.90	6.20	1011.30	85	
314	8/17/2010	08 01	71°08.862N	135°44.664W	116	Surface Temp Buoy	982	108	24					
314	8/17/2010	10 19	70°55.178N	134°51.188W	298	Water Sampling ↓	248	107	25	11.20	10.18	1010.16	81	

314	8/17/2010	11 00	70°55.285N	134°51.765W	305	Water Sampling ↑	256	100	29	10.80	10.42	1009.37	82	
314	8/17/2010	11 06	70°55.3131N	134°51.0503W	309	CTD Rosette ↓	258	094	28	10.80	10.42	1009.37	82	
314	8/17/2010	11 33	70°55.2623N	134°52.7789W	312	CTD Rosette ↑	262	098	28	12.70	10.70	1009.34	77	
314	8/17/2010	12 25	70°55.08N	134°51.22W	290	Tucker ↓	242	112	23	11.00	11.00	1008.90	82	
314	8/17/2010	12 45	70°55.11N	134°52.83W	290	Tucker ↑	261	110	26	11.00	11.10	1008.90	83	
314	8/17/2010	12 52	70°55.15N	134°53.04W	293	Monster Net↓	261	110	25	11.10	10.90	1006.30	82	
314	8/17/2010	13 15	70°55.16N	134°53.11W	300	Monster Net↑	262	105	25	14.00	10.00	1008.40	71	
314	8/17/2010	13 36	70°55.12N	134°51.48W	302	Rosette ↓	248	107	27	14.00	10.10	1008.40	71	
314	8/17/2010	14 09	70°55.11N	134°51.63W	296	Rosette ↑	247	105	33	14.00	10.60	1008.00	72	
314	8/17/2010	14 32	70°55.09N	134°51.59W	299	Box Core↓	246	105	30	13.40	10.60	1007.70	75	
314	8/17/2010	14 36	70°55.10N	134°51.59W	298	Box Core -	246	105	30	13.40	10.60	1007.70	75	
314	8/17/2010	14 40	70°55.11N	134°51.53W	295	Box Core↑	247	105	30	13.40	10.60	1007.70	75	
314	8/17/2010	15 06	70°55.03N	134°51.67W	225	Agassiz ↓	246	127	25	13.90	10.60	1006.90	76	
314	8/17/2010	15 31	70°55.05N	134°54.80W	244	Agassiz ↑	357	180	22	11.40	10.75	1007.00	82	
GLACE	8/18/2010	10 40	71°47.65N	136°43.43W	009	EM Scan	2102	100	20	3.20	1.11	1008.70	95	8/10
GLACE	8/18/2010	17 28	71°00.16N	135°31.74W	275	CTD Rosette ↓	734	81	15.7	10.30	9.00	1010.60	85	
GLACE	8/18/2010	18 00	71°00.17N	135°32.24W	270	CTD Rosette ↑	738	81	15.7	10.30	9.00	1010.60	85	
GLACE	8/18/2010	19 10	71°00.152N	135°28.738W	270	Debut Recuperation (mooring G - 09)	701	88	19	12.00	11.10	1011.30	77	
GLACE	8/18/2010	19 45	71°00.28N	135°28.969W	287	Fin Recuperation (G-09)	701	88	19	12.60	11.50	1011.50	77	
	8/18/2010	21 19	71°04.90N	135°33.65W	267	Water Pumping ↓	843	86	15	9.50	10.38	1012.20	88	
	8/18/2010	22 05	71°05.065N	135°33.587W	260	Water Pumping ↑	844	90	18	9.70	10.33	1012.32	88	
	8/18/2010	22 13	71°05.1120N	135°33.5814W	256	Rosette ↓	843	90	20	10.10	10.26	1012.43	87	
	8/18/2010	22 55	71°05.2911N	135°33.5814W	281	Rosette ↑	842	77	21	12.10	10.20	1012.74	79	
	8/18/2010	23 14	71°05.310N	135°33.699W	294	Horizontal ↓	845	90	21	10.90	10.24	1012.92	85	
	8/18/2010	23 28	71°05.334N	135°35.262W	247	Horizontal ↑	860	96	22	11.70	10.29	1013.07	88	
	8/18/2010	23 48	71°04.998N	135°33.556W	264	Vertical (Monster)↓	841	88	15	10.70	10.32	1013.15	83	
	8/19/2010	00 40	71°05.33N	135°33.42W	277	Vertical (Monster)↑	842	180	21	11.30	9.90	1013.17	81	
	8/19/2010	01 43	71°05.20N	135°33.33W	285	Rosette ↓	839	97	22	9.20	10.20	1013.40	89	
	8/19/2010	3 21	71°05.33N	135°33.25W	298	Rosette ↑	843	80	13	11.50	10.00	1014.90	80	
	8/19/2010	03 31	71°05.12N	135°34.95W	331	Agassiz ↓	856	97	15	8.90	10.00	1014.90	86	
	8/19/2010	05 30	71°04.17N	135°42.88W	225	Agassiz ↑	886	92	21	8.80	10.00	1015.40	86	
	8/19/2010	06 13	71°05.16N	135°33.67W	258	Box Core↓	846	99	20	9.00	10.30	1015.40	86	
	8/19/2010	06 30	71°05.26N	135°34.04W	262	Box Core Fond	848	46	21	8.60	10.00	1015.70	86	
	8/19/2010	06 45	71°05.33N	135°34.27W	282	Box Core↑	851	86	19	8.60	10.00	1015.80	86	
	8/19/2010	08 31	71°01.789N	134°48.485W	290	Rosette ↓	442	77	19	8.7	10.39	1016.38	85	
	8/19/2010	09 24	71°01.7675N	134°48.2367W	285	Rosette ↑	432	80	16	10.3	10.21	1016.59	75	
	8/19/2010	09 35	71°01.759N	134°48.871W	265	Tucker ↓	442	83	17	11.7	10.23	1016.61	71	
	8/19/2010	09 48	71°01.592N	134°50.112W	220	Tucker ↑	448	91	17	12.2	10.25	1016.64	70	
	8/19/2010	10 05	71°01.767N	134°48.567W	255	Monster Net↓	442	85	16	9.9	10.36	1016.66	78	
	8/19/2010	10 34	71°01.855N	134°48.686W	261	Monster Net↑	442	77	17	8.8	10.26	1016.83	84	
	8/19/2010	12 58	71°01.77N	134°48.06W	285	Box Core↓	442	70	12	9.3	10.50	1017.2	81	
	8/19/2010	13 41	71°01.74N	134°48.01W	268	Box Core Fond	432	71	10	11.4	10.60	1017.7	75	
	8/19/2010	13 49	71°01.77N	134°48.01W	292	Box Core↑	430	71	10	11.4	10.60	1017.7	74	
	8/19/2010	14 07	71°01.75N	134°48.02W	292	Box Core↓	432	72	8	10.3	11.00	1017.8	79	
	8/19/2010	14 17	71°01.74N	134°48.01W	298	Box Core Fond	430	72	8	10.3	11.00	1017.8	79	
	8/19/2010	14 25	71°01.75N	134°48.06W	296	Box Core↑	433	76	9.4	11.2	11.30	1017.9	77	
	8/19/2010	14 35	71°01.86N	134°49.30W	208	Agassiz ↓	449	79	7.6	10.4	11.40	1018	78	
	8/19/2010	15 15	71°01.74N	134°49.61W	201	Agassiz ↑	437	7.8	7.6	9	10.90	1017.8	77	
	8/19/2010		71°N	134°W		Met Ocean Buoy Debut ↓		66	15.4	9.1	11.00	1018.13	87	
	8/19/2010					Fin Ocean Buoy								
	8/20/2010	20 58	70°51.830N	134°45.864W	181	Water Pumping ↓	90	10	16	7.6	11.00	1015.48	84	
	8/20/2010	21 38	70°51.714N	134°46.053W	192	Water Pumping ↑	87	012	17	8.5	11.10	1015.52	83	
	8/20/2010	21 44	70°51.723N	134°46.141W	207	Rosette ↓	88	350	22	9.4	11.17	1015.49	83	
	8/20/2010	22 14	70°51.697N	134°46.214W	194	Rosette ↑	88	359	21	10.3	11.20	1015.30	78	
	8/20/2010	22 28	70°51.687N	134°46.350W	196	Tucker ↓	88	355	20	9.7	11.20	1015.26	82	
	8/20/2010	22 42	70°51.169N	134°46.238W	121	Tucker ↑	87	002	24	7.9	11.20	1015.04	89	
	8/20/2010	23 02	70°51.729N	134°45.943W	199	Monster Net↓	89	003	21	7.3	11.18	1014.57	94	
	8/20/2010	23 09	70°51.723N	134°45.999W	189	Monster Net↑	89	005	22	9.0	11.17	1014.90	88	
	8/21/2010	00 22	70°51.91N	134°45.92W	210	Box Core↓	89	360	15	8.8	11.10	1014.60	89	
	8/21/2010	00 27	70°51.88N	134°45.94W	232	Box Core Fond	88	360	15	8.8	11.10	1014.60	89	
	8/21/2010	00 33	70°51.84N	134°45.92W	241	Box Core↑	88	360	15	8.8	11.10	1014.60	89	
	8/21/2010	00 45	70°51.76N	134°46.05W	179	Agassiz ↓	88	355	16	8.8	11.10	1014.60	88	
	8/21/2010	01 01	70°51.17N	134°45.84W	173	Agassiz ↑	89	355	16	8.7	11.10	1014.40	92	
	8/21/2010	02 26	70°45.39N	135°03.74W	195	Rosette ↓	75	357	16	9.6	11.20	1013.90	90	

8/21/2010	02 57	70°45.33N	135°03.74W	201	Rosette ↑	74	355	16	9.6	11.20	1013.80	91
8/21/2010	03 10	70°45.34N	135°03.77W	196	Tucker ↓	75	004	14.9	10.2	11.20	1013.70	92
8/21/2010	03 87	70°45.37N	135°04.12W	183	Tucker ↑	75	010	14.9	10.2	11.20	1013.20	98
8/21/2010	03 41	70°45.44N	135°04.23W	178	Monster Net↓	75	010	18	10.2	11.10	1013.20	98
8/21/2010	03 50	70°45.36N	135°04.18W	203	Monster Net↑	75	008	17	8.1	11.20	1013.70	96
8/21/2010	04 35	70°45.23N	135°04.61W	216	Box Core↓ (1)	74	N	22	7.7	11.10	1013.40	96
8/21/2010	04 28	70°44.22N	135°04.59W	216	Box Core Fond	74	N	22	7.7	11.10	1013.40	96
8/21/2010	04 31	70°45.20N	135°04.61W	208	Box Core↑	73	N	22	7.7	11.10	1013.40	96
8/21/2010	04 45	70°45.06N	135°04.77W	150	Agassiz ↓	73	025	21	8.9	11.08	1013.40	91
8/21/2010	05 05	70°45.85N	135°04.84W	220	Agassiz ↑	74	007	22	6.5	11.11	1013.20	9.8
8/21/2010	06 10	70°51.1N	135°00.20W	205	Rosette ↓	127	033	17	5.5	11.09	1013.14	99
8/21/2010	06 42	70°50.91N	135°00.17W	218	Rosette ↑	118	019	18	8.8	11.05	1013.30	90
8/21/2010	06 55	70°51.40N	135°59.73W	192	Tucker ↓	123	032	19	7.5	11.00	1013.14	94
8/21/2010	07 12	70°50.98N	135°58.91W	096	Tucker ↑	113	021	18	5.7	11.00	1013.18	99
8/21/2010	07 32	70°51.37N	135°00.07W	216	Monster Net↓	129	022	18	5.7	11.00	1012.88	99
8/21/2010	07 44	70°51.34N	135°00.17W	216	Monster Net↑	128	012	18	6.3	11.00	1013.09	99
8/21/2010					Le monster à eu problème. Compteur tueuil à refaire							
8/21/2010	07 53	70°51.285N	135°00.216W	206	Monster Net↓	130	025	16	8.1	11.00	1013.08	95
8/21/2010	08 03	70°51.279N	135°00.185W	206	Monster Net↑	126	033	14	6.4	11.00	1013.03	97
8/21/2010	09 32	70°51.435N	135°00.357W	208	Box Core↓ (2)	133	025	18	6.2	11.00	1012.64	96
8/21/2010	09 35	70°51.437N	135°00.379W	204	Box Core Fond	133	028	15	6.2	11.00	1012.64	96
8/21/2010	09 38	70°51.446N	135°00.397W	205	Box Core↑	134	023	17	6.2	11.00	1012.64	96
8/21/2010	09 56	70°51.524N	135°00.355W	202	Box Core↓ (3)	131	039	19	6.5	10.90	1012.60	95
8/21/2010	09 58	70°51.527N	135°00.385W	209	Box Core Fond	132	026	17	6.5	10.90	1012.60	95
8/21/2010	10 10	70°51.529N	135°00.399W	214	Box Core↑	131	026	20	6.4	10.90	1012.60	95
8/21/2010	10 41	70°51.36N	135°00.795W	215	Agassiz: Trawl↓	132	040	15	6.2	10.90	1012.45	97
8/21/2010	11 06	70°50.743N	135°01.564W	176	Agassiz: Trawl ↑	128	040	15	6.3	10.98	1012.41	96
8/21/2010	09 06	70°51.135N	135°00.03W	200	Box Core↓	130	036	16	6.8	11.00	1012.90	95
8/21/2010	09 07	70°51.522N	135°00.08W	202	Box Core Fond	125	021	15	6.8	11.00	1012.90	95
8/21/2010	09 11	70°51.51N	135°00.03W	200	Box Core↑	127	021	15	6.8	11.00	1012.80	98
8/21/2010	16 10	71°00.23N	135°28.46W	226	Mouillage G-10(Debut)	693	030	16	5.1	10.80	1012.30	99
8/21/2010	17 15	71°00.36N	135°29.53W	143	Mouillage G-10(Fin)	706	019	13	5.2	11.20	1012.90	99
8/21/2010	18 53	71°00.32N	135°27.56W	217	Rosette ↓	689	012	17	5.2	11.10	1012.20	99
8/21/2010	19 22	71°00.21N	135°27.82W	232	Rosette ↑	693	004	19	6.5	10.99	1012.20	98
8/21/2010	20 22	71°08.003N	135°29.581W	204	Rosette ↓	897	351	19	6.2	10.60	1012.02	99
8/21/2010	21 50	71°08.059N	135°29.935W	230	Rosette ↑	904	015	19	10.2	10.12	1011.72	83
8/21/2010	22 00	71°08.012N	135°30.119W	226	Tucker ↓	903	014	20	9	10.05	1011.71	89
8/21/2010	22 16	71°07.486N	135°30.618W	142	Tucker ↑	884	025	21	7.9	10.05	1011.62	91
8/21/2010	22 38	71°08.121N	135°29.848W	220	Monster Net↓	898	008	17	7	10.11	1011.62	97
8/21/2010	23 40	71°08.286N	135°30.619W	203	Monster Net↑	908	023	15	8.6	9.50	1011.82	89
8/22/2010	00 53	71°08.04N	135°29.74W	226	Box Core↓	902	014	15	6.2	9.70	1011.70	97
8/22/2010	01 14	71°08.08N	135°30.32W	134	Box Core Fond	899	020	15	6.2	9.60	1011.60	96
8/22/2010	01 40	71°08.06N	135°30.70W	226	Box Core↑	845	013	10	7.7	9.90	1011.70	93
8/22/2010	01 46	71°08.06N	135°30.70W	225	Agassiz ↓	907	015	12	7.7	9.90	1011.70	93
8/22/2010	03 37	71°06.88N	135°29.12W	084	Agassiz ↑	852	015	13.5	6.8	10.20	1012.00	99
8/22/2010	07 11	71°01.38N	134°43.72W	270	Rosette ↓	393	50	17	7	10.30	1011.90	99
8/22/2010	07 32	71°01.29N	134°43.87W	262	Rosette ↑	392	44	17	7.9	10.31	1012.11	97
8/22/2010	09 33	71°01.142N	134°41.667W	017	Récupération Mouillage Debut	368	54	15	7.7	12.46	1012.55	98
8/22/2010	09 49	71°01.139N	134°41.803W	031	Récupération Mouillage Fin	370	47	16	7.5	12.60	1012.59	99
8/22/2010	12 48	70°59.88N	135°36.63W	238		709	26	13.7	7.5	11.00	1013.70	99
8/22/2010	12 48	70°59.88N	135°36.63W	238	Rosette ↓	709	26	13.7	7.5	11.00	1013.70	99
8/22/2010	13 58	70°59.64N	135°36.92W	247	Rosette ↑	710	26	13.7	7.5	11.00	1014.00	94
8/22/2010	13 24	70°59.77N	135°36.85W	267	Ballon Meteo Debut	712	34	10.6	9.1	10.90	1014.00	92
8/22/2010	13 48	70°59.69N	135°36.90W	222	Ballon Meteo Lancement	714	34	10.6	9.2	11.00	1014.00	93
8/22/2010	14 31	70°59.94N	135°36.60W	235.0	Tucker ↓	716	37	14	7.3	11.00	1014.00	99
8/22/2010	14 43	70°59.61N	135°37.08W	199	Tucker ↑	715	37	14	7.3	11.00	1014.00	98
8/22/2010	14 51	70°59.96N	135°36.54W	062	Monster Net↓	714	40	15	7.3	11.00	1014.10	98
8/22/2010	15 42	70°59.84N	135°36.72W	098	Monster Net↑	716	30	13.5	8.3	11.00	1014.50	94
8/22/2010	15 52	70°59.95N	135°36.52W	239	Rosette ↓	723	30	13.6	8.1	11.00	1014.60	95
8/22/2010	17 06	70°59.68N	135°37.17W	249	Rosette ↑	714	267	15.6	8.1	11.00	1014.90	97
8/22/2010	20 23	71°00.047N	135°36.777W	231	Box Core↓	726	19	12	8.0	10.95	1015.69	95
8/22/2010	20 38	71°00.000N	135°36.854W	129	Box Core Fond	722	27	13	8.6	10.96	1015.72	94
8/22/2010	20 58	70°59.967N	135°37.091W	230	Box Core↑	713	11	14	7.4	11.00	1015.66	96
8/22/2010	21 09	70°59.929N	135°37.165W	197	Agassiz ↓	715	30	12	8.9	11.00	1015.68	90
8/22/2010	22 40	70°57.704N	135°32.909W	062	Agassiz ↑	660	7	14	6.4	11.00	1015.90	99
8/22/2010	23 28	70°59.261N	135°22.525W	200	Water Pumping ↓	629	17	13	8.2	11.00	1015.92	94
8/23/2010	00 12	70°59.161N	135°22.79W	210	Water Pumping ↑	632	8	68	7.5	11.00	1016.20	97

8/23/2010	00 32	70°59.28N	135°22.77W	202	Rosette ↓	633	9	6.8	7.5	11.00	1016.20	97
8/23/2010	00 55	70°59.18N	135°22.84W	210	Rosette ↑	627	9	6.8	7.5	11.00	1016.10	97
8/23/2010	01 13	70°59.11N	135°22.69W	245	Tucker ↓	628	10	6.9	7.5	10.80	1016.20	92
8/23/2010	01 26	70°58.81N	135°22.40W	231	Tucker ↑	627	10	6.6	7.5	10.70	1016.20	91
8/23/2010	01 35	70°58.88N	135°21.94W	181	Monster Net↓	620	1	12	6.4	11.00	1016.30	99
8/23/2010	02 29	70°58.80N	135°21.81W	207	Monster Net↑	621	10	13	6.3	11.00	1016.30	98
8/23/2010	02 52	70°59.19N	135°22.27W	207	Box Core↓	633	4	13.5	6.4	11.00	1016.50	98
8/23/2010	03 11	70°59.18N	135°22.36W	204	Box Core Fond	628	4	13.5	6.4	10.90	1016.50	98
8/23/2010	03 22	70°59.19N	135°22.39W	191	Box Core↑	627	5	13.5	6.4	10.90	1016.50	99
8/23/2010	03 39	70°59.15N	135°22.47W	158	Agassiz ↓	622	8	13.1	7	10.90	1016.80	97
8/23/2010	04 45	70°57.58N	135°18.30W	114	Agassiz ↑	615	10	13	6.4	10.90	1016.90	99
8/23/2010	16 06	71°01.26N	134°41.23W	135	Mouliiage H-10	366	33	11	5.5	11.20	1018.90	99
8/23/2010	18 10	70°48.74N	134°31.70W	205	Rosette ↓	72	21	6	6.5	10.80	1019.20	99
8/23/2010	18 17	70°48.73N	134°31.74W	221	Rosette ↑	76	21	6	6.4	10.80	1019.20	99
8/23/2010	18 49	70°48.87N	134°32.79W	015	Recuperation I9	72	38	6	7.2	10.80	1019.40	96
8/23/2010	18 51	70°48.88N	134°32.80W	009	Recuperation I9	73	34	7	6.7	10.90	1019.40	97
8/23/2010	19 27	70°49.46N	134°34.41W	260	Rosette ↓	72	36	8	6.7	11.20	1019.60	99
8/23/2010	19 44	70°49.50N	134°34.50W	266	Rosette ↑	74	36	7	6.7	11.00	1019.80	99
8/23/2010	19 39	70°49.52N	134°34.50W	255	Water Pumping ↓	72	36	7	6.8	11.00	1019.80	99
8/23/2010	20 26	70°49.363N	134°34.530W	232	Water Pumping ↑	72	22	6	6.9	10.93	1019.91	98
8/23/2010	20 44	70°49.279N	134°34.703W	229	Tucker ↓	72	43	6	6	10.92	1019.98	99
8/23/2010	20 55	70°48.983N	134°34.606W	109	Tucker ↑	71	22	6	6.3	10.91	1020.00	99
8/23/2010	21 07	70°49.282N	134°34.606W	036	Monster Net↓	72	10	5	6	10.89	1019.98	99
8/23/2010	21 14	70°49.286N	134°34.552W	057	Monster Net↑	72	8	4	6	10.87	1020.01	99
8/23/2010	21 36	70°49.280N	134°34.629W	057	Box Core↓	72	36	8	5.9	10.83	1020.18	99
8/23/2010	21 37	70°49.283N	134°34.632W	052	Box Core Fond	72	43	5	5.9	10.83	1020.18	99
8/23/2010	21 40	70°49.285N	134°34.633W	057	Box Core↑	72	20	5	5.8	10.84	1020.16	99
8/23/2010	21 55	70°49.268N	134°34.634W	073	Box Core↓	72	51	5	5.9	10.83	1020.17	99
8/23/2010	21 57	70°49.266N	134°34.638W	073	Box Core Fond	72	41	5	5.9	10.83	1020.17	99
8/23/2010	22 00	70°49.265N	134°34.639W	070	Box Core↑	71	29	3	6	10.83	1020.21	99
8/23/2010	22 11	70°49.274N	134°34.545W	038	Agassiz ↓	72	38	4	6	10.85	1020.28	99
8/23/2010	22 28	70°49.265N	134°35.475W	157	Agassiz ↑ rien dans le filet??	72	36	4	6.2	10.85	1020.28	99
8/23/2010	22 30	70°49.202N	134°35.380W	144	Agassiz ↓	71	52	5	6.2	10.83	1020.34	99
8/23/2010	22 48	70°49.221N	134°33.833W	342	Agassiz ↑	71	69	4	6.1	10.82	1020.37	99
8/24/2010	00 15	70°57.09N	134°57.72W	225	Water Pumping	379	50	8.2	6	10.70	1020.80	99
8/24/2010	00 15	70°57.09N	134°57.72W	225	Water Pumping ↓	379	50	8.2	6	10.70	1020.80	99
8/24/2010	01 01	70°57.07N	134°57.07W	235	Water Pumping ↑	379	60	8.2	6	10.70	1020.80	99
8/24/2010	01 07	70°57.07N	134°57.08W	220	Rosette ↓	381	60	8.2	6	10.70	1020.80	99
8/24/2010	01 32	70°57.03N	134°58.11W	212	Rosette ↑	382	56	6.6	6.2	10.70	1021.20	99
8/24/2010	01 48	70°57.07N	134°57.86W	227	Tucker ↓	381	55	6.6	6.2	10.70	1021.30	99
8/24/2010	02 05	70°56.77N	134°57.46W	22	Tucker ↑	367	61	6.4	6.4	10.70	1021.40	99
8/24/2010	02 21	70°57.13N	134°57.25W	045	Monster Net↓	375	60	6.4	6.4	10.70	1021.40	99
8/24/2010	02 53	70°57.14N	134°57.47W	244	Monster Net↑	379	58	6.4	6.4	10.70	1021.50	99
8/24/2010	03 24	70°57.13N	134°57.45W	235	Rosette ↓	378	60	64	6.4	10.70	1021.40	99
8/24/2010	04 20	70°57.08N	134°57.82W	244	Rosette ↑	380	66	5	6.3	10.70	1022.00	99
8/24/2010	04 41	70°57.13N	134°57.58W	231	Box Core↓	379	84	7	6.2	10.70	1022.00	99
8/24/2010	04 51	70°57.13N	134°57.68W	202	Box Core Fond	380	80	7	6.2	10.70	1022.00	99
8/24/2010	05 12	70°57.17N	134°57.90W	220	Box Core↑	380	87	7	6.1	10.60	1022.30	99
8/24/2010	05 30	70°57.18N	134°57.60W	264	Agassiz ↓	383	77	5	7.4	10.60	1022.30	99
8/24/2010	06 34	70°57.27N	134°57.47W	266	Agassiz ↑	382	75	5	6.7	10.70	1022.70	99
8/24/2010	11 43	70°48.949N	134°32.604W	137	Mouillage I-10	72	32	13	6.2	10.92	1023.43	99
8/24/2010	12 38	70°48.67N	134°31.91W	036	Rosette ↓	72	35	9.8	7.6	11.70	1023.50	98
8/24/2010	12 48	70°48.64N	134°32.02W	121	Rosette ↑	71	35	9.8	7.6	11.70	1023.50	98
8/24/2010	17 10	70°56.90N	134°44.88W	140	Met Ocean Buoy Debut	250	34	11	6.8	12.20	1024.30	99
8/24/2010	18 05	70°56.948N	134°44.593W	125	Met Ocean Buoy Fin	250	21	11	6.9	12.50	1024.30	99
8/24/2010	19 25	70°59.23N	135°22.29W	211	Rosette ↓ 1	630	1	11	7.3	11.40	1024.50	98
8/24/2010	20 00	70°59.158N	135°22.783W	249	Rosette ↑	627	15	13	8.2	11.18	1024.52	94
8/24/2010	20 33	70°59.123N	135°22.783W	174	Rosette ↓ 2	623	24	14	6.6	11.11	1024.77	98
8/24/2010	21 41	70°59.231N	135°22.484W	165	Rosette ↑	622	nord	12	6.2	11.15	1024.29	98
8/24/2010	23 07	71°07.072N	135°11.577W		Rosette ↓	722	5	13	6.1	10.36	1024.11	98
8/25/2010	00 13	71°07.08N	135°11.84W	078	Rosette ↑	727	358	12	5.4	10.30	1024.10	99
8/25/2010	00 26	71°07.05N	135°12.14W	180	Tucker ↓	728	357	12	5.4	10.30	1024.10	99
8/25/2010	01 01	71°07.08N	135°12.83W	178	Tucker ↑	723	356	12	5.4	10.30	1024.10	99
8/25/2010	01 12	71°07.15N	135°11.58W	254	Box Core↓	731	7	11	7.2	9.80	1024.10	94

	8/25/2010	01 35	71°07.17N	135°11.72W	263	Box Core Fond	735	10	5	6.7	9.90	1024.10	99
	8/25/2010	01 48	71°07.19N	135°11.91W	218	Box Core↑	734	10	5	6.7	9.90	1024.10	99
	8/25/2010	01 57	71°07.21N	135°11.99W	235	Agassiz ↓	732	10	5	6.7	9.90	1024.10	99
	8/25/2010	03 31	71°05.66N	135°05.97W	117	Agassiz ↑	651	356	11.4	5.7	9.70	1023.80	99
	8/25/2010	04 27	71°40.93N	134°00.69W	238	CTD (STN H10)↓	351	12	9	5.7	9.90	1023.40	99
	8/25/2010	04 46	71°00.87N	134°41.06W	239	CTD (STN H10)↑	350	11	9	6.5	9.40	1023.40	99
	8/25/2010	08 45	71°04.862N	133°38.594W	287	Mouillage Récupéré	294	34	14	4.7	10.00	1022.41	99
	8/25/2010	14 35	71°20.84N	131°03.60W	067	(test) MVP (in)	219	50	10	4.7	6.40	1021.60	99
	8/25/2010	17 47	71°25.94N	130°10.81W	063	(test) MVP (out)	72	35	11.3	4.6	7.00	1021.40	99
	8/27/2010	07 29	71°24.96N	129°55.4W	264	(test) MVP (in)	90	98	13	5.6	9.10	1018.00	99
	8/27/2010	08 42	71°25.13N	130°21.04W	253	(test) MVP (out)	89	90	15	5.3	6.98	1017.00	99
	8/27/2010	18 18	70°52.23N	133°53.83W	237	MVP ↓	79	89	17	9.5	7.30	1014.80	99
	8/27/2010	19 44	70°53.16N	134°13.3W	330	MVP↑	73	93	15	10.9	9.00	1013.00	99
USBL	9/2/2010	06 09	71°04.44N	135°42.81W	284	CTD (STN USBL)↓	886	44	10	4.8	8.90	1013.00	96
USBL	9/2/2010	06 46	71°04.18N	135°43.14W	239	CTD (STN USBL)↑	885	46	12	5.6	8.30	1013.00	93
USBL	9/2/2010	07 15	71°04.39N	135°43.02W	203	USBL Beacon↓	891	58	13	4.6	8.60	1013.00	97
B09	9/2/2010	17 26	71°39.96N	135°35.98W	306	Rosette ↓	153	65	17	5.0	10.80	1014.50	93
B09	9/2/2010	17 36	71°39.93N	135°35.11W	291	Rosette ↑	155	57	14	6.0	10.80	1014.50	91
B09	9/2/2010	20 55	70°54.58N	135°32.45W	050	MVP ↓	606	35	16	3.3	10.60	1015.70	93
B09	9/3/2010	09 27	71°10.886N	135°13.962W	326	MVP↑ Line 6	660	50	11	0.9	7.90	1019.11	98
BP10 - PC31	9/3/2010	11 15				Probleme avec winch							
BP10 - PC31	9/3/2010	13 50	71°06.53N	134°32.96W	248	MVP ↓	469	30	9.8	1.1	8.60	1020.30	94
BP10 - PC31													
BP10 - PC31	9/3/2010	20 48	71°11.883N	135°24.863W	138	MVP ↓ Line 5	1013	30	15	1.3	8.10	1020.40	99
BP10 - PC31	9/4/2010	01 00	70°45N	134°27.9W		MVP↑ Line 5 (fin)							
BP10 - PC31	9/4/2010	10 20	70°45N	134°28.6W		MVP ↓ Line 8 (debut)							
BP10 - PC31	9/4/2010	03 25	70°56.8N	134°10.1W		MVP↑ Line 8 (fin)							
BP10 - PC31	9/4/2010	04 15	71°02.3N	134°20W		MVP ↓ Line 14 (debut)							
BP10 - PC31	9/4/2010	06 48	70°44.9N	134°52.2W		MVP↑ Line 8 (fin)	63						
B-10	9/4/2010	09 25	70°40.121N	135°35.201W	194	Mooring B-10	150	65	19	6.7	11.40	1018.93	78
	9/4/2010	10 20	70°39.900N	135°35.414W	067	Rosette ↓	142	73	14	5.6	11.19	1018.87	77
	9/4/2010	10 31	70°39.892N	135°35.505W	084	Rosette ↑	144	65	16	5.6	11.01	1018.90	77
	9/4/2010	12 04	70°47.59N	135°33.74W	225	Piston Core BP 10, PC12	425	82	14	7.0	11.80	1019.00	78
	9/4/2010	12 28	70°47.59N	135°33.74W	225	Piston Core BP 10, PC12	425	82	14	7.0	11.80	1019.00	78
	9/4/2010	12 39	70°47.59N	135°33.74W	225	Piston Core BP 10, PC12	425	82	14	7.0	11.80	1019.00	78
	9/4/2010	15 15	70°59.48N	135°31.55W		Piston Core 13 BP10 PC39	677	73	19	3.9	11.00	1019.00	87
	9/4/2010	15 43	70°59.48N	135°31.55W		Piston Core 13 BP10 PC39	677	73	19	3.9	11.00	1019.00	87
	9/4/2010	16 04	70°59.48N	135°31.55W		Piston Core 13 BP10 PC39	677	73	19	3.9	11.00	1019.00	87
	9/4/2010	18 45	70°59.17N	135°22.21W		Piston Core BP10 - PC 34	630	69	15	4.5	11.70	1018.00	84
	9/4/2010	18 55	70°59.17N	135°22.21W		Piston Core BP10 - PC 34	630	69	15	4.5	11.70	1018.00	84
	9/4/2010	18 55	70°59.17N	135°22.21W		Piston Core BP10 - PC 34	630	69	15	4.5	11.70	1018.00	84
	9/4/2010	20 45	71°02.688N	135°32.053W	141	MVP ↓ Line 2	778	60	15	3.4	10.90	1017.60	86
	9/4/2010	23 32	70°45.160N	134°56.187W	140	MVP↑ Line 2	66	40	17	3.6	10.50	1016.49	92
	9/5/2010	00 05	70°45.18N	135°06.60W	322	MVP ↓ Line 1	431	76	17	4.2	10.30	1016.20	89
	9/5/2010	03 44	71°08.94N	136°01.91W	322	MVP↑ Line 1	1051	80	17	3.9	10.20	1013.20	78
	9/5/2010	04 45	71°03.54N	135°50.64W	139	MVP ↓ Line 12	1013	85	23	3.7	9.80	1015.20	94
	9/5/2010	06 15	70°54.41N	135°30.82W	144	MVP↑ Line 12	597	88	20	3.5	10.20	1023.00	95
	9/5/2010	08 10	70°55.720N	136°23.696W	266	Rosette ↓	999	85	13	4.6	10.14	1014.56	94
	9/5/2010	08 54	70°55.638N	136°23.648W	286	Rosette ↑	1000	80	18	4.4	10.14	1014.60	96
	9/5/2010	09 50	70°55.600N	136°26.186W	100	Mooring F-09↑ (debut)	998	86	16	4.5	10.70	1019.60	97
	9/5/2010	10 56	70°55.127N	136°27.885W	066	Mooring F-09↑ (Fin)	1009	97	17	4.8	10.60	1014.56	97
	9/5/2010	13 57	71°00.37N	135°27.25W		Piston Core BP10, PC06	683	90	13	5.7	11.30	1014.90	89

9/5/2010	14 23	71°00.37N	135°27.25W		Piston Core BP10, PC06	683	90	13	5.7	11.30	1014.90	89
9/5/2010	14 39	71°00.37N	135°27.25W		Piston Core BP10, PC06	683	90	13	5.7	11.30	1014.90	89
9/5/2010	16 13	70°59.45N	135°15.24W	282	Box Core BP10 BX14 ↓	595	69	18	5.2	11.80	1015.00	96
9/5/2010	16 28	70°59.43N	135°15.19W	226	Box Core -	595	094	17	7.9	11.80	1014.70	85
9/5/2010	16 44	70°59.43N	135°15.44W	250	Box Core BP10 BX14 ↑	595	071	18	4.7	11.80	1014.60	99
9/5/2010	17 48	71°00.37N	135°27.37W	277	Sub-Bottom Line 2 ↓	641	077	18	6.4	11.30	1015.00	94
9/5/2010	19 30	71°11.5N	135°50.8W	330	Sub-Bottom Line 2 (fin)	1127	104	17	4.6	9.60	1015.00	98
9/5/2010	20 00	71°11.741N	135°44.370W	139	Line 3 Debut	1139	115	20	3.9	9.12	1015.08	97
9/6/2010	00 10	70°45.181N	134°46.08W	139	Line 3 Fin	436	085	15 / 20	4.9	10.30	1015.72	99
9/6/2010	00 25	70°45.24N	134°38.82W	322	Ligne 4 Debut	840	090	15	4.6	10.10	1015.10	99
9/6/2010	04 35	71°12.13N	135°39.20W	327	Ligne 4 Fin	1090	095	20	4.5	10.30	1018.00	99
9/6/2010	05 55	71°12.01N	135°16.16W	237	Ligne x debut mapping		098	20	4.4	10.50	1018.30	97
9/6/2010	06 25	71°08.5N	135°32.9W	237	Ligne x fin mapping		098	19	4.4	10.96	1019.20	97
9/6/2010	07 08	71°08.709N	135°34.807W	294	Piston Core Bp10 PC22	952	091	20	4.6	11.31	1019.00	97
9/6/2010	07 33	71°08.709N	135°34.807W	294	Piston Core Bp10 PC22	952	091	20	4.6	11.31	1019.00	97
9/6/2010	08 02	71°08.709N	135°34.807W	294	Piston Core Bp10 PC22	952	091	20	4.6	11.31	1019.00	97
9/6/2010	10 51	70°57.083N	134°53.056W	307	Piston Core BP10 - PC29	330	111	22	6.3	11.32	1021.20	88
9/6/2010	11 09	70°57.083N	134°53.056W	307	Piston Core BP10 - PC29	330	111	22	6.3	11.32	1021.20	88
9/6/2010	11 09	70°57.083N	134°53.056W	307	Piston Core BP10 - PC29	330	111	22	6.3	11.32	1021.20	88
9/6/2010	13 09	71°01.64N	134°48.32W		Piston Core BP10 - PC31	433	095	17	4.2	10.10	1022.00	94
9/6/2010	13 31	71°01.64N	134°48.32W		Piston Core BP10 - PC31	433	095	17	4.2	10.10	1022.00	94
9/6/2010	13 45	71°01.64N	134°48.32W		Piston Core BP10 - PC31	433	095	17	4.2	10.10	1022.00	94
9/6/2010	15 09	70°59.98N	134°45.49W		Piston Core BP10 - PC40	349	100	13	5.0	9.20	1023.00	90
9/6/2010	16 07	70°59.98N	134°45.49W		Piston Core BP10 - PC40	349	100	13	5.0	9.20	1023.00	90
9/6/2010	16 15	70°59.98N	134°45.49W		Piston Core BP10 - PC40	349	100	13	5.0	9.20	1023.00	90
9/6/2010	18 42	71°01.28N	135°01.99W	301	Box Core BX 12 -	557	105	17	4.2	10.40	1024.00	94
9/6/2010	19 00	71°01.37N	135°02.69W		Box Core Sortie		100	19	6.4	10.40	1024.60	85
9/6/2010	19 40	70°58.98N	135°16.56W	311	Line 20	618	100	17	4.1	10.52	1024.57	94
9/6/2010	20 24	71°02.708N	135°28.882W	312	Line 20	765	108	18	5.2	10.32	1029.93	92
9/6/2010	20 34	71°02.305N	135°29.907W	137	Line 16	747	110	19	5.0	10.35	1022.49	91
9/6/2010	21 20	70°58.551N	135°17.600W	131	Line 16	591	100	19	4.4	10.24	1024.50	91
9/6/2010	21 29	70°58.276N	135°19.157W	313	Line 15	593	110	18	4.5	10.00	1024.90	92
9/6/2010	22 11	71°01.908N	135°31.097W	313	Line 15	752	100	15 / 20	5.2	10.10	1024.99	91
9/6/2010	22 21	71°01.537N	135°32.190W	135	Line 17	758	090	22	4.8	10.24	1024.81	91
9/6/2010	23 04	70°57.804N	135°19.960W	130	Line 17	595	105	24	4.6	10.23	1024.56	91
9/6/2010	23 13	70°57.412N	135°21.094W	305	Line 18	597	100	16	4.6	9.98	1024.66	90
9/6/2010	23 52	71°01.139N	135°33.451W	313	Line 18	781	090	22	5.4	10.09	1025.34	90
9/7/2010	00 01	71°00.78N	135°34.62W	130	Line 19	706	105	19	4.6	10.20	1024.00	91
9/7/2010	00 49	70°56.78N	135°21.36W	130	Ligne 19	597	115	19	4.9	10.20	1024.00	92
9/7/2010	01 25	70°51.96N	135°04.68W	138	Ligne 23	269	110	20	5.0	9.80	1024.00	94
9/7/2010	01 50	70°49.80N	134°59.88W	138	Ligne 23	90	110	20	5.2	10.00	1024.50	94
9/7/2010	02 200	70°50.1N	134°58.56W	323	Ligne 21	92	110	20	5.2	10.00	1024.60	94
9/7/2010	02 20	70°52.32N	135°03.36W	323	Ligne 21	260	120	18	5.9	10.30	1025.20	94
9/7/2010	02 30	70°52.62N	135°02.04W	133	Ligne 25	251	096	21	5.9	10.30	1025.20	94
9/7/2010	02 50	70°50.40N	134°57.24W	133	Ligne 25	91	098	20	5.2	10.30	1024.60	96
9/7/2010	03 00	70°50.70N	134°55.92W	323	Ligne 22	94	111	18	5.3	10.30	1024.70	96
9/7/2010	03 20	70°52.92N	135°00.66W	323	Ligne 22	233	107	020	6.0	10.40	1025.10	95
9/7/2010	03 30	70°53.22N	134°59.34W	140	Ligne 24	243	093	020	5.6	10.40	1024.80	95
9/7/2010	03 52	70°51.06N	134°54.54W	142	Ligne 24	88	106	021	5.1	10.40	1022.00	97
9/7/2010	04 25	70°55.1N	135°04.3W	057	Debut Ligne c20	379	120	20	5.5	10.30	1024.50	97
9/7/2010	05 40	71°00.4N	135°21.4W	057	Fin Ligne c20	360	103	27	4.5	8.50	1024.20	99
9/7/2010	06 35	71°00.95N	134°22.66W	285	Piston Core Fond	339	105	25	4.1	9.50	1025.00	99
9/7/2010	06 35	71°00.95N	134°22.66W	285	Piston Core Fond	339	105	25	4.1	9.50	1025.00	99
9/7/2010	06 35	71°00.95N	134°22.66W	285	Piston Core Fond	339	105	25	4.1	9.50	1025.00	99
9/7/2010	09 10	70°55.388N	134°12.301W	291	Piston Core BP10 - PC14	101	112	23	5.1	10.60	1023.81	98
9/7/2010	09 24	70°55.388N	134°12.301W	291	Piston Core BP10 - PC14	101	112	23	5.1	10.60	1023.81	98
9/7/2010	09 27	70°55.388N	134°12.301W	291	Piston Core BP10 - PC14	101	112	23	5.1	10.60	1023.81	98
9/7/2010	11 03	70°53.879N	134°14.681W	295	Piston Core BP10 - PC28	83	114	21	5.7	10.80	1023.03	96
9/7/2010	11 12	70°53.879N	134°14.681W	295	Piston Core BP10 - PC28	83	114	21	5.7	10.80	1023.03	96
9/7/2010	11 12	70°53.879N	134°14.681W	295	Piston Core BP10 - PC28	83	114	21	5.7	10.80	1023.03	96
					Box Core GSC 10 BX10	80	Cancellé					
9/7/2010	18 48	71°05N	134°23.2W		Debut Ligne 18 Mapping	484	115	27	6.3	8.90	1018.00	91
9/7/2010	22 47	70°50.37N	135°32.66W	233	Ligne 18	512	115	28	8.4	10.60	1014.10	88
9/7/2010	23 00	70°50.795N	135°33.513W	066	Ligne 17	546	118	28	8.8	10.86	1013.68	88
9/8/2010	03 28	71°05.65N	134°23.61W	066	Ligne 17	523	114	26	7.1	9.00	1013.90	92
9/8/2010	03 37	71°05.81N	134°25.33W	237	Ligne 16	518	115	25	7.1	9.00	1013.90	92

	9/8/2010	05 25	70°58.01N	135°01W	237	Ligne 16 Fin		115	25	7.0	10.00	1012.00	91
	9/8/2010	07 15	70°51.35N	134°40.99W		Box Core GSC 10 -BX01	80	130	17	8.2	10.80	1012.04	91
	9/8/2010	07 30	70°51.34N	134°41.02W	304	Box Core GSC - BX01	80	120	17	8.0	11.75	1012.50	90
	9/8/2010	07 35				Box Core ↑							
	9/8/2010	08 54	70°58.379N	135°01.050W	231	Ligne 16 2 partie	460	120	14	8.5	10.90	1011.86	89
	9/8/2010	09 50	70°55.377N	135°18.167W	063	Ligne 15 (debut)	536	120	20 / 25	8.8	10.70	1011.19	86
	9/8/2010	12 44	71°06.30N	134°25.89W	062	Ligne 15 Fin	559	120	21	6.5	7.80	1011.00	92
	9/8/2010	13 10	71°06.60N	134°27.53W	244	Ligne C14 Debut	532	125	18	6.2	7.41	1011.70	91
	9/8/2010	15 10	70°58.50N	135°05.6W	237	Ligne 14 Fin	551	130	20	8.2	10.40	1009.70	91
	9/8/2010	15 15	70°51.98N	134°53.56W	300	↓ Box Core Bx 06	112	124	15	11.9	11.00	1010.40	77
	9/8/2010	16 21	70°51.97N	134°53.56W	290	- Box Core Bx 06	112	124	15	11.9	10.95	1010.40	77
	9/8/2010	16 26	70°51.99N	134°53.52W	272	↑ Box Core Bx 06	112	132	16	11.1	11.40	1010.40	80
	9/8/2010	17 44	70°46.59N	134°49.18W	320	↓ Box Core Bx 07	73	114	18	9.0	11.80	1010.20	87
	9/8/2010	17 48	70°46.59N	134°49.14W	294	- Box Core Bx 07	73	124	14	12.0	11.90	1010.20	76
	9/8/2010	17 52	70°46.59N	134°49.13W	301	↑ Box Core Bx 07	73	122	16	12.0	11.90	1010.20	76
	9/8/2010	19 05	70°48.94N	135°10.68W	270	↓ Box Core BP10 BX08	159	134	10	9.0	11.90	1009.90	88
	9/8/2010	19 08	70°48.94N	135°10.68W	270	- Box Core Bx 08	159	134	10	9.0	11.90	1009.90	88
	9/8/2010	19 13	70°48.93N	135°10.77W	299	↑ Box Core Bx 08	159	133	13	8.5	11.90	1009.90	90
	9/8/2010	20 42	70°58.885N	135°04.824W	236	Ligne 14 (2 partie)	507	128	17	8.8	11.13	1009.97	90
	9/8/2010	21 52	70°55.097N	135°25.489W	056	Ligne 14 Fin	574	135	13	8.6	10.92	1009.90	92
	9/8/2010	21 30	70°55.251N	135°24.758W	056	Ligne 13 Debut	570	135	14	8.7	10.89	1009.84	92
	9/8/2010	23 14	71°07.169N	134°27.748W	058	Ligne 13 Fin	533	120	17	6.0	8.00	1010.00	96
	9/8/2010	23 23	71°07.540N	134°29.260W	234	Ligne 12 (debut)	550	120	18	5.7	7.60	1010.09	96
	9/9/2010	01 50	70°54.74N	135°29.806W	234	Ligne 12 (fin)	581	105	7	8.5	10.40	1010.30	93
	9/9/2010	01 29	70°50.96N	135°22.33W	057	Ligne B2 debut	459	105	7	8.5	10.40	1010.30	93
	9/9/2010	03 00	70°01.6N	134°32.6W	057	Ligne B2 Fin	318	135	15	8.1	10.40	1010.70	95
	9/9/2010	03 05	70°01.5N	134°31.4W	237	Ligne B3 Debut	318	135	15	8.1	10.40	1010.70	93
	9/9/2010	04 30	70°50.7N	135°22.1W	234	Ligne B3 fin	449	130	13	8.8	10.90	1010.70	92
Mouillage F10	9/9/2010	10 47	70°55.814N	136°24.801W	050	Mouring F10	1003	120	5	8.6	12.52	1012.41	96
	9/9/2010	12 18	70°55.87N	136°24.53W		Rosette ↓	1009	160	6	8.1	12.40	1012.60	98
	9/9/2010	12 56	70°55.29N	136°24.23W		Rosette ↑	985	160	6	8.1	12.40	1013.00	99
	9/9/2010	14 05	70°55.41N	135°59.91W		Rosette ↓	672	150	7.5	8.3	11.50	1013.30	98
	9/9/2010	14 36	70°45.37N	136°00.21W		Rosette ↑	672	150	7.2	8.2	11.50	1013.30	97
Mouillage A1-09	9/9/2010	15 58	70°45.88N			Recuperation A1-09 Debut							
	9/9/2010	16 35	70°45.88N	136°00.89W		Recuperation A1-09 Fin	689	165	5	8.2	12.50	1014.10	98
	9/9/2010	19 23	70°51.57N	134°59.68W	242	Piston Core BP10-PC26	103	192	5	9.2	12.40	1015.30	94
	9/9/2010	21 11	70°50.525N	135°21.373W	056	Ligne B-4	425	300	10	6.7	12.50	1015.93	99
	9/10/2010	00 50	71°06.455N	134°05.936W	100	Ligne B-4 Fin	450	278	6	3.8	7.50	1016.95	99.00
	9/10/2010	00 56	71°06.125N	134°05.145W	240	Ligne B-5 debut	452	278	5	3.8	7.50	1016.90	99.00
	9/10/2010	04 15	70°49.9N	135°22.8W	237	Ligne B-5 Fin		315	10	4.8	10.70	1018.00	96.00
	9/10/2010	04 20	70°49.6N	135°22.43W	057	Ligne B-6 debut		315	10	4.8	10.70	1018.00	96.00
	9/10/2010	05 15	70°56.6N	135°45.5W	057	Lighne B-6 fin	80	315	10	4.8	10.70	1018.00	96.00
	9/10/2010	06 20	70°51.34N	134°41.09W		Piston Core GSC PC01	80	325	10	3.7	10.00	1017.00	93.00
	9/10/2010	08 49	70°51.571N	134°26.409W	265	Piston Core BP10-PC09	78	011	330	4.1	11.55	1018.90	92.00
	9/10/2010	08 54	70°51.571N	134°26.409W	265	Piston Core BP10-PC09	78	011	330	4.1	11.55	1018.90	92.00
	9/10/2010	08 59	70°51.571N	134°26.409W	265	Piston Core BP10-PC09	78	011	330	4.1	11.55	1018.90	92.00
	9/10/2010	10 15	70°53.994N	134°46.611W	203	Piston Core BP10 - PC08	141	321	8	3.9	11.25	1019.06	96.00
	9/10/2010	10 19	70°53.994N	134°46.611W	203	Piston Core BP10 - PC08	141	321	8	3.9	11.25	1019.06	96.00
	9/10/2010	10 19	70°53.994N	134°46.611W	203	Piston Core BP10 - PC08	141	321	8	3.9	11.25	1019.06	96.00
	9/10/2010	12 11	70°55.31N	70°55.31N		Piston Core BP10-PC30	93	290	2	5.2	11.30	1019.40	90.00
	9/10/2010	12 21	70°55.31N	70°55.31N		Piston Core BP10-PC30	93	290	2	5.2	11.30	1019.40	90.00
	9/10/2010	12 21	70°55.31N	70°55.31N		Piston Core BP10-PC30	93	290	2	5.2	11.30	1019.40	90.00
	9/10/2010	13 19	70°57.35N	134°40.45W		Piston Core BP10-PC41	238	320	3	4.5	11.70	1019.60	94.00
	9/10/2010	13 36	70°57.35N	134°40.45W		Piston Core BP10-PC41	238	320	3	4.5	11.70	1019.60	94.00
	9/10/2010	13 41	70°57.35N	134°40.45W		Piston Core BP10-PC41	238	320	3	4.5	11.70	1019.60	94.00
	9/10/2010	14 43	70°54.87N	134°48.53W		Piston Core GSC-06	190	010	5	4.7	12.00	1019.70	94.00
	9/10/2010	14 57	70°54.87N	134°48.53W		Piston Core GSC-06	190	010	5	4.7	12.00	1019.70	94.00
	9/10/2010	15 04	70°54.87N	134°48.53W		Piston Core GSC-06	190	010	5	4.7	12.00	1019.70	94.00
	9/10/2010	15 35	70°54.87N	134°48.53W		Box Core GSC-06 ↓	182	015	6	4.7	12.0	1019.60	95
	9/10/2010	15 39	70°54.87N	134°48.53W		Box Core GSC-06 -	182	015	6	4.7	12.0	1019.6	95
	9/10/2010	15 44	70°54.87N	134°48.53W		Box Core GSC-06↑	182	010	6	4.7	12.0	1019.6	95
	9/10/2010	16 55	70°55.53N	134°22.75W		Box Core BP10-BX09 ↓	111	007	5	3.1	12.0	1019.7	99
	9/10/2010	16 57	70°55.53N	134°22.76W		Box Core BP10-BX09 -	111	008	4	3.1	12.0	1019.7	99

	9/10/2010	17 00	70°55.53N	134°22.78W		Box Core BP10-BX09↑	111	007	3	3.1	12.0	1019.8	99	
	9/10/2010	18 16	70°58.45N	134°43.11W		Box Core BX13↓	285	345	6	3.3	10.5	1019.9	99	
	9/10/2010	18 26	70°58.44N	134°43.09W		Box Core BX13 -	288	345	6	3.3	10.5	1019.9	99	-
	9/10/2010	18 33	70°58.44N	134°43.20W		Box Core BX13↑	287	353	4	3.1	10.8	1019.9	99	-
	9/10/2010	19 00	70°56.4N	134°50.66W	057	LIGNE B6(debut)	270	325	7	3.7	11.1	1019.0	98	-
	9/10/2010	20 25	71°05.857N	134°05.831W	055	LIGNE B6(fin)	460	313	4	3.5	8.78	1020.09	98	-
	9/10/2010	20 30	71°05.533N	134°06.103W	236	LIGNE B7(debut)	465	313	1	3.5	8.97	1020.16	98	-
	9/10/2010	22 45	71°49.373N	135°20.905W	237	LIGNE B7(fin)	389	358	1	4.2	10.60	1020.4	99	-
	9/10/2010	22 49	71°49.570N	135°19.816W	055	LIGNE B8(debut)	388	350	1	4.2	10.60	1020.4	99	-
	9/11/2010	01 04	71°05.40N	134°04.81W	057	LIGNE B8(fin)	440	120	3	3.4	9.10	1020.5	99	-
	9/11/2010	01 09	71°05.21N	134°04.27W	237	LIGNE B9(debut)	440	120	3	3.4	9.10	1020.5	99	-
	9/11/2010	03 53	70°47.44N	135°26.00W	237	LIGNE B9(fin)	355	215	3	4.7	10.70	1020.0	96	-
	9/11/2010	03 52	70°47.70N	135°25.34W	368	LIGNE B10(debut)	220	220	6	4.8	10.70	1020.6	96	-
	9/11/2010	04 30	70°51.5N	135°08.15W	368	LIGNE B10(fin)	274	220	6	4.8	10.70	1020.0	96	-
	9/11/2010	04 33	70°51.25N	135°07.35W	237	LIGNE B11(debut)	247	Calm	Calm	4.5	11.02	1020.5	99	-
	9/11/2010	05 08	70°47.14N	135°26.9W	237	LIGNE B11(fin)	371	Calm	Calm	4.5	11.02	1020.5	99	-
														-
A1(10)	9/11/2010	09 35	70°45.891N	136°00.111W	325	Mouillage A1	684	232	4	5.2	12.72	1020.46	99	-
A1(10)	9/11/2010	10 22	70°46.029N	135°59.764W	284	CTD ROSETTE ↓	692	207	6	5.6	12.75	1020.57	99	-
A1(10)	9/11/2010	11 24	70°46.005N	135°59.643W	246	CTD ROSETTE ↑	690	198	7	5.8	13.03	1020.53	99	-
A1(10)	9/11/2010	12 30	70°44.61N	135°54.56W		Recuperation Mouillage A2	607	145	4	6.2	12	1020.5	99	-
A1(10)	9/11/2010	15 01	70°46.17N	135°10.83W		Piston Core PC 18	91	160	11	6.6	12.7	1020.5	95	-
A1(10)	9/11/2010	15 28	70°46.17N	135°10.83W		Piston Core PC 18	91	160	11	6.6	12.7	1020.5	95	-
A1(10)	9/11/2010	15 30	70°46.17N	135°10.83W		Piston Core PC 18	91	160	11	6.6	12.7	1020.5	95	-
A1(10)	9/11/2010	17 11	70°39.36N	134°41.84W		Piston Core PC 44	60	168	6	6.0	12.9	1020.6	99	-
A1(10)	9/11/2010	17 13	70°39.36N	134°41.84W		Piston Core PC 44	60	168	6	6.0	12.9	1020.6	99	-
A1(10)	9/11/2010	17 16	70°39.36N	134°41.84W		Piston Core PC 44	60	168	6	6.0	12.9	1020.6	99	-
A1(10)	9/11/2010	19 09	70°55.73N	134°50.27W	↓	Box Core ↓	254	198	6	6.2	12.70	1020.7	99	-
A1(10)	9/11/2010	19 16	70°55.73N	134°50.26W		Box CORE GSC10 -05	254	198	6	6.3	12.70	1020	99	-
A1(10)	9/11/2010	19 23	70°55.75N	135°50.09W	↑	Box Core ↓	254	198	6	6.5	12.70	1020	99	-
A1(10)	9/11/2010	20 14	71°01.943N	134°49.352W	205	Box Core ↓	253	177	7	6.4	12.70	1019.97	99	-
A1(10)	9/11/2010	20 24	71°01.954N	134°49.461W	162	Box Core (Au fond)	454	203	8	6.5	12.87	1019.91	99	-
A1(10)	9/11/2010	20 38	71°02.077N	134°49.222W	077	Box Core ↑	454	189	7	6.5	12.91	1019.89	99	-
A1(10)	9/11/2010	21 16	71°05.098N	134°38.293W	142	Box Core ↓	467	192	6	6.3	12.23	1019.85	99	-
A1(10)	9/11/2010	21 20	71°05.076N	134°38.260W	136	Box Core (Au fond)	467	195	6	6.2	11.70	1019.87	99	-
A1(10)	9/11/2010	21 38	71°05.076N	134°38.299W	096	Box Core ↑	467	200	6	6.4	11.51	1019.9	99	-
A1(10)	9/11/2010	22 39	71°04.978N	134°04.305W	233	Ligne B10 (DEBUT)	429	126	6	5.2	9.67	1019.94	99	-
A1(10)	9/12/2010	00 36	70°51.00N	135°08.00W	237	Ligne B10 (FIN)	245	310	6	4.2	10.90	1020.1	99	-
A1(10)	9/12/2010	00 38	70°51.22N	135°07.68W	057	Ligne B11 (DEBUT)	245	310	6	4.2	10.90	1020.1	99	-
A1(10)	9/12/2010	02 31	71°04.81N	134°03.02W	057	Ligne B11 (FIN)	417	300	10	4.4	12.50	1019.6	99	-
A1(10)	9/12/2010	02 34	71°04.66N	134°02.67W	237	Ligne B12 (DEBUT)	417	300	10	4.4	12.50	1019.6	99	-
A1(10)	9/12/2010	04 42	70°49.5N	135°14.5W	235	Ligne B12 (FIN)	237	304	7	4.5	11.00	1020	99	-
A1(10)	9/12/2010	06 49	70°49.52N	134°21.61W		PISTON Fond BP-10 PC 42	70	320	9	4.4	12.16	1020.1	98	-
A1(10)	9/12/2010	08 22	70°46.989N	134°25.682W	255	PISTON PC 27(Fond)	69	303	4	3.9	12.59	1020.36	99	-
A1(10)	9/12/2010	09 23	70°47.558N	134°33.153W	257	PISTON CORE BP10 - PC43	58	304	7	3.6	12.48	1020.27	99	-
A1(10)	9/12/2010	10 55	70°55.730N	134°50.224W	245	PISTON CORE GSC10 - PC05	255	287	7	2.9	12.36	1020.55	99	-
A1(10)	9/12/2010	13 06	70°57.01N	135°07.11W		PISTON CORE PC 36 (FOND)	472	270	5	3.0	12.0	1020.5	95	-
A1(10)	9/12/2010	14 23	70°56.24N	135°09.91W		PISTON CORE PC 37 (FOND)	489	236	10	4.3	12.6	1020.1	99	-
A1(10)	9/12/2010	15 50	70°54.67N	135°15.46W		PISTON CORE PC 01(FOND)	485	220	11	4.9	12.8	1019.8	99	-
A1(10)	9/12/2010	19 18	71°01.55N	135°33.02W		Box CORE Brol ↓	772	280	22	6.5	11.5	1018.3	95	-
A1(10)	9/12/2010	19 38	71°01.57N	135°33.14W		Box BP 10-BX 01(F)	772	305	19	6.3	11.5	1018.5	95	-
A1(10)	9/12/2010	19 55	71°01.475N	135°33.350W	148	BOX CORE ↑	783	288	19	4.6	11.6	1018.64	99	-
A1(10)	9/12/2010	21 08	71°01.775N	135°35.157W	321	BOX CORE ↓BP 10- BX 02	839	275	17	6.2	12.15	1019.28	95	-
A1(10)	9/12/2010	21 24	71°01.785N	135°35.082W	332	Box Core (Au fond)	832	277	17	4.5	12.63		99	-
A1(10)	9/12/2010	21 45	71°01.815N	135°35.066W	335	BOX CORE ↑	848	277	17	4.9	12.79	1019.49	99	-
A1(10)	9/13/2010	22 10	71°02.223N	135°39.184W	104	Ligne Box Core 1,2,3,(debut)	897	288	13	5.2	11.72	1019.24	99	-
A1(10)	9/13/2010	22 26	71°01.282N	135°30.133W	108	Ligne Box Core 1,2,3,(Fin)	730	285	14	5.3	10.76	1019.65	99	-
A1(10)	9/13/2010	23 35	70°46.573N	135°25.587W	054	Ligne (debut)	248	270	18	7.7	11.06	1020.06	99	-
A1(10)	9/13/2010	02 00	71°04.3N	134°02.4W	057	Ligne 13 Fin	352	284	19	6.1	8.8	1018.7	99	-
A1(10)	9/13/2010	02 05	71°04.08N	134°02.1W	237	Ligne debut	349	277	19	6.1	8.8	1018.7	99	-
A1(10)	9/13/2010	04 35	70°46.5N	135°25W	237	Ligne 14 Fin		285	20	6.8	10	1019		-
A1(10)	9/13/2010	04 40	70°46.3N	135°23.8W	057	Ligne debut		285	20	6.8	10	1019		-
A1(10)	9/13/2010	05 55	70°54.6N	134°45.1W	057	Ligne C1 Fin		280	20	7	11	1019		-
A1(10)	9/13/2010	05 55	70°55N	134°43W	237	Ligne debut		280	20	8	11	1019		-
A1(10)	9/13/2010	07 15	70°46N	134°24W	237	Ligne C2 Fin		280	20	8	11	1019		-
A1(10)	9/13/2010	10 56	70°44.652N	135°54.966W	140		609	290	18	10.2	12.5	1019.86	83	-
A1(10)	9/13/2010	12 22	70°44.01N	135°55.21W		ROSETTE ↓	570	290	10	6.6	13.2	1019.8	99	-
A1(10)	9/13/2010	12 47	70°43.98N	135°54.95W		ROSETTE ↑	571	290	21	6.6	13.3	1019.7	99	-

A1(10)	9/13/2010	15 08	71°00.59N	135°54.95W		Piston CORE PC-23	776	315	21	2.3	11.4	1020	99	-
A1(10)	9/13/2010	15 21	71°00.59N	135°54.95W		Piston CORE PC-23	776	315	21	2.3	11.4	1020	99	-
A1(10)	9/13/2010	15 36	71°00.59N	135°54.95W		Piston CORE PC-23	776	315	21	2.3	11.4	1020	99	-
A1(10)	9/13/2010	17 10	71°00.03N	135°32.85W		Piston BP 10-PC 21	696	343	19	1.9	11.9	1021	97	-
A1(10)	9/13/2010	17 24	71°00.03N	135°32.85W		Piston BP 10-PC 21	696	343	19	1.9	11.9	1021	97	-
A1(10)	9/13/2010	17 38	71°00.03N	135°32.85W		Piston BP 10-PC 21	696	343	19	1.9	11.9	1021	97	-
A1(10)	9/13/2010	19 27	71°03.81N	135°07.44W	↓	BOX CORE GSCBX 04	629	357	17	0.8	12.0	1020.9	95	-
A1(10)	9/13/2010	19 48	71°03.81N	135°07.40W	Fond	BOX GSCBX 04	629	356	21	0.6	12.0	1023	96	-
A1(10)	9/13/2010	20 01	71°03.835N	135°07.659W	↑	BOX GSC 10 BX 04	629	351	17	0.6	12.0	1023.4	96	-
A1(10)	9/13/2010	20 55	71°02.597N	135°17.388W	237	Box Core BP10-Bx 10 ↓	680	3	22	3.3	11.8	1024.19	86	-
A1(10)	9/13/2010	21 09	70°02.575N	135°17.343W	159	Box Core Au fond	676	339	18	2.1	11.7	1024.24	90	-
A1(10)	9/13/2010	21 23	70°02.612N	135°17.406W	189	Box Core ↑	672	350	18	1.1	11.7	1024.38	90	-
A1(10)	9/13/2010	23 37	70°00.700N	134°54.150W	060	Ligne (debut)	459	340	22	-1.3	9.9	1025.7	88	-
A1(10)	9/14/2010	00 05	70°03.9N	134°41.1W	060	Ligne (Fix)	429	0	28	-1.5	9.3	1025.1	86	-
A1(10)	9/14/2010	01 10	70°03.82N	134°02.1W	237	Ligne (debut)	375	0	19	-1.4	7.4	1025.2	89	-
A1(10)	9/14/2010	02 25	70°55.2N	134°43.7W	237	Ligne CL(Fix)	130	o	22	-1.2	8.4	1025.5	85	-
A1(10)	9/14/2010	02 30	70°55.1N	134°42.9W	057	Ligne (debut)	130	0	22	-1.2	8.4	1025.5	85	-
A1(10)	9/14/2010	03 30	71°03.69N	134°01.58W	057	Ligne C2 (Fin)		356	17	-0.5	7.6	1026	89	-
A1(10)	9/14/2010	03 57	71°03.1N	134°03.5W	237	Ligne (debut)	371	356	17	-0.5	7.6	1026	89	-
A1(10)	9/14/2010	05 37	71°51.7N	134°57.8W	237	Ligne C3 (Fin)	290	16	20	-0.8	8.4	1027.8	87	-
A1(10)	9/14/2010	05 46	71°51.7N	134°57.8W	057	Ligne (debut)	290	16	20	-0.8	8.4	1027.8	87	-
A1(10)	9/14/2010	07 30	71°51.50N	134°00.35W	057	Ligne C4(Fin)	344	25	18	-0.3	7.6	1027.8	81	-
A1(10)	9/14/2010	08 32	70°57.924N	134°08.281W	150	Piston Core BP10 - PC	194	5	13	2.4	9.8	1029.11	75	-
A1(10)	9/14/2010	09 09	70°57.924N	134°08.281W	150	Piston Core BP10 - PC	194	5	13	2.4	9.8	1029.11	75	-
A1(10)	9/14/2010	09 14	70°57.924N	134°08.281W	150	Piston Core BP10 - PC	194	5	13	2.4	9.8	1029.11	75	-
A1(10)	9/14/2010	12 12	70°47.17N	133°47.17W		Piston Core	81	11.5	30	-0.1	10.6	1029.6	91	-
A1(10)	9/14/2010	12 33	70°47.17N	133°47.17W		Piston Core	81	11.5	30	-0.1	10.6	1029.6	91	-
A1(10)	9/14/2010	12 36	70°47.17N	133°47.17W		Piston Core	81	11.5	30	-0.1	10.6	1029.6	91	-
A1(10)	9/14/2010	19 50	70°40.249N	133°21.265W		Piston Core PC-13↓	54	23	6	-0.1	10.96	1029.85	87	-
A1(10)	9/14/2010	19 51	70°40.247N	133°21.295W		PISTON CORE PC-13 Fond	53	358	6	0.5	10.95	1029.68	80	-
A1(10)	9/15/2010	19 54	70°40.233N	133°21.258W	072	PISTON PC-13 ↑	53	340	4	0.5	10.94	1029.68	80	-
A1(10)	9/15/2010	10 43	70°40.751N	132°38.593W	048	PISTON PC-16	20	013	15	0.1	10.72	1026.36	71	-
A1(10)	9/15/2010	13 18	70°47.04N	132°35.58W		PISTON CORE	30	030	14	-0.7	10.3	1027.6	79	-
A1(10)	9/15/2010	13 25	70°47.04N	132°35.58W		PISTON CORE	30	030	14	-0.7	10.3	1027.6	79	-
A1(10)	9/15/2010	13 28	70°47.04N	132°35.58W		PISTON CORE	30	030	14	-0.7	10.3	1027.6	79	-
A1(10)	9/15/2010	16 58	70°35.12N	132°05.48W		PISTON BP 10-PC-07(fond)	45	000	15	0.2	10.5	1028.6	83	-
A1(10)	9/15/2010	16 59	70°35.12N	132°05.48W		PISTON BP 10-PC-07(fond)	45	000	15	0.2	10.5	1028.6	83	-
A1(10)	9/15/2010	17 01	70°35.12N	132°05.48W		PISTON BP 10-PC-07(fond)	45	000	15	0.2	10.5	1028.6	83	-
A1(10)	9/15/2010	20 59	70°48.389N	133°13.641W		PISTON CORE PC-11	23	010	10	-0.8	10.84	1029.18	88	-
A1(10)	9/15/2010	21 01	70°48.389N	133°13.641W		PISTON CORE PC-11	23	010	10	-0.8	10.84	1029.18	88	-
A1(10)	9/15/2010	21 02	70°48.389N	133°13.641W		PISTON CORE PC-11	23	010	10	-0.8	10.84	1029.18	88	-
A1(10)	9/16/2010	08 34	71°00.992N	132°41.383W		PISTON CORE PC-15	67	044	6	0.1	9.94	1027.98	94	-
A1(10)	9/16/2010	08 37	71°00.992N	132°41.383W		PISTON CORE PC-15	67	044	6	0.1	9.94	1027.98	94	-
A1(10)	9/16/2010	08 40	71°00.992N	132°41.383W		PISTON CORE PC-15	67	044	6	0.1	9.94	1027.98	94	-
A1(10)	9/16/2010	14 34	71°00.89N	135°00.09W	037	PISTON CORE PC-33	602	130	10	1.3	8.6	1026.7	95	-
A1(10)	9/16/2010	14 46	71°00.89N	135°00.09W	045	PISTON CORE PC-33	602	130	10	1.3	8.6	1026.7	95	-
A1(10)	9/16/2010	15 00	71°00.89N	135°00.09W		PISTON CORE PC-33	602	130	10	1.3	8.6	1026.7	95	-
A1(10)	9/16/2010	17 44	70°47.55N	134°33.21W		Rov Dive BP 10-PC-43 Surface	62	134	14	3.4	9.5	1025	85	-
A1(10)	9/16/2010	20 00	70°47.572N	134°33.169W	167	Rov Dive BP 10 43 Fond		120	13	2.3	11.67	1024.54	89	-
A1(10)	9/17/2010	00 55	70°46.11N	135°22.24W	057	Ligne (debut)	262	150	11	4.3	10.1	1022.6	82	-
A1(10)	9/17/2010	01 45	70°51.57N	134°58.28W	237	Ligne C4(fin)	118	150	12	4.2	10.1	1022.6	82	-
A1(10)	9/17/2010	01 44	70°51.41N	134°59.08W	237	Ligne (debut)	118	150	12	4.2	10.1	1022.6	82	-
A1(10)	9/17/2010	02 30	70°45.99N	135°24.18W	237	Ligne C3(fin)	254	146	8	4.6	9.95	1022.1	81	-
A1(10)	9/17/2010	02 35	70°45.68N	135°23.72W	057	Ligne (debut)	250	146	8	4.6	9.95	1022.1	81	-
A1(10)	9/17/2010	05 00	71°02.96N	134°01.6W	057	Ligne D(Fin)		0	12	2.0	6.2	1023.4	92	-
A1(10)	9/17/2010	06 15	71°13.2N	134°35.6W	237	Ligne (debut)	635	0	12	2.0	6.2	1023.4	92	-
A1(10)	9/17/2010	08 25	71°57.639N	135°51.482W	000	Ligne Z1(fin)	831	E	13	2.8	9.34	1023.2	93	-
A1(10)	9/17/2010	08 31	71°58.682N	135°50.749W	048	Ligne (debut)	816	80	14	3.0	9.24	1023	94	-
A1(10)	9/17/2010	09 28	71°05.660N	135°18.194W	060	Ligne Z2(fin)	731	73	12	2.6	9.32	1022.7	88	-
A1(10)	9/17/2010	10 14	71°11.435N	135°23.827W	141	BOX CORE GSC 10-Bx02	993	081	7	2.40	9.85	1023.71	85	-
A1(10)	9/17/2010	10 32	71°11.409N	135°23.878W	155	BOX CORE (Au fond)	N/A	080	8	2.3	10.8	1023.74	90	-
A1(10)	9/17/2010	10 55	71°11.414N	135°23.858W	158	BOX CORE ↑	993	060	8	2.3	11.23	1023.87	88	-
A1(10)	9/17/2010	12 05	71°11.407N	135°23.863W		PISTON CORE GSC 10-02	999	45	11	2.1	12.00	1024.5	93	-
A1(10)	9/17/2010	12 36	71°11.407N	135°23.863W		PISTON CORE GSC 10-02	999	45	11	2.1	12.00	1024.5	93	-
A1(10)	9/17/2010	13 00	71°11.407N	135°23.863W		PISTON CORE GSC 10-02	999	45	11	2.1	12.00	1024.5	93	-
A1(10)	9/17/2010	13 53	71°06.99N	135°05.93W		PISTON CORE	680	46	11	2.2	11.00	1025.2	89	-
A1(10)	9/17/2010	14 19	71°06.99N	135°05.93W		PISTON CORE	680	46	11	2.2	11.00	1025.2	89	-

A1(10)	9/17/2010	14 33	71°06.99N	135°05.93W		PISTON CORE	680	46	11	2.2	11.00	1025.2	89	-
A1(10)	9/17/2010	15 37	71°58.90N	135°17.04W		PISTON CORE	600	044	9	2.3	10.2	1025.7	89	-
A1(10)	9/17/2010	16 37	71°58.90N	135°17.04W		PISTON CORE	600	044	9	2.3	10.2	1025.7	89	-
A1(10)	9/17/2010	16 50	71°58.90N	135°17.04W		PISTON CORE	600	044	9	2.3	10.2	1025.7	89	-
A1(10)	9/17/2010	18 11	71°02.9N	135°46.34W		PISTON CORE	970	026	9	1.6	10.0	1027.2	94	-
A1(10)	9/17/2010	19 00	71°02.9N	135°46.34W		PISTON CORE	970	026	9	1.6	10.0	1027.2	94	-
A1(10)	9/17/2010	19 24	71°02.9N	135°46.34W		PISTON CORE	970	026	9	1.6	10.0	1027.2	94	-
A1(10)	9/17/2010	20 06	71°02.374N	135°38.076W	↓	Box CORE BP-10-Bx03	883	040	11	0.3	10.05	1027.6	99	-
A1(10)	9/17/2010	20 24	71°02.355N	135°37.973W	Fond	Box CORE BP-10-Bx03	883	029	12	0.0	10.18	1027.7	99	-
A1(10)	9/17/2010	20 43	71°02.377N	135°38.039W	050	BOX CORE ↑	883	021	12	-0.1	010	1027.9	99	-
A1(10)	9/17/2010	21 09	71°03.413N	135°40.252W	066	BOX CORE BP10-↓	854	005	12	0.3	010	1027.8	99	-
A1(10)	9/17/2010	21 27	71°03.409N	135°40.260W	138	BOX CORE (Au fond)	850	033	10	-0.1	010	1028.03	99	-
A1(10)	9/17/2010	21 48	71°03.416 N	135°40.248W	157	BOX CORE ↑	850	030	9	-0.4	010	1028.13	99	-
A1(10)	9/17/2010	21 53	71°03.4 N	135°40.600W	233	Ligne (debut)	962	037	9	-0.2	010	1028.31	99	-
A1(10)	9/17/2010	22 40	70°57.982 N	136°06.310W	235	Ligne Z4(Fin)	960	002	9	0.3	010	1028.71	99	-
A1(10)	9/17/2010	22 47	70°58.738 N	136°08.509W	056	Ligne (debut)	979	009	12	0.3	9.9	1028.71	99	-
A1(10)	9/18/2010	01 00	71°14.4 N	134°51.5W		Ligne Z5(Fin)		030	10	-0.5	9.9	1028		-
A1(10)	9/18/2010	02 55	71°03.0 N	134°09.1W	237	Ligne (debut)		350	10	-0.6	7.9	1029.7		-
A1(10)	9/18/2010	05 00	71°45.9 N	135°21.4W	237	Ligne D2(Fin)	359	021	7	7.0	10	1030	98	-
A1(10)	9/18/2010	05 10	71°47.00 N	135°25.5W	057	Ligne (debut)	359	021	7	-0.5	10	1030	98	-
A1(10)	9/18/2010	05 35	71°49.2N	135°15.3W	057	Fin B12	300	012	6	0	9	1030.2	98	-
A1(10)	9/18/2010	08 28	71°08.475N	135°30.771W	059	PISTON CORE	909	022	10	-0.2	10.1	1030.81	99	-
A1(10)	9/18/2010	08 44	71°08.475N	135°30.771W	134	PISTON CORE	909	022	10	-0.2	10.1	1030.81	99	-
A1(10)	9/18/2010	09 00	71°08.475N	135°30.771W		PISTON CORE	909	022	10	-0.2	10.1	1030.81	99	-
A1(10)	9/18/2010	10 18	71°10.382N	135°53.910W		PISTON CORE	1070	075	6	-0.4	9.89	1031.04	96	-
A1(10)	9/18/2010	10 37	71°10.382N	135°53.910W		PISTON CORE	1070	075	6	-0.4	9.89	1031.04	96	-
A1(10)	9/18/2010	10 58	71°10.382N	135°53.910W		PISTON CORE	1070	075	6	-0.4	9.89	1031.04	96	-
A1(10)	9/18/2010	12 30	71°00.421N	135°53.053W		PISTON CORE	912			1.5	9.7	1031.5	86	-
A1(10)	9/18/2010	12 55	71°00.421N	135°53.053W		PISTON CORE	912			1.5	9.7	1031.5	86	-
A1(10)	9/18/2010	13 16	71°00.421N	135°53.053W		PISTON CORE	912			1.5	9.7	1031.5	86	-
A1(10)	9/18/2010	14 08	71°02.32N	135°44.92W		BOX CORE	924	80		0	9.9	1031.5	95	-
A1(10)	9/18/2010	14 20	71°02.34N	135°44.97W		BOX CORE	924	150	3	0.6	10	1031.5	91	-
A1(10)	9/18/2010	14 46	71°02.35N	135°44.89W		BOX CORE	924	155	3	0.4	10.1	1031.5	92	-
A1(10)	9/18/2010	15 54	70°59.44N	135°13.71W		PISTON CORE PC-45	593	158	4	0.5	9.9	1031.2	97	-
A1(10)	9/18/2010	16 06	70°59.44N	135°13.71W		PISTON CORE PC-45	593	158	4	0.5	9.9	1031.2	97	-
A1(10)	9/18/2010	16 20	70°59.44N	135°13.71W		PISTON CORE PC-45	593	158	4	0.5	9.9	1031.2	97	-
A1(10)	9/18/2010	18 14	71°04.91N	134°55.54W		BP 10 ↓	558	170	6.4	1.1	7.8	1031	95	-
A1(10)	9/18/2010	18 30	71°04.96N	134°55.43W		BP 10 Bx11	558	170	6.4	1.1	7.8	1031	95	-
A1(10)	9/18/2010	18 44	71°05.00N	134°55.46W		BP 10 Bx11 ↑	559	180	5	0.7	7.9	1031	92	-
A1(10)	9/18/2010	20 35	71°05.457N	134°18.085W	233	Ligne = (debut)	485	160	6	1.1	7.55	1031.07	93	-
A1(10)	9/18/2010	22 47	70°49.870N	135°32.133W	236	LIGNE A19 (Fin)	497	130	14	1.5	9.64	1030	96	-
A1(10)	9/18/2010	23 17	70°45.403N	135°22.807W	58	LIGNE (debut)	240	150	17	2.1	9.9	1029.11	95	-
A1(10)	9/19/2010	01 50	71°02.95N	134°00.16W	57	LIGNE D3 (Fin)	320	140	14	1.9	8.4	1028.9	99	-
A1(10)	9/19/2010	01 55	71°02.81N	133°59.71W	237	LIGNE (debut)	317	140	14	1.9	8.3	1028.8	99	-
A1(10)	9/19/2010	04 20	70°45.8N	135°22.7W	237	LIGNE D4 (Fin)	219	155	20	3.2	9.5	1022		-
A1(10)	9/19/2010	04 25	70°15N	135°22.5W	057	LIGNE (debut)	211	155	20	3.2	9.5	1022		-
A1(10)	9/19/2010	07 20	71°07.7N	135°59.5W	057	Fin D5		160	22	3.9	7.7	1025	88	-
A1(10)	9/19/2010	08 42	70°59.268N	134°33.031W	308	PISTON CORE BP10	259	179	16	6.9	8.1	1024.97	77	-
A1(10)	9/19/2010	08 47	70°59.268N	134°33.031W	308	PISTON CORE BP10	259	179	16	6.9	8.1	1024.97	77	-
A1(10)	9/19/2010	08 52	70°59.268N	134°33.031W	308	PISTON CORE BP10	259	179	16	6.9	8.1	1024.97	77	-
A1(10)	9/19/2010	10 35	71°03.809N	134°07.403W	340	PISTON CORE BP10	635	167	19	5.8	9.2	1022.88	82	-
A1(10)	9/19/2010	10 45	71°03.809N	134°07.403W	340	PISTON CORE BP10	635	167	19	5.8	9.2	1022.88	82	-
A1(10)	9/19/2010	10 59	71°03.809N	134°07.403W	340	PISTON CORE BP10	635	167	19	5.8	9.2	1022.88	82	-
A1(10)	9/19/2010	12 27	71°10.192N	135°21.217W		PISTON CORE GSC 10	880	190	12	7	10	1021.5	81	-
A1(10)	9/19/2010	12 54	71°10.192N	135°21.217W		PISTON CORE GSC 10	880	190	12	7	10	1021.5	81	-
A1(10)	9/19/2010	13 14	71°10.192N	135°21.217W		PISTON CORE GSC 10	880	190	12	7	10	1021.5	81	-
A1(10)	9/19/2010	13 32	71°10.189N	135°21.209W		BOX CORE	880	190	12	7	10.0	1021.4	81	-
A1(10)	9/19/2010	13 48	71°10.187N	135°21.203W		BOX CORE	880	190	12	7	10.0	1021.4	81	-
A1(10)	9/19/2010	14 03	71°10.189N	135°21.201W		BOX CORE	880	190	12	7	10	1021.4	81	-
A1(10)	9/19/2010	14 20	71°12.5N	135°22.1W	237	Mapping	880	193	12	4.1	10.1	1021	94	-
A1(10)	9/19/2010	18 00	70°57N	135°45.7W	076	Mapping (Fin)	251	000	11	4	10.3	1019.0	99	-
A1(10)	9/19/2010	18 33	70°56.83N	134°44.98W			250	000	10	4	9.9	1093.0	99	-
A1(10)	9/19/2010	19 20	70°56.84N	134°44.72W			252	344	15	3.4	9.7	1019.2	99	-
A1(10)	9/19/2010	20 13	70°54.635N	134°43.752W	057	Ligne (debut)	118	344	19	3.6	9.5	1019.41	99	-
A1(10)	9/19/2010	21 30	71°03.567N	134°00.850W	054	Ligne (Fin)	359	330	14	2.6	8016	1018.59	96	-
A1(10)	9/19/2010	21 40	71°02.544N	133°59.386W	233	Ligne (debut)	317	333	14	2.7	8.06	1018.62	97	-
A1(10)	9/20/2010	00 22	71°02.54N	133°59.16W	237	Ligne (Fin)	197	320	22	2.7	9.4	1018.3	97	-
A1(10)	9/20/2010	00 27	71°44.83N	135°21.94W	057	Ligne (debut)	218	310	23	2.7	9.4	1018.3	97	-

A1(10)	9/20/2010	02 50	71°02.40N	133°58.88W	57	Ligne D7 (Fin)	305	310	24	-0.8	7.8	1017.8	91	-
A1(10)	9/20/2010	02 53	71°02.27N	133°58.61W	237	Ligne (debut)	305	325	22	-0.8	7.8	1017.8	91	-
A1(10)	9/20/2010	06 00	70°55.5N	134°59.7W	237	Ligne D8 (Fin)		340	24	-0.7	7.8	1017.0		-
A1(10)	9/20/2010	07 10			N	Ligne Ravdive (Fin)	440	335	19	-0.6	8.3	1018.0	78	-
A1(10)	9/20/2010	08 36	71°02.979N	134°51.398W	333	Ligne (debut)	491	323	24	0.3	8.03	1017.93	82	-
A1(10)	9/20/2010	09 07	71°07.826N	135°03.429W		Ligne (Fin)	692	326	20	0.1	7.9	1017.81	83	-
A1(10)	9/20/2010	09 16	71°08.822N	135°03.072W	054	Ligne (debut)	758	322	23	-0.1	7.9	1017.8	90	-
A1(10)	9/20/2010	09 37	71°10.867N	134°52.173W	107	Ligne Z2 (Fin)	733	310	20	-0.3	7.83	1018.3	88	-
A1(10)	9/20/2010	09 50	71°08.183N	134°49.144W	143	↓Debut Ligne 7	673	326	15	-0.3	7.4	1018.43	90	-
A1(10)	9/20/2010	12 40	70°52.20N	134°11.50W	057	(Fin)	70	315	21	-0.4	7.1	1017.4	96	-
A1(10)	9/20/2010	14 20	71°02.13N	133°58.33W	237	(debut)	300	315	22	-0.4	7.1	1017.4	96	-
A1(10)	9/20/2010	16 50	70°44.05N	135°21.04W	237	D-9 (Fin)	100	340	25	0.4	9.1	1017.9	96	-
A1(10)	9/20/2010	16 55	70°44.4N	135°21.0W	057	(debut)	100	340	25	.0.4	9.1	1017.9	96	-
A1(10)	9/20/2010	19 30	71°01.9N	133°58.32W	057	D-10(Fin0	300	328	22	-0.9	7.4	1017	96	-
A1(10)	9/20/2010	19 34	71°01.8N	133°58.20W	237	(debut)	305	328	22	0.9	7.4	1017	93	-
A1(10)	9/20/2010	21 54	70°44.320N	135°20.874W	237	D- 1(Fin)	140	339	21	-0.4	8.6	1017.5	93	-
A1(10)	9/20/2010	22 00	70°44.323N	135°19.782W	054	(debut)	137	347	27	-0.5	8.7	1017.69	91	-
A1(10)	9/21/2010	00 41	71°01.73N	133°57.51W	057	D- 12 (Fin)	303	330	26	0.2	7.1	1015.8	91	-
A1(10)	9/21/2010	00 43	71°01.67N	133°57.37W	237	(debut)	303	330	25	0.1	7.1	1015.7	91	-
A1(10)	9/21/2010	03 11	70°44.04N	135°20.43W	237	E - 1 (Fin)	102	335	23	0.2	8.9	1017.2	92	-
A1(10)	9/21/2010	03 20	70°43.93N	135°20.21W	057	(debut)	106	335	23	0.2	8.9	1017.2	92	-
A1(10)	9/21/2010	06 00	71°01.05N	133°56.7W	057	E - 2 (Fin)	266	330	20/25	0	9	1016		-
A1(10)	9/21/2010	06 08	71°01.04N	133°57.0W	237	(debut)	266	330	20/23	0	9	1016		-
A1(10)	9/21/2010	06 40	70°59.7N	134°14.0W	237	E - 3 (Fin)		330	20	0	9	1016		-
A1(10)	9/21/2010	06 50	70°57.7N	134°13.5W	057	(debut)		330	20	0	9	1016		-
A1(10)	9/21/2010	07 25	70°59.0N	134°7.5W	057	E - 4 (Fin)	259	350	23	-1	6.9	1015	97	-
A1(10)	9/21/2010	10 55	71°04.865N	133°37.866W	142	Mouillage A1	308	340	22	-0.2	7.5	1015.04	88	-
408	21/09/2010	11 43	71°04.776N	133°37.085W	159	ROSETTE ↓	310	22	332	-0.2	7.45	1015.1	89	-
408	21/09/2010	11 58	71°04.69N	133°36.97W	185	ROSETTE ↑	309	18	340	1.8	7.5	1015.3	80	-
408	22/09/2010	18 17	71°45.18N	126°30.04W	-	ROSETTE ↓	352	11	020	-1.5	8.2	1017.2	89	-
408	22/09/2010	18 35	70°45.01N	126°30.45	-	ROSETTE ↑	352	12	030	-0.8	8.4	1017.3	83	-
CA-16 MMP 04	22/09/2010	18 54	71°45.20N	126°30.79W	-	CA-16 MMP 04, MOORING CA	356	10	040	-1.5	8.6	1017	90	-
CA 16 MMP 09	22/09/2010	19 26	71°44.92N	126°31.26W	-	MOORING, CA 16 MMP 09	359	13	040		8.3	1017	91	-
CA-16-09	24/09/2010	12 17	71°48.45N	126°32.15W	-	CA 16-09, ROSETTE ↓	307	8	031	-3.6	6.08	1014.6	93	-
CA-16-09	24/09/2010	12 30	71°48.47N	126°32.14W	-	CA 16-09, ROSETTE ↑	303	6	041	-3.8	5.97	1014.6	93	-
CA-16-09	24/09/2010	12 41	71°47.99N	126°30.86W	-	CA-16-09 ↑	302	8	043	-3.8	5.97	1014.6	93	-
CA-16-09	24/09/2010	13 32	71°47.62N	126°37.78W	-	CA-16-09 ↑	325	4	025	-3.6	6.03	1014.3	90	-
CA05-09	24/09/2010	16 43	71°19.66N	124°35.73W	033	ROSETTE CA05-09↓	214	8	030	-1.8	6.80	1013.4	87	-
CA05-09	24/09/2010	16 55	71°19.71N	127°35.69W	002	ROSETTE CA05-09↑	211	010	6	-1.8	6.78	1013.1	88	-
CA05-09	24/09/2010	17 16	71°19.06N	127°35.49W	-	CA 05-09	209	020	7	-1.8	6.78	1012.9	87	-
CA05-09	24/09/2010	17 30	76°19.052N	127°35.29W	350	BRIS-DE LA 46NE	423	028	5	-1.6	6.77	1012.8	88	-
CA05 MAP-09	24/09/2010	18 44	71°25.63N	127°39.39W	032	ROSETTE, CA 05 MMP ↓	255	030	7	-1.9	6.5	1012.0	85	-
CA05 MAP-09	24/09/2010	18 57	71°25.63N	127°39.15W	043	ROSETTE, CA 05 MMP ↑	053	030	7	-1.8	6.5	1011.9	86	-
CA05 MAP-09	24/09/2010	19 20	71°24.93N	127°39.61W	153	CA05 MMP-09m↑	238	060	5	-1.9	6.4	1011.7	87	-
CA05 MAP-09	24/09/2010	18 51	71°24.76N	127°39.81W	193	FIN- RECUPERATION	235	070	6	-1.9	6.4	1011.4	8.5	-
CA05 MAP-09	25/09/2010	09 77	70°50.87N	134°06.86W	250	RECUPERATION LF8	68	23	187	1	6.4	1001.6	7.3	-
CA05 MAP-09	25/09/2010	10 25	70°48.36N	134°19.73W	215	RECUPERATION LF 1	69	25	171	0.8	6.6	1001.2	7.1	-
CA05 MAP-09	25/09/2010	11 25	70°53.34N	134°17.5W	139.5	RECUPERATION LF 5	80	19	184	1.1	6.5	1001.2	71	-
CA05 MAP-09	25/09/2010	12 52	70°52.28N	134°28.36W	185	RECUPERATION HF 2	81	20	175	1.2	6.5	1000.9	70	-
CA05 MAP-09	25/09/2010	12 40	70°52.290N	134°28.379W	189	BALLOON METEO	80	21	187	-0.8	6.6	1000.9	70	-
CA05 MAP-09	25/09/2010	15 35	70°55.83N	134°32.93W	112	RECUPERATION LF 6	104	20	211	-0.5	6.1	1000.8	74	-
CA05 MAP-09	25/09/2010	16 23	70°53.26N	134°46.018W	080	RECUPERATION LF 3	108	16	185	-0.1	5.9	1000.9	78	-
CA05 MAP-	25/09/2010	17 00	70°55.81N	134°46.55W	051	RECUPERATION HF 3	228	16	192	0.5	5.4	1000.8	81	-

09														
CA05 MAP-09	25/09/2010	18 19	70˚58.27N	134˚46.04W	204	RECUPERATION LF 7	303	16	330	-0.1	5.3	1001.3	98	-
CA05 MAP-09	25/09/2010	19 13	70˚55.85N	134˚58.62W	204	RECUPERATION LF 4	345	14	330	-0.5	5.4	1002.1	81	-
CA05 MAP-09	25/09/2010	20 40	70˚56.8N	134˚18.6W	237	Ligne de Sondage BP 250	172	16	338	-0.1	5.55	1003.35	78	-
CA05 MAP-09	25/09/2010	22 22	70˚44.19N	135˚17.36W	057	Ligne de Sondage 500	97	9	318	0.5	5.62	1002.91	65	-
CA05 MAP-09	25/09/2010	00 30	70˚57.484N	134˚14.243 W	232	BALLOON METEO	181	01	240	0.1	5.57	1003.7	66	-
CA05 MAP-09	26/09/2010	08 00	70˚45.54N	135˚08.94W	315	ROSETTE HF4	77	6	323	0.5	6.17	1002.0	77	-
CA05 MAP-09	26/09/2010	09 33	70˚53.33N	135˚22.23W	300	MARU HF5	524	8	265	5.03	0.5	1004.6	75	-
CA05 MAP-09	26/09/2010	11 55	71˚06.042N	135˚23.01W	082	Morus HF4	641	6	259	1.3	3.99	1004.3	78	-
CA05 MAP-09	26/09/2010	12 15	71˚03.877N	134˚22.204W	057	AREA MAPPING	519	9	280	0.8	4.2	1005.2	79	-
CA05 MAP-09	26/09/2010	12 38	71˚06.43N	134˚40.03W	058	BALLOON METEO	499	5	275	0.8	4.3	1005.3	79	-
CA05 MAP-09	26/09/2010	14 21	71˚10.17N	134˚40.00W	054	MAPPING Fin	599	7	340	0.2	4.33	1005.5	88	-
CA05 MAP-09	27/09/2010	00 00	72˚40.56N	130˚37.74W	040	BALLOON Meteo	1531	5	190	-1.8	1.2	1005.95	89	Frazil
CA05 MAP-09	27/09/2010	22 13	74˚23.774N	129˚08.157W	107	E.M Scan	404	7	160	-4.1	0.25	1000.93	93	8/10
CA05 MAP-09	28/09/2010	00 35	74˚23770N	129˚09.400W	035	BALLOON Meteo	411	8	164	-3.8	0.23	999.9	97	9/10
CA05 MAP-09	28/09/2010	09 05	74˚21.84N	129˚10.15W	073	Equipe sur la glace	428	6	120	-3.3	0.18	997.7	76	9/10
CA05 MAP-09	28/09/2010	10 00	74˚21.66N	129˚11.05W	073	Fin d	428	6	161	-3.5	0.87	1000.2	88	9/10
CA05 MAP-09	28/09/2010	12 11	74˚24.46N	129˚09.55W	022	BALLOON Meteo	287	6	156	-3.9	1.24	1000.14	93	3/10
CA05 MAP-09	28/09/2010	17 01	74˚40.28N	128˚32.55W	080	RoSETTE ↓	379	6	180	-4.1	1.32	1000.6	96	8/10
CA05 MAP-09	28/09/2010	17 35	74˚40.17N	128˚32.31W	088	ROSETTE ↑	385	7	150	-4.0	1.25	1000.7	97	8/10
CA05 MAP-09	28/09/2010	19 29	74˚39.93N	128˚15.50W	281		378	2	061	-3.5	-0.45	1000.7	97	8/10
CA05 MAP-09	28/09/2010	20 43	74˚39.93N	128˚15.50W	281	Fin d	378	2	061	-3.5	-0,45	1000.7	97	8/10
CA05 MAP-09	29/09/2010	16 37	79˚37.25N	128˚20.864W	355	Scatterometer Scan	381	5	227	-5.8	1.71	1600.83	99	7/10
CA05 MAP-09	29/09/2010	11 25	74˚36.96N	128˚21.205W	000	Debut n enchantionnage eun glace	379	2	213	-5.3	1.79	1000.97	99	8/18
CA05 MAP-09	29/09/2010	14 45	74˚36.9N	128˚21.3W	000	Fin echant. I6n Glace	380	8	220	-5.8	2.21	1001.20	99	9+/10
CA05 MAP-09	29/09/2010	15 30	74˚45.34N	127˚56.62W	130	Debut echan. Glace	367	9	234	-4.1	2.39	1001.80	99	9+/10
CA05 MAP-09	29/09/2010	11 47	74˚45.49N	127˚54.22W	130	Fin echan. Glace	367	8	230	-8.9	2.08	1002.44	95	9+/10
CA05 MAP-09	30/09/2010	11 20	71˚55.86N	125˚20.52W	268	Equire de caliberation a Terre a Sachs Harbour	17	22	277	-0.8	5.16	1006.36	67	-
CA05 MAP-09	30/09/2010	13 20	71˚55.875N	125˚29.513W	291	BALLOON Meteo	24	20	282	-1.1	5.07	1010.31	66	-
CA05 MAP-09	30/09/2010	18 37	71˚47.183N	126˚29.969W	330	SECCHI↓	3.8	10	280	-1.4	5.56	1013.91	67	-
CA05 MAP-09	30/09/2010	18 39	71˚ 47.191N	126˚29.931W	347	SECCHI↑	3.7	6	273	-1.5	5.55	1014.14	67	-
437	30/09/2010	18 40	71˚47.193N	126˚29.943W	002	PNF ↓	315	6	278	-1.5				
437	30/09/2010	18 47	71˚47.184N	126˚29.916W	016	PNF ↑	316	7	260	-1.5				
437	30/09/2010	19 36	71˚47.178	126˚29.762W	252	CA - 16 -10	318	13	240	-1.4				
437	30/09/2010	19 48	71˚46.948N	126˚29.415W	050	Triangulation CA -16-10	321	10	270	-1.3				
437	30/09/2010	20 02	71˚47.437N	126˚29.364W	030	Triangulation CA -16-10	304	11	263	-1.6				

437	30/09/2010	21 13	71˚47.303N	126˚30.443W	165	Triangulation CA -16-10	318	9	264	-1.6				
437	30/09/2010	20 44	71˚46.8N	126˚32.6W	283	ROSETTE ↑	341	5	232	-1.3				
437	30/09/2010	21 13	71˚46.8N	126˚33.0W	303	ROSETTE ↓	342	8	253	-1.6				
437	30/09/2010	21 39	71˚46.4N	126˚32.2W	097	TUCKER ↓	344	9	236	-1.1				
437	30/09/2010	21 56	71˚46.8N	126˚31.6W	348	TUCKER ↑	335	9	237	-1.1				
437	30/09/2010	22 40	71˚47.1N	126˚34.4W	021	MONSTER NET ↓	350	8	230	-1.2				
437	30/09/2010	23 06	71˚47.0N	126˚34.4W	010	MONSTER NET ↑	351	9	234	-1.2				
437	30/09/2010	23 50	71˚47.0N	126˚35.0W	333	ROSETTE ↓Diversity	355	7	222	-1				
437	01/10/2010	00 35	71˚47.02N	126˚35.84W	210	ROSETTE ↑Diversity	360	9	242	-0.5				
437	01/10/2010	25 17	71˚47.0N	126˚34.5W	09	Petifilet de planeton	351	8	243	-1.2				
437	01/10/2010	23 23	71˚47.0N	126˚34.5W	21	Petifilet de planeton	352	9	246	-1.1				
410	01/10/2010	01 33	71˚41.83N	126˚29.49W	205	ROSETTE ↓	410	9	199	-0.4				
410	01/10/2010	02 06	71˚41.79N	126˚29.58W	208	ROSETTE ↑	411	8	186	-0.2				
412	1/10/2010	03 19	71˚33.80 N	126˚55.15W	178	Rosette NUTS ↓	419	10	192	-0.1	5.51	1014.8	70	-
412	1/10/2010	03 43	71˚33.67 N	126˚54.75W	176	Rosette NUTS ↑	418	10	208	0.2	5.65	1014.9	71	-
414	1/10/2010	04 51	71˚25.35N	127˚21.78W	183	Rosette NUTS ↓	306	10	179	0.4	5.71	1014.6	72	-
414	1/10/2010	05 14	71˚25.28N	127˚21.20W	172	Rosette NUTS ↑	312	9	170	0.4	5.82	1014.6	73	-
416	1/10/2010	06 17	71˚17.55N	127˚45.33W	184	Rosette NUTS ↓	160	10	187	0.7	5.55	1013.9	80	-
416	1/10/2010	06 33	71˚17.44N	127˚44.61W	178	Rosette NUTS ↑	160	10	178	0.9	5.55	1014.4	82	-
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418	1/10/2010	07 33	71˚09.81N	128˚10.83W	203	Rosette NUTS ↓	66	6	240	0.7	5.48	1014	80	-
418	1/10/2010	07 43	71˚09.81N	128˚10.05W	204	Rosette NUTS ↑	65	6	230	0.7	5.47	1014.1	80	-
418	1/10/2010	11 25	71˚24.023N	127˚39.69W	005	Mooring CA 05	238	9	298	0.3	5.62	1013.7	90	-
418	1/10/2010	11 37	71˚25.023N	127˚39.677W	321		238	7	272	0.1	5.56	1013.7	91	-
418	1/10/2010	10 50	71˚28.3N	127˚30.28W	041	Ligne Sardag dibut	312	9	274	1	5.56	1013.72	75	-
418	1/10/2010	11 52	71˚25.223N	127˚40.077W	341	CA 05 MMP 10	248	12	266	0.2	5.51	1011.39	88	-
418	1/10/2010	12 01	71˚24.076N	127˚39.884W	178	Triangulation 582m CA C5 MMP 10	242	09	262	0.7	5.45	1013.75	87	-
418	1/10/2010	12 08	71˚25.076N	127˚38.850W	270	Triangulation 592m CA C5 MMP 10	242	09	282	0.7	5.45	1013.75	87	-
418	1/10/2010	12 58	71˚24.67N	127˚41.60W	219	CTD CAST ↓	229	12	221	0.7	5.42	1013.5	85	-
418	1/10/2010	12 39	71˚24.74N	127˚41.55W	262	BALLOON METEO	232	5/10	260	99	5.43	1013.6	80	-
418	1/10/2010	13 04	71˚24.61N	127˚41.59W	205	Rosette CTD CAST ↑	230	8	218	92	5.43	1013.4	93	-
418	1/10/2010	13 47	71˚24.970N	127˚43.580W	41	MAPPING DEBUT	225	7	262	0.8	5.38	1013.33	85	-
418	1/10/2010	15 30	71˚42.510N	126˚55.81W	41	MAPPING FIN	439	4	310	0.6	5.6	1012.94	76	-
418	1/10/2010	16 29	71˚45.31N	126˚30.52W	354	DEBUT MOUILLAGE CA 16, MMP 10	352	12	300	0.6	5.4	1012.6	75	-
418	1/10/2010	16 54	71˚45.27N	126˚30.54W	21	FIN MOUILLAGE CA 16, MMP 10	353	9	290	0.6	5.41	1012.6	75	-
418	1/10/2010	16 57	71˚45.64N	126˚30.404W	320	TRIANGULATION CA 16, MMP 10	353	12	280	0.6	5.41	1012.56	75	-
418	1/10/2010	17 15	71˚41.051N	126˚31.343W	096	TRIANGULATION CA 16, MMP 10	393	9	264	0.6	5.41	1012.56	75	-
418	1/10/2010	17 25	71˚45.311N	126˚29.436W	262	TRIANGULATION CA 16, MMP 10	349	10	270	0.5	5.41	1012.46	75	-
418	1/10/2010	17 57	71˚45.41N	126˚32.70W	269	CTD CAST ↓	366	10	300	0.5	5.38	1012.32	75	-
418	1/10/2010	18 13	71˚45.37N	126˚33.06W	270	CTD CAST ↑	369	10	270	0.4	5.39	1012.28	76	-
TUKTOYOK TUK	2/10/2010	12 38	69˚51.933N	133˚20.444W	93	BALLOON meteo	16	28	071	0.1	4.4	1000.44	97	-
DULLEN PINGOS	3/10/2010	01 18	70˚59.363N	133˚58.999W	237	MAPPING DEBUT SECTION 1	218	21	056	-0.6	6.76	1003.25	97	-
DULLEN PINGOS	3/10/2010	02 30	70˚56.790N	134˚13.777W	237	MAPPING FIN SECTION 1	158	19	056	-0.7	6.24	1005.28	86	-
DULLEN PINGOS	3/10/2010	02 30	70˚56.790N	134˚13.777W	237	MAPPING DEBUT SECTION 2	158	19	056	-0.7	6.24	1003.20	86	-
DULLEN PINGOS	3/10/2010	14 14	70˚56.39N	134˚13.51W	60	MAPPING FIN SECTION 2	143	20	051	-22	6.90	1009.1	87	-
DULLEN PINGOS	3/10/2010	11 20	70˚56.467N	134˚11.477W	058	CTD ROSETTE CAST↓	144	21	055	-2.4	6.82	1009.49	87	-
DULLEN PINGOS	3/10/2010	14 30	70˚56.509N	134˚13.117W	052	CTD ROSETTE CAST↑	146	22	051	-2.4	6.81	1009.88	87	-
DULLEN PINGOS	3/10/2010	14 37	70˚56.543N	134˚13.204W	237	MAPPING debut SECTION 2B	149	22	062	-1.1	6.77	1009.84	93	-
DULLEN PINGOS	3/10/2010	16 45	70˚42.667N	135˚18.900W	070	CTD ROSETTE ↓	87	21	70	-1.1	6.77	1009.84	93	-
DULLEN PINGOS	3/10/2010	16 59	70˚42.727N	135˚19.150W	050	CTD ROSETTE ↑	88	22	70	-0.9	6.79	1009.55	91	-
DULLEN PINGOS	3/10/2010	17 15	70˚44.149N	135˚16.982W	057	MAPPING debut SECTION 3	86	23	070	-0.8	6.78	1009.4	91	-

DULLEN PINGOS	3/10/2010	23 45	70˚53.26N	134˚27.80W		MAPPING FIN Section 3		23	085	-1.3	6.89	1008.7		-
DULLEN PINGOS	4/10/2010	00 45	71˚05.03N	134˚17.40W	304	MAPPING debut ner Beaufort	481	25	071	-1.4	6.77	1011.73	76	-
DULLEN PINGOS	4/10/2010	03 08	71˚14.768N	134˚34.798W	035	MAPPING FIN ner Beaufort	860	28	075	-1.7	6.42	1012.73	80	-
DULLEN PINGOS	4/10/2010	12 52	71˚47.20N	130˚00.84W	092	BALLOON meteo	284	35	099	-3.4	5.87	1015.5	74	-
DULLEN PINGOS	5/10/2010	13 24	71˚55.915N	125˚21.454W	086	BALLOON meteo	16	27	083	-6.5	5.12	1007.8	91	-
408	6/10/2010					ROSETTE ↓								-
408	6/10/2010					ROSETTE ↑								-
408	6/10/2010	14 35	71˚19.05N	127˚35.60W	025	↓ P.N.F	205	16	048	-4.2	6	1008.2	81	-
408	6/10/2010	14 40	71˚19.05N	127˚35.68W	016	↑ P.N.F	207	14	044	-4.9	6	1008.1	79	-
408	6/10/2010	14 40	71˚19.06N	127˚35.69W	014	SECCHI ↓	208	15	042	-4.9	6	1008.1	79	-
408	6/10/2010	14 43	71˚19.06N	127˚35.73W	013	SECCHI ↑	205	13	034	-4.9	6	1008.1	79	-
408	6/10/2010	15 10	71˚19.05N	127˚35.54W	030	DEBUT MOUILLAGE CA05-10	205	15	056	-5.2	6.14	1008.1	79	-
408	6/10/2010	15 37	71˚19.05N	127˚35.59W	031	FIN mouillage, CA05-10	206	10	025	-11	6.18	1008.2	78	-
408	6/10/2010	15 51	71˚19.662N	127˚36.212W	147	Trinagulation CA 05 - 10, 427 m	702	16	030	-4.0	6.19	1008.15	79	-
408	6/10/2010	15 56	71˚18.912N	127˚35.394W	096	Trinagulation CA 05 - 10, 419 m	707	20	029	-4.0	6.19	1008.15	79	-
408	6/10/2010	16 01	71˚19.230N	127˚35.514W	318	Trinagulation CA 05 - 10, 422 m	709	18	044	-4.7	6.19	1007.98	82	-
408	6/10/2010	20 40	71˚00.22N	126˚04.36W	030	Deployment CA 08-10	392	19	011	-3.5	5.59	1007.22	88	-
408	6/10/2010	21 14	71˚00.279N	126˚04.275W	071	CA-08-10 deploye	394	18	022	-3.6	5.50	1007.57	88	-
408	6/10/2010	21 47	71˚00.025N	126˚04.704W	193	Triangulation Pos 3	399	19	027	-3.6	5.5	1007.37	88	-
408	6/10/2010	22 00	71˚01.050N	126˚02.233W	036	ROSETTE PP, NUTS ↓	393	14	015	-3.5	5.44	1007.15	93	-
408	6/10/2010	22 41	71˚01.70N	126˚07.629W	020	ROSETTE PP, NUTS ↑	396	13	025	-3.9	5.42	1007.12	94	-
408	6/10/2010	22 56	71˚00.987N	126˚02.136W	123	TUCKER NET ↓	397	15	020	-4.1	5.43	1007.59	94	-
408	6/10/2010	23 17	71˚00.618N	126˚00.009W	109	TUCKER NET ↑	393	16	020	-4.2	5.40	1007.69	96	-
408	6/10/2010	23 27	71˚00.529N	125˚59.767W	90	BONGO NET ↓	397	16	020	-4.3	5.39	1007.71	95	-
408	6/10/2010	23 35	71˚00.473N	125˚59.784W	114	BONGO NET ↑	394	14	015	-4.3	5.38	1007.73	95	-
408	6/10/2010	23 57	71˚00.44N	125˚59.72W	52	MONSTER NET ↓	397	13	018	-4.1	5.38	1007.8	94	-
408	7/10/2010	00 25	71˚00.42N	125˚59.46W	47	MONSTER NET ↑	394	13	024	-4.1	5.39	1007.9	95	-
408	7/10/2010	00 54	71˚00.48N	125˚59.85W	5	ROSETTE ↓	395	13	013	-4.1	5.4	1008.2	96	-
408	7/10/2010	01 12	71˚00.23N	126˚00.23W	10	ROSETTE ↑	396	12	000	-4.3	5.41	1008.3	96	-

APPENDIX B: DATA CHART