

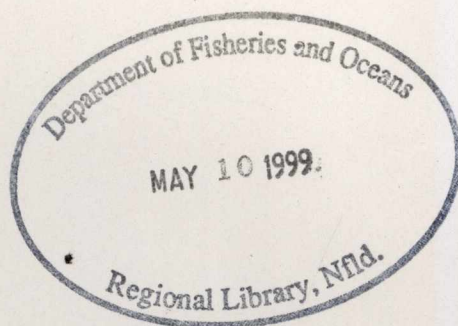


AIRBORNE ELECTROMAGNETIC SEA ICE SOUNDING MEASUREMENTS DURING 1998 GULF OF ST. LAWRENCE FIELD PROGRAM

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1999

Canadian Contractor Report of Hydrography and Ocean Sciences 53



Fisheries
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Pêches
et Océans

Canada

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by

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Cat. No. Fs 97-17/53E

ISSN 0711-6748

Correct Citation for this publication:

Holladay, J.S. and S.J. Prinsenberg, 1999. Airborne Electromagnetic Sea Ice Sounding Measurements During 1998 Gulf of St. Lawrence Field Program. Can. Contract. Rep. Hydrogr. Ocean Sci. 53: vi + 118p.

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Abstract

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The 1998 Gulf of St. Lawrence airborne ice monitoring program was active between February 21 and March 24. Field operations were based at the Canadian Coast Guard Helicopters facility at Charlottetown Airport in PEI. Approximately 1520 line kilometres of airborne Electromagnetic Ice Sounder data were obtained during this period, including long data acquisition traverses over the Gulf and Northumberland Strait as well as calibration confirmation lines over marked and augered sites.

The real-time data snow-plus-ice thickness data acquired by the system during the first half of the field program were contaminated by spikes generated by poor signal returns during laser altimeter operation over open water. A post-processing procedure removed the spikes from affected datasets for presentation in this report, while improvements to the system software installed on March 18 eliminated spiking in the real-time output of the system.

The system's calibration had changed since the 1997 field season owing to the removal of a snow radar transceiver unit from the sensor bird. A new "field" calibration was calculated, tested and installed on February 22, based on data obtained on February 21 over a marked and augered test line. An independent opportunity to verify system calibration occurred on 18 March, using a marked and augered ice floe floating in the Northumberland Strait. This yielded good agreement between EIS and surface measurements on average despite strong lateral changes in ice thickness along the surveyed line. Over a thin flat floe at this site, the results agreed at the 1 centimetre level. The system calibration was re-calculated using an advanced calibration utility during the preparation of this report and found to be consistent with the field calibration to within 0.4% in amplitude, corresponding to negligible systematic error at the normal bird height of 15 m.

Résumé

Holladay, J.S. and S.J. Prinsenberg, 1999. Airborne Electromagnetic Sea Ice Sounding Measurements During 1998 Gulf of St. Lawrence Field Program. Can. Contract. Rep. Hydrogr. Ocean Sci. 53: vi + 118p.

Le programme d'observation aéroporté des glaces du golfe du Saint-Laurent 1998 a eu lieu du 21 février au 24 mars. Les opérations sur le terrain ont été menées à partir de l'installation des hélicoptères de la Garde côtière canadienne à l'aéroport de Charlottetown, à l'Île-du-Prince-Édouard. On a recueilli des données de sondage électromagnétique aéroporté sur environ 1 520 kilomètres de lignes au cours de cette période, y compris de longs trajets d'acquisition de données effectués au-dessus du golfe du Saint-Laurent et du détroit de Northumberland, ainsi que des lignes de confirmation de l'étalonnage effectuées au-dessus de sites marqués et forés.

Les données en temps réel sur l'épaisseur de la neige et de la glace saisies par le système au cours de la première moitié des programmes sur le terrain étaient contaminées par des pics engendrés par de mauvais retours de signaux au cours des opérations à l'altimètre laser effectuées au-dessus des eaux libres. Une procédure post-traitement a permis d'enlever les pics des ensembles de données contaminés afin qu'ils puissent être présentés dans ce rapport. De plus, des améliorations apportées au logiciel installé le 18 mars a permis d'éliminer les pics dans les extraits en temps réel du système.

L'étalonnage du système avait été modifié après les opérations sur le terrain de 1997, puisqu'on avait enlevé un émetteur-récepteur radar à neige de la torpille de détection. Un nouvel étalonnage « sur le terrain » a été calculé, mis à l'essai et installé le 22 février à partir des données saisies le 21 février au-dessus d'une ligne d'essai marquée et forée. Une nouvelle occasion de vérifier l'étalonnage du système s'est présentée le 18 mars. Cette vérification a été effectuée au-dessus d'une banquise marquée et forée dans le détroit de Northumberland. Il y avait, en moyenne, une bonne concordance entre les données de sondage électromagnétique aéroporté et les mesures à la surface, malgré d'importants changements latéraux au niveau de l'épaisseur de la glace le long de la ligne observée. L'écart entre les données recueillies pour une banquise plate et mince à ce site était inférieur à 1 centimètre. L'étalonnage du système a été recalculé au moyen d'un programme d'étalonnage perfectionné pendant la préparation de ce rapport. On a conclu que l'étalonnage était fidèle à l'étalonnage sur le terrain à moins de 0,4 % d'amplitude, ce qui constitue une erreur systématique négligeable étant donnée l'altitude moyenne des torpilles de détection, soit 15 m.

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1. Introduction

The 1998 Gulf of St. Lawrence pack ice field measurement program began on February 17 and continued to March 24. Airborne Electromagnetic Ice Sounder (EIS) measurements were obtained over the Northumberland Strait and southern Gulf during a series of flights by CCG helicopter CG353. Surface activities, including Argos beacon emplacement and retrieval, preparation of marked lines for test and calibration purposes, and sampling for ice salinity were conducted using other CCG helicopters.

The methodology used during this program was based on procedures developed during field work and data analysis for programs in 1994, 1995 and 1996, as described in Holladay and Moucha, (1998), Holladay *et al*, (1998), and Moucha *et al*, (1998).

The Canadian Coast Guard airborne Electromagnetic Ice Sounder used during this field program was described in Holladay *et al*, (1998). It was towed by a Coast Guard MBB B0105 helicopter #CG353 that was piloted by Ron Moores.

This report begins with a summary of field personnel and operations, describes the 1998 EIS dataset, and concludes with an assessment of system performance and calibration.

The processed results are presented in flight statistics table form in Appendix B and as profile plots in Appendix D. Flight path plots are provided in Appendix C. "Standard Plots" of the data have not been included in this report, as they would fill hundreds of pages. They are however available as Postscript file archives which are indexed relative to the statistics tables and the flight path and profile plots in the Appendices. Surface measurements obtained during the field program are listed in Appendix A.

2. 1998 Field Program

Objectives

The 1998 field program for the EIS had the following objectives:

1. Evaluate and improve modifications made to the laser hardware and software so that improved high-frequency laser data could be acquired and stored,
2. Deliver real-time and processed EIS data and plots to the Canadian Ice Service, and
3. Collect EIS data to validate ice signatures seen in RADARSAT imagery.

Personnel:

Bedford Institute of Oceanography

- SP Simon Prinsenberg (Principal Investigator)
- GF George Fowler
- IP Ingrid Peterson (remote support)

Vanguard Geophysics Inc.

- JSH Scott Holladay (EIS support lead)
- RZM Robert Z. Moucha (contractor to Vanguard)
- JL James Lee (EIS remote support)

Canadian Coast Guard

- AM André Maillet (Ice Operations chief)
- RM Ronald Moores (pilot)
- PM Paul Mosher (pilot)
- IH Ian Henderson (Charlottetown helicopter engineer)

Canadian Ice Centre

- ST Syd Thompson (Ice Services Specialist)
- CS Colin Stock (Ice Services Specialist)
- DF Dan Fequet (Ice Services Specialist)

Daily Field Activity Summary:**Tuesday, 17 February**

Weather: clear, cold -10°C . Winds light NW

On arrival JSH and RZM, initiated diagnostics on Ice Probe bird. Identified and repaired problem with analogue input for EM: input amplifiers damaged. Cause uncertain, but static discharge through the tag line is a possibility. Added some protection for the inputs to the analog board. Tested bird outside in evening: EM signals good, but no GPS data.

Wednesday, 18 February

Weather: fair, -2°C , turning poor in evening. Winds light NE

Troubleshooting GPS problem began with cable continuity checks: all cables were OK but an incipient problem with a signal line from preamplifier was noted and repaired. An oscilloscope was requested from CG base to assist in troubleshooting the GPS problem. Oscilloscope arrived in afternoon. Testing confirmed that the interface chips on both channels of the RS422-232 interface board were damaged. No spares for the chip were present in the CG spares kit.

Thursday, 19 February

Weather: rain, low ceiling all day.

A workaround for the blown interface chip for Channel A (the only one in use) was fabricated from discrete components. This was tested and found to be operational. The bird was tested outside. Pitch and roll data were found to be correct. The rest of the system was set up and tested as well as possible on the ground for a flight test on Friday.

Friday, 20 February

Weather: rain, slight clearing in late afternoon (ceiling still low).

EM Flight Files: 001-003

Test flight #1. On takeoff, bird shut down. On disassembly, found fuse blown on 5V-power supply input. Symptoms suggest low power supply voltage at bird. Inspected and rebuilt the helicopter power supply cable: located a possible high-resistance point at helicopter end during rebuild. Note that this cable is not the same one as was used earlier (apparently lost). Present cable was assembled from the cable designed for 206L installation, and had been modified by the addition of a plug to its helicopter end. It was in this modification that the apparent high-resistance point was located. Ground tests completed. Installed DVM to monitor 28V output of rack-mount power supply.

Saturday, 21 February

Weather: overcast in am, clearing toward noon.

EM Flight Files: 004-007

Flew test flight #2. Noted that Navlink transmissions seemed to interfere with the GPS interface. RM turned Navlink off. File FLT004 measured over Hillsborough Bay calibration line. All systems appear to be operational. Calibration is slightly low (20 cm over line which should read 35 cm ice thickness). Flight #3: short flight over Strait, ended with ceiling deteriorating. Files FLT005, 007 included good data. FLT006, 008-009 were tests. Halted analogue chart recording after these flights due to chart paper shortage. System operating normally without chart printing.

Sunday, 22 February

Weather: clear, -2° to 0°C, winds 10 km/hr W

EM Flight Files: 010-013

Flight #4: JSH operated over test line and Strait for extended test of EM and new calibration, FLT10-012, set up using FLT004 data over marked line.

Old calibration factors:

(+1.0315 0.0194),(0.9806 0.3300),(1.3076 0.5778)

New calibration factors computed in field from FLT004, Line 20:

(+0.9953 0.0034),(0.9560 0.3104) (1.2994 0.5733)

Ratios (new/old): (0.9646 - 0.0148i), (0.9714 - 0.0104i), (0.9935 - 0.0006i)

Calibration appeared to be good. Noted many spikes in laser altimeter caused by melt water on ice.

Flight #4: Re-fueled at Summerside. System problem appeared during FLT013, just after start of profiling. Restarted immediately, received error messages from bird, so returned to base. Determined that bird was operational after landing. The error messages seen were due to startup too soon after bird turnoff. A 2 minute wait between shutdown and startup under this circumstance (hot shutdown without "halt" being issued) is advisable to avoid this problem.

Flight #5: Trained ST (ISS) in use of system over Hillsborough Bay, files FLT014 –015. JSH evaluated new post-processing software with RZM in evening.

Monday, 23 February

Weather: Clear, -1 °C, winds light W

EM Flight Files: 016-021

Flight #6: Flight file FLT016 for training purposes over Hillsborough Bay test line and out over Strait, including run north along the western side of the Confederation Bridge.

Flight #7-8: Flight files FLT017-018, 019 – 021 with ST operating solo. 021 aborted. JSH continued to check through new post-processing software with RZM during ST solo flights. RZM departed 1400 for Toronto. ST departing on Tuesday, to be replaced by Colin Stock (CS)

Plotted portions of FLT017 and provided them to SP. Laser-generated spikes made it difficult to use profile plots. Colour plots will serve a short-term solution until the laser spike problem can be corrected.

Tuesday, 24 February

Weather: clear, high cirrus, degrading as storm approaches from S.

EM Flight Files: 022-024

Flight #9: Flight file FLT022 to north of PEI, then west over North Cape and down over ice to Summerside.

Flight #10: After refuelling at Summerside, flew east along strait to a point east of Hillsborough Bay. Strong winds were encountered toward the end of this track.

System “froze” twice during eastbound acquisition. Real-time data were recovered, but raw data files 023-024 were not. Reasons for these infrequent freeze-ups unknown. [Later determined likely due to Ethernet intermittency.]

Wednesday, 25 February

Weather: rain, windy (40 kts)

EM Flight Files: none. JSH worked on field report and processing.

Thursday, 26 February

Weather: rain, low ceiling.

EM Flight Files: none. JSH worked on field report and processing. Plotted up colour bar plots of FLT010, 011, (012 already plotted), 014, (017 already plotted), 018, 019, 020. Plotted 024 from real-time results.

Friday, 27 February

Weather: poor, no flying, bad forecast for weekend.

EM Flight Files: none. Met with SP, discussed profile plots prepared during field work and further plans for processing and field work. JSH returned to Toronto.

Monday, 9 March

Weather: poor, no flying. EM Flight Files: none

Problems encountered with tow cable: Ethernet failure. Turned out to be due to the Ethernet's socket pins at bottom of tow cable being pulled back into the rubber insert (remote diagnosis.) Temporarily solved by Andre, helicopter engineer from Laurentian Region, working with RM, by pulling socket pins down into play using pliers.

Tuesday, 10 March

Weather: poor, no flying. EM Flight Files: none

Complete bird shutdown during takeoff, would not restart. Attempted to run TST on ground, no response. Turned out to be due to 3A fuse F1 on Receiver Power Supply board in slow blow failure again. This fuse is evidently slightly underrated and should be replaced by a larger one.

Thursday, 12 March

EM Flight Files: 039, 040 (high altitude ferry)

Flight #11: CS operated. System operated nominally for FLT039 and high altitude ferry during 040 for return to base.

Friday, 13 March

Weather: snow showers

EM Flight Files: 041-043 (all aborts). Ground testing with TST prior to flight indicated that EM was operational. CS flew FLT041 to 043 (through snow shower on way out). No EM responses measured, indicating that EM had failed. JSH during phone support call requested that copies of chart records be faxed so that he could assess operational status.

Saturday, 14 March

Weather: clear, -10°C, winds 10km/hr W.

EM Flight Files: none

Chart records not available for faxing at time of call to JSH by RM in morning. Evidence from TST check by RM strongly suggested failure of EM receiver. SP authorized RM to request that JSH travel to PEI to service system by this time.

JSH travelled to Charlottetown. On inspection of analog chart plots, it was determined that a receiver or transmitter failure had occurred after the successful flight on March 12. Further troubleshooting with the bird opened up indicated that the problem lay in the input amplifiers on the analog/digital board. All three were replaced, and the anti-static protection at this end of the board improved. Testing indicated that the system was operating normally.

3A fuse F1 was replaced with a 5A fuse to prevent future slow-blow failures. Extra loading (not visible at DC) due to high pulsed load from Vicor DC-DC converters may account for these marginal overloads. During testing, it was observed that the socket pins at the bottom of the tow cable were improperly seated. These carry the Ethernet signal, and intermittence in this connection could have caused some of the problems observed.

Sunday, 15 March

Weather: poor and deteriorating, with snow and low ceilings.

EM Flight Files: none

The connector at the bottom of the tow cable was partially rebuilt to permit proper seating of the Ethernet socket pins. The Molex connectors used in this system should be replaced with a more robust type of connector as soon as is practical.

Monday, 16 March

Weather: clear in morning, snow showers developing

EM Flight Files: 044-055

Flight #12: JSH flew with system FLT044-52, Charlottetown to Cape Egmont, returning via Strait after fueling. System operated nominally. Arrived at Charlottetown in light snow shower in late morning. Laser, GPS shut down during approach, perhaps due to a static discharge. The system was restarted to ensure that laser was available for pilot, as no ground crew was available.

Flight #13: CS scheduled to fly out over Gulf on long mission with SP. Many snow showers were present, due to instability in advance of a high pressure system. First test line (FLT055) with system started properly, but failed in snow shower and could not be restarted. Helicopter returned to base.

Determined that either receiver or transmitter were damaged, based on initial examination of chart record. Receiver subsequently found to be operational. Transmitter was inspected. Damage was found in the driver portion of the unit, which was disassembled. After replacement of damaged parts, the transmitter was reassembled and tested. Steps were also taken to reduce static buildup on the transmitter heat sink and to repair mechanical damage (chafe on digital signal lines) observed at this time. After reassembly, the system was found to be fully operational.

Tuesday, 17 March

Weather: Clear, -6°C, wind light NW

EM Flight Files: 056-073

Flight #14: CS flew a long mission with system, refueling in Moncton. One survey line per flight file was recorded. Operation was essentially nominal.

Wednesday, 18 March

Weather: clear, -6 °C in morning. Winds calm.

EM Flight Files: 074-076

Installed revised bird program intended to prevent laser spikes from reaching the real-time processing and logging system.

Flight #15: During test FLT074, the revised software worked very well. The laser display was steady over open water and no spikes were noted at any time.

Flight #16: During the afternoon, flew out to a floe (FLT075) in Egmont Bay to test system calibration where a Granada TV crew was filming.

Flight #17: FLT076: Flew numerous passes along line and perpendicular to line. Lack of video recording on the ice sensor helicopter make it hard to tie the results back to the marked ice, as the floe was drifting. However, real-time results

were in close agreement with drilling results, particularly over the small, thin pan at the north end of the line where thicknesses were quite uniform. Main floe thickness was found (both from airborne and surface measurements) to be highly variable.

Thursday, 19 March

Weather: clear, cold in morning, winds light E

EM Flight Files: 077-081

Flight #18-19: JSH flew long tandem mission with SP and LL over Strait and Gulf. System operation was nominal, data quality very good for all five flight files.

Weather: forecast to be poor for Friday and through weekend. Backed up remaining data onto Zip disk. Returned to Toronto in afternoon.

Tuesday, 24 March

Weather: Clear, -2°C, winds light NW.

EM Flight Files: 082-086

Flight #20: CS flew last mission of season, FLT082-086 (O84 aborted). System performed nominally.

3. Flight Summary

1998 flights are summarised in Table 3.1 below. They are listed by their FLT number and date, with a brief description for each flight file. Also included is operator identification by initials for the flight (see Sect. 3). Files which were aborted or which could not be used for profile and map preparation are not listed. Statistical summary files for these files may be found in Appendix B.

Table 3.1: 1998 Flight Summary

FLT Number	Date	Comments	Operator
4	21-Feb-98	Test flight over marked line: Recalibrate	JSH
5	21-Feb-98	Test flight over Strait: Recalibrate	JSH
7	21-Feb-98	Test run over Strait: Recalibrate	JSH
10	22-Feb-98	Test flight over marked line--verify new RT calib.	JSH
11	22-Feb-98	Hillsborough Bay: marked lines	JSH
12	22-Feb-98	N. Strait, Hillsb. Bay to Bedeque Bay	JSH
15	22-Feb-98	Training flight for S. Thompson, Hillsb. Bay	ST
16	23-Feb-98	S. Thompson solo check over Hillsb. Bay	ST
17	23-Feb-98	Gulf N. of Charlottetown: NW, then SE	ST
18	23-Feb-98	East through Strait after refuel at S'side	ST
19	23-Feb-98	West from Hillsb. Bay to Egmont Bay	ST
20	23-Feb-98	Egmont Bay, West Point, North Cape	ST
22	24-Feb-98	Radarsat validation, leg 1 in Gulf	JSH
47	16-Mar-98	E Side, W Side of Confederation Bridge	JSH
48	16-Mar-98	Continue to Egmont Bay	JSH
51	16-Mar-98	Cape Egmont and eastward	JSH
52	16-Mar-98	Strait E from Bridge to open water	JSH
56	17-Mar-98	File 1: long flight to Moncton and return	CS
62	17-Mar-98	Recce leg #1 N. of Tracadie (short line)	CS
63	17-Mar-98	Recce leg #2 N. of Tracadie to North Cape	CS
64	17-Mar-98	Recce leg #3: Cape North course WNW	CS
65	17-Mar-98	Recce leg #4: Course SSW to 46.80 N	CS
66	17-Mar-98	Recce leg #5: Course SSW, end SW West Point	CS
69	17-Mar-98	Recce leg #6: E in Strait	CS
70	17-Mar-98	Recce leg #7: E in Strait, end S of Bedeque Bay	CS
71	17-Mar-98	Recce leg #8: NE along Confederation Bridge	CS
72	17-Mar-98	Recce leg #9: SW along Confederation Bridge	CS
74	18-Mar-98	Test after Bird Program patch for spikes	JSH
75	18-Mar-98	Egmont Bay marked line: approach, 1 pass	JSH
76	18-Mar-98	Egmont Bay marked line: multiple passes	JSH
77	19-Mar-98	Strait to Bridge	JSH
78	19-Mar-98	Bridge, E and W sides	JSH
79	19-Mar-98	Bridge to Egmont waypoint, then refuel	JSH
80	19-Mar-98	Egmont waypoint to Cape North waypoint	JSH
81	19-Mar-98	Cape North waypoint to Pearkes, S. to Tracadie	JSH
82	24-Mar-98	Reconnaissance flight	CS
83	24-Mar-98	Reconnaissance flight	CS
85	24-Mar-98	Reconnaissance flight	CS
86	24-Mar-98	Reconnaissance flight	CS

4. Processing

Introduction:

The plan at the outset of this project was to process the airborne data overnight in order to provide processed and plotted data to the Canadian Ice Service on a daily basis. Some processing was in fact carried out during the program and the results provided to S. Prinsenberg and I. Peterson on an overnight basis.

The task was complicated by the abundance of spikes in the ice thickness output caused by laser altimeter glitches where the bird flew over open water. The spikes arose from changes made to the laser altimeter filtering software and to the installation of a different model of laser altimeter. Field priorities were therefore amended as follows:

1. Keeping the system operational and correcting problems as they occurred,
2. Gaining a detailed understanding of the source of the altimeter glitches,
3. Devising means of removing these glitches from the processed data, and
4. Considering techniques for preventing such glitches from generating spikes during real-time processing.

By the end of the February phase, the laser altimeter glitches were well understood and a technique for removing them from existing data had been formulated and initially tested. The real-time elimination of laser spikes was successfully tested on March 18. Laser data obtained after this time were essentially spike-free and unfiltered.

Data gathered prior to this time required de-spiking in post-processing. A preliminary “cumulant” procedure for removing spikes using the observed statistical behaviour of the laser altimeter data to distinguish laser-generated spikes from genuine ice thickness changes was implemented as an m-file and Fortran program by R. Moucha.

After testing and analysis, it was determined that this statistical approach was unsatisfactory. A new method based on searching for indicators in the “fast” laser altimeter data embedded in the .RAW output files was implemented as a Matlab script and found to be very effective in removing laser spikes.

Flight files 004 – 073 were de-spiked using this new method during post-processing for this report. The profile map results presented in Appendix C thus show no evidence of such contamination. Flights after this time did not require de-spiking in post-processing.

Processing Procedure:

The first step in processing of the 1998 field dataset was to adjust for incorrect system calibrations, as discussed in the next section.

When this had been completed, the files were conditioned and re-inverted using the standard utilities. Except for FLT files 51, 63 and 71, the drift corrections were not altered, as the real-time drift corrections were of acceptable quality. Where corrections were necessary, new baseline drift correction points were selected and the data re-baselined using utility program DRIFT32.

The data were then inverted using the same frequencies and model set-up used for post-processing inversion of the 1996 and 1997 data, *i.e.*

- Frequencies used were 30 kHz, 90 kHz, inphase and quadrature;
- Ice conductivity initial value 0.02 S/m, with range 0.001 to 0.1 S/m;
- Seawater conductivity 2.5 S/m (fixed);
- Ice thickness initial value 0.35 m, with range 0.01 and 10 m;

While some of these model and inversion control parameters may eventually benefit from adjustment, it was considered preferable for the purposes of this report to maintain consistency in the model parameters from year to year to prevent the introduction of spurious systematic changes into this series of ice thickness datasets.

When inversion was complete, the flight files were processed in Matlab to remove spikes due to laser dropouts using the raw laser data. The de-spiked data were then used to generate standard plot profiles and map output using the Matlab mapping utilities. The statistical summaries, flight paths and profile maps for each flight are listed in Appendices B, C and D. Appendix A lists the surface measurements obtained during this field program.

5. Calibration

The 1998 system calibration was prepared on February 22 using data from FLT004, line 20. The required surface measurements are summarised in Table 5.1. There was no snow present on the ice (it had melted during a thaw) so that only ice thicknesses are provided.

Table 5.1: Surface measurements for Hillsborough Bay calibration line

Distance	Site #	Thickness	Distance	Site #	Thickness
0	1*	36	100	21*	36
5	2	36	105	22	38
10	3	37	110	23	40
15	4	37	115	24	36
20	5*	38	120	25*	36
25	6	35	125	26	39
30	7	37	130	27	36
35	8	38	135	28	36
40	9*	37	140	29*	37
45	10	39	145	30	38
50	11	35	150	31	39
55	12	36	155	32	38
60	13*	38	160	33*	36
65	14	36	165	34	39
70	15	38	170	35	36
75	16	40	175	36	39
80	17*	35	180	37*	38
85	18	35	185	38	38
90	19	37	190	39	38
95	20	35	195	40	38
			200	41**	40

* indicates a marker bag placed at the site

The EM system component of EIS uses calibration coefficients which are expressed as three complex numbers, one each for the 30, 90 and 150 kHz operating frequencies. The use of complex coefficients is an efficient way to scaling changes in amplitude and changes in system phase. The results of the calibration calculations performed in the field were:

Old calibration factors (pre-98):

(+1.0315 0.0194i),(0.9806 0.3300i),(1.3076 0.5778i)

New calibration factors computed on Feb. 22, 1998 from FLT004, Line 20:

(+0.9953 0.0034i),(0.9560 0.3104i) (1.2994 0.5733i)

Ratios (new/old):

(0.9646 - 0.0148i), (0.9714 - 0.0104i), (0.9935 - 0.0006i)

The above field calibration was checked after reprocessing of the dataset using the program PCCalQW on two passes from this flight, lines 20 and 50:

The mean and SD of the incremental calibration factors computed using PCCalQW for Line 020 were

(0.99546, -0.00071) (0.99787, -0.00167) (1.00206, 0.00069)
(0.00115, 0.00014) (0.00109, 0.00038) (0.00123, 0.00037)

These incremental changes are consistent with those generated in the field (a perfect match would consist of (1.0, 0.0) for each frequency). These values differ in amplitude by less than 0.5% from the field calibration in all cases.

As a consistency check, the mean and SD of Incremental Calibration Factors computed using PCCalQW for Line 050 are:

(0.99969, 0.00192) (0.99318, 0.00807) (0.98146, -0.00425)
(0.00066, 0.00007) (0.00066, 0.00025) (0.00088, 0.00028)

Again, these results match the field calibration very well, to within 0.1% at 30 kHz, .7% for 90 kHz, and 1.9% at 150 kHz.

These two sets of incremental factors match well (to better than 0.5% in amplitude) between Line 20 and Line 50 at 30 and 90 kHz but differ at the 2% level at 150 kHz. The reasons for the differences are not known, but are consistent with typical noise levels for the three frequencies. The results from the first pass will be used for later comparisons. To put these differences into perspective, at 15 m altitude over 1 m ice, an difference of 1% in the amplitude of the calibration factors at both frequencies being used for inversion (30 and 90 kHz) corresponds to a difference of about 0.6 cm in snow plus ice thickness and 0.12 mS/m in ice conductivity. The 0.5% differences observed in this case yields a systematic difference of about 0.3 cm in ice thickness and 0.06 mS/m in ice conductivity. These differences are certainly negligible compared to errors in surface measurements and laser altitude.

Using PCCalQW to combine the pre-98 calibration factors with the observed incremental factors yielded the following mean bird calibration factors:

(0.99157, 0.00383) (0.95579, 0.30762) (1.30359, 0.57886)

The differences between the factors determined using PCCalQW to those prepared on February 22 and used in real time are approximately 0.4% 0.2% and 0.2% in amplitude for the three frequencies. As a further check, tests were performed to evaluate the differences in inverted data corrected with these two calibrations. The differences were found to be negligible, as expected.

This analysis indicated that it was not necessary to recalibrate FLT010-086 before re-inversion for this report. FLT004-007 were re-calibrated using the field-generated incremental factors

(0.9646 -0.0148), (0.9714 -0.0104), (0.9935 -0.0006)

for the 30, 90 and 150 kHz data to make them consistent with the rest of the dataset.

Confirmation of calibration over marked line:

Figure 5.1 and Figure 5.2 below show the EIS result on which the February 22 calibration was based (Line 20) and a subsequent pass (Line 50). Laser altimeter spikes are present near –100 and +230 m during the second pass, generated by specular reflection of the laser beam from the surface of small melt pools on the ice and the consequent loss of reflected signal. These artifacts were left in to illustrate the large amplitude of the laser spikes, which were eliminated in real-time data by a bird software change on March 18. Spikes were removed during post-processing from data files gathered prior to this date.

The correspondence between the mean airborne and surface measurements was good, to within 2.5 cm for both passes. Registration to the surface measurement line was accomplished through manual “fiducial” marks placed on the system’s hardcopy chart output during data acquisition. This procedure is not as precise as registration from video imagery, but over flat ice surfaces it is the best approach available, in the absence of differentially corrected GPS positions.

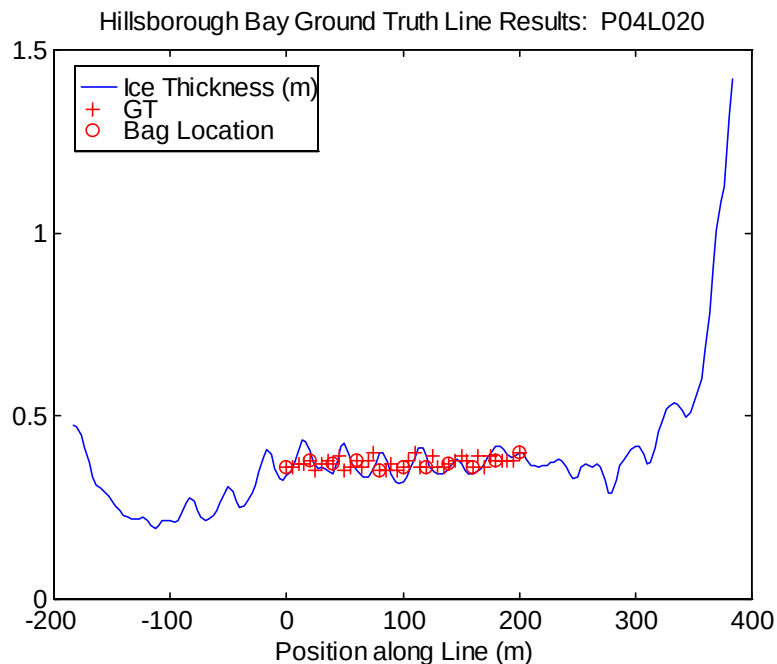


Figure 5.1: Plot of EIS-observed ice thickness over Hillsborough Bay calibration line. Surface measurements are presented as crosses. Circles mark bag locations or other known features.

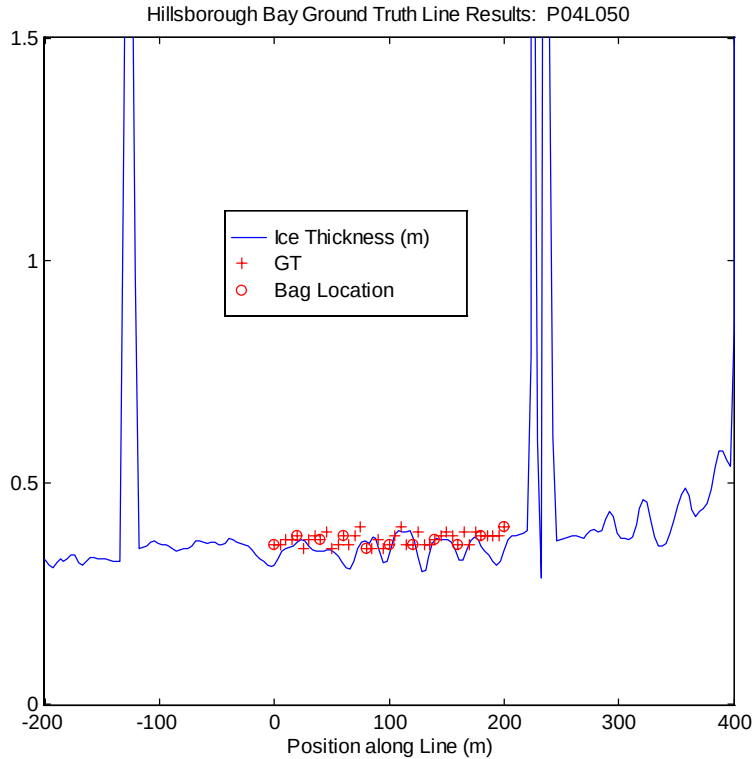


Figure 5.2: A subsequent pass over the calibration line. Surface measurements are presented as crosses. Circles mark bag locations or other known features. Laser-altimeter generated spikes may be seen near the –100 and 230 metre positions.

Comparison to pre-1998 Calibration:

The change required between the 1998 calibration factors and those from the previous year were the result of two factors:

1. The calibration calculation during the 1997 field work was erroneous due to a mistaken snow plus ice thickness estimate along the calibration line of 0.35 m (this was the average ice-only thickness), when in fact the average snow plus ice thickness along the line was 0.50 m. This error was not detected until recent reprocessing for reporting purposes. The actual bird calibration factors (A_{30} , A_{90} and A_{150}), computed during this reprocessing, were approximately:

$$(0.9865 + 0.0187i) \quad (0.9471 + 0.3171i) \quad (1.2690 + 0.5438i)$$

2. The snow thickness radar was installed in the bird throughout the 1997 field season. Its presence was expected to alter the system's calibration slightly. The actual differences between the 1998 field calibration and the corrected 1997 calibration stated in item 1 above were:

$$(-0.0255 - 0.0330i) \quad (0.0233 - 0.3299i) \quad (-0.2713 - 0.5420i)$$

This suggests shifts in both amplitude and phase calibration due to the presence of the radar transceiver: the differences in amplitude are on the order of 3-5% at 30 and 90 kHz, and the phase difference increases rapidly with frequency. These differences are large enough to generate ice thickness errors on the order of 0.03 m at normal operating altitudes, as well as more serious ice conductivity errors.

Test of Open-Water Calibration:

Another system calibration test was performed using four patches of open water encountered during FLT074, after the laser spike rejection software had been installed in the bird. This yielded the following set of incremental calibration factors (relative to FLT004 Line 20 calibration):

A	(0.99433, -0.00254)	(0.98211, 0.00683)	(0.96753, -0.00413)
B	(1.00285, 0.00098)	(0.98974, 0.00731)	(0.97507, -0.00527)
C	(1.00116, -0.00067)	(0.98818, 0.00700)	(0.97678, -0.00557)
D	(0.99765, -0.00017)	(0.98359, 0.00833)	(0.97369, -0.00480)

Differences from FLT004, L20 were:

A (	0.0019	+0.0030i)	(0.0169	-0.0094i)	(0.0366	+0.0064i)
B (	-0.0066	-0.0005i)	(0.0092	-0.0099i)	(0.0291	+0.0076i)
C (	-0.0049	+0.0011i)	(0.0108	-0.0095i)	(0.0274	+0.0079i)
D (	-0.0014	+0.0006i)	(0.0154	-0.0109i)	(0.0305	+0.0071i)

These differences had percentage means and SD's (in amplitude) of

mean	(-0.28	+0.10i)	(1.31	-0.99i)	(3.09	+0.73i)
sd		0.41		.037		0.41

which are considerably larger than the differences between the L20 and L50 on the Hillsborough Bay calibration line, as well as the difference between the February 22 field calibration and the PCCalQW calibration, both of which were based on FLT004, Line 20.

The use of open water for calibration purposes, if it could be accomplished without generating systematic errors in estimated ice thickness and conductivity, would be useful for Coast Guard operational surveys in Gulf and Labrador Sea waters as it would reduce the amount of laborious ground truth data acquisition required. A few conductivity-temperature-depth (CTD) casts in the immediate vicinity of the site and at the approximate time of EM data acquisition would probably provide sufficiently accurate ground truth for such calibrations. The logistics of obtaining good CTD data in open water may make optimal experimental design difficult, but performing a number of CTD casts in close proximity to the ice edge should provide sufficient constraints on the water conductivity profile for calibration purposes.

Although open-water calibration may be a desirable alternative in an operational CCG mode to the present method, the above results do raise some questions.

They suggest that some systematic errors may be generated during the procedure, particularly at high frequencies, or that a systematic bias is present in the existing calibration procedure. Further experimental work including simultaneous acquisition of CTD data, ice-based calibration and adjacent open-water-based calibration appear to be required to further test this approach.

Before data acquisition activities are resumed in 1999, an accurate assessment of the system calibration should be obtained by the standard method, including if possible airborne imagery to verify registration of the airborne dataset to the on-ice calibration line. This will facilitate the assessment of system calibration changes as a function of time. This can be followed, if desired, with a careful assessment of open-water calibration.

6. Egmont Bay Validation Line

A drifting floe in Egmont Bay was marked and drilled, then profiled with EIS on March 18, FLT075-076. The surface measurements for this line are given in Table 6.1:

Table 6.1: Surface measurements on Egmont Bay marked floe

Distance	Snow	Thickness	Distance	Snow	Thickness
-100	15	125	200*	10	34
-80	5	146	220	10	39
-60	0	160	235*	--	--
-40	26	50	240	10	38
-20	0	136	260	0	125
0***	12	34	270*	--	--
10	20	37	350	12	42
20	1	40	370	0	35
30	20	48	390	0	120+
40*	18	75	410	13	120+
50	17	68	430	0	120+
60	9	64	450	0	52
70	8	50	470	0	120+
80*	1	36	490	10	46
90	15	32	510	0	58
110	12	40	530	7	34
130*	15	32	550	0	36
140*	15	30	570	15	32
160	15	30	590	10	32
180	15	32	650	rubble starts	

where

* denotes a surface mark position

+ denotes that ice is greater than the stated thickness

FLT075 ended with an initial pass over the floe from E-W before it had been marked. FLT076 included five N-S and S-N passes. The first three airborne passes flew directly over the line, while the last two were displaced

approximately 40 m to the W owing to the presence of a film crew near the line. These profiles are presented as a composite in Figure 6.1.

The lack of flight path imagery makes direct registration of the ground truth to the airborne data difficult. However, this was accomplished to first order by the following procedure:

1. Identify common features (e.g. a ridge with a particular shape in profile)
2. Use these features to register the different airborne passes together
3. Register the ground truth data to the airborne passes using stretching (effectively just velocity changes) and translation of the airborne data.

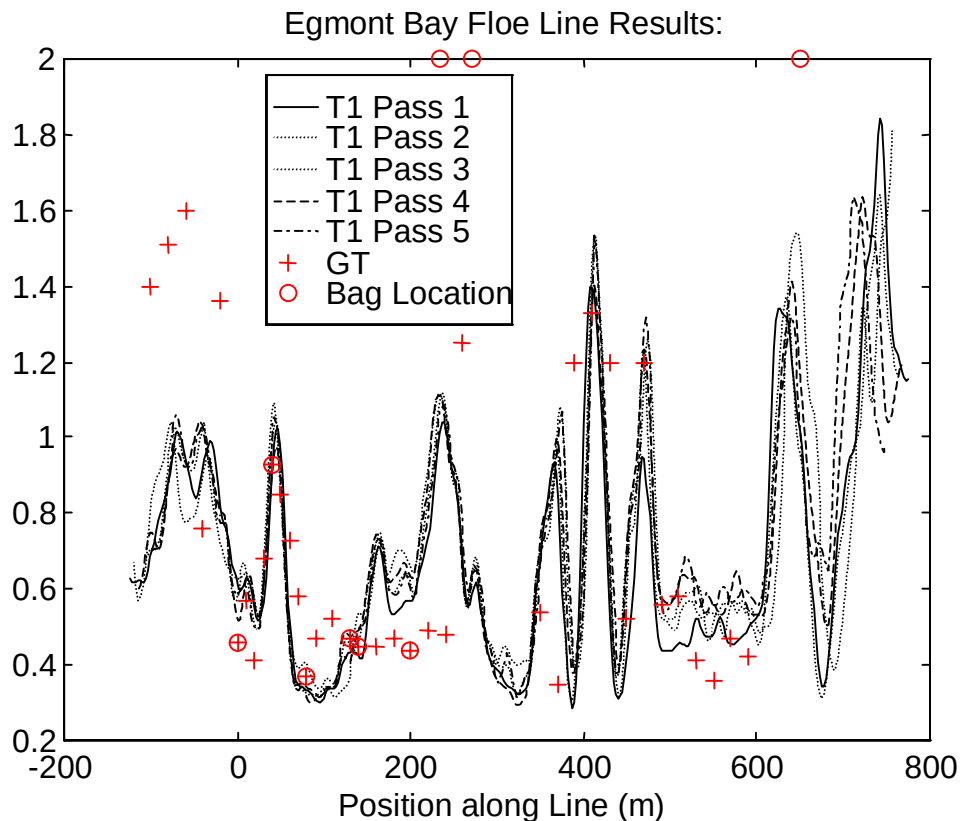


Figure 6.1: Composite of five airborne thickness profiles over the Egmont Bay floe line. Surface measurements are presented as crosses. Circles mark bag locations or other known features.

Figure 6.1 is of particular interest in that it shows the strong coherency and repeatability of the airborne measurements over the complex floe structure, as well as the degree of correspondence between surface and airborne measurements expected for such a structure. There are zones of disagreement between surface and airborne measurements, such as the section between -100 and -40 m along the line. It is likely that the feature responsible for these thickness disparities was a narrow ridge of total thickness 1.2 - 1.4 m, aligned with the survey line. This is supported by the small snow thickness observed at

several of the auger sites and by the much lower average thickness of the floe. A feature having this geometry would not have been accurately captured by the airborne measurements unless its width was greater than 10-30 m. A less likely explanation is that, since these auger measurements were obtained at unmarked points on the lead-up to the marked portion of the line, they may have been systematically excluded by curvature in the flight path as the bird was lined up with the marks.

Another point of systematic difference between the airborne and ground measurements occurs near +200 m. The ground truth indicates a consistent 0.45 to 0.5 m snow plus ice thickness, while the airborne data suggests at least 10 cm greater thickness and considerably more variability. It is possible that a large rafted block exists beneath this section of the floe which was not detected in the auger holes but which does increase the EM-estimated thickness.

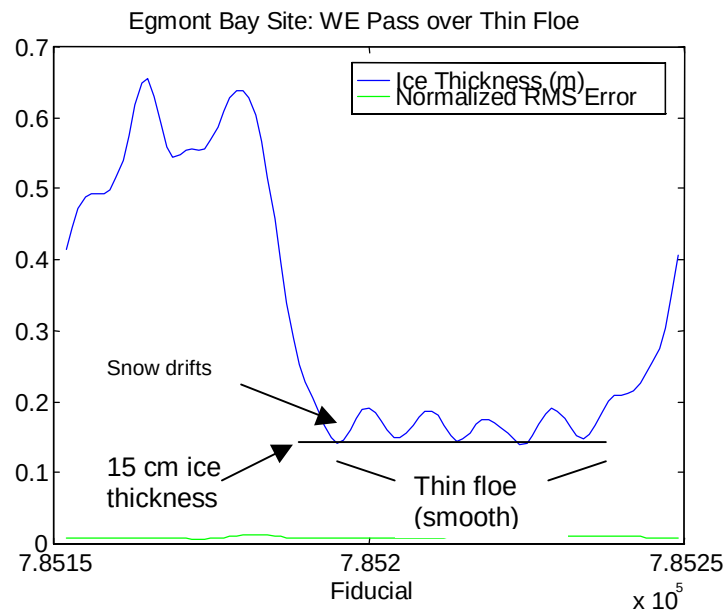


Figure 6.2: Pass from W to E over thin floe to north of main Egmont Bay floe. The auger-measured 0.15 m ice thickness and snow drifts are clearly visible due to the smooth surface and uniform thickness of the floe.

An airborne pass crossed the thin (15 cm ice plus 10 cm snow drifts) floe to the north of the main floe from W to E (Figure 6.2). This example provides an opportunity to examine the snow-plus-ice thickness resolution of the under good operating conditions. The auger-measured thickness of the ice of this floe was 0.15 m, with snow drifts of up to 0.1 m observed and drift-to-drift separations of about 20 m. The real-time airborne data (here plotted with respect to time in tenths of a second) are in agreement with these observations. They show a 0.15 m minimum thickness matching the surface measurements within 0.01 m), corresponding to bare ice, and undulations with an amplitude of 0.05 m and a period of 1 second, corresponding to 30 m at a speed of 30 m/s. The greater apparent separation of the drifts appears to correspond to the effect of crossing the linearly oriented drifts at an oblique angle.

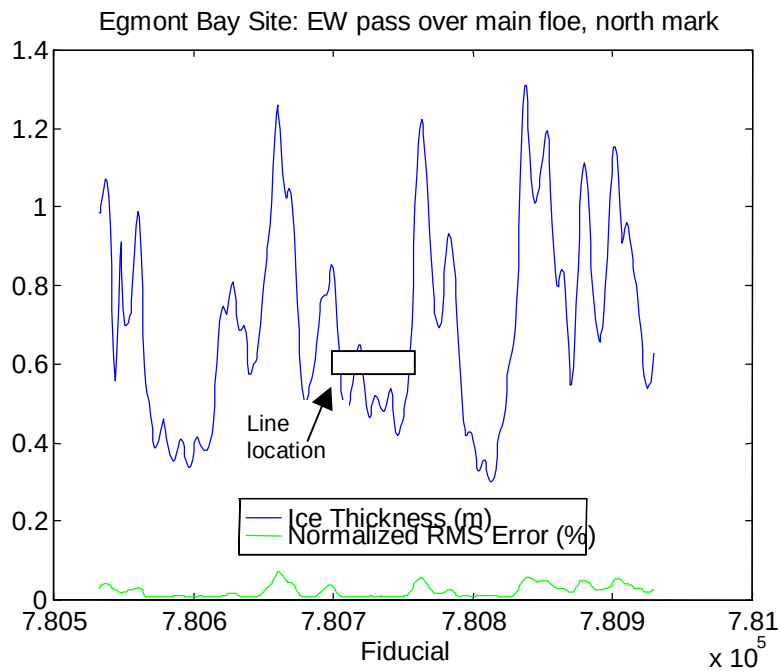


Figure 6.3: Line crossing northern end of marked line from W to E. Box marks estimated location of ground truth line.

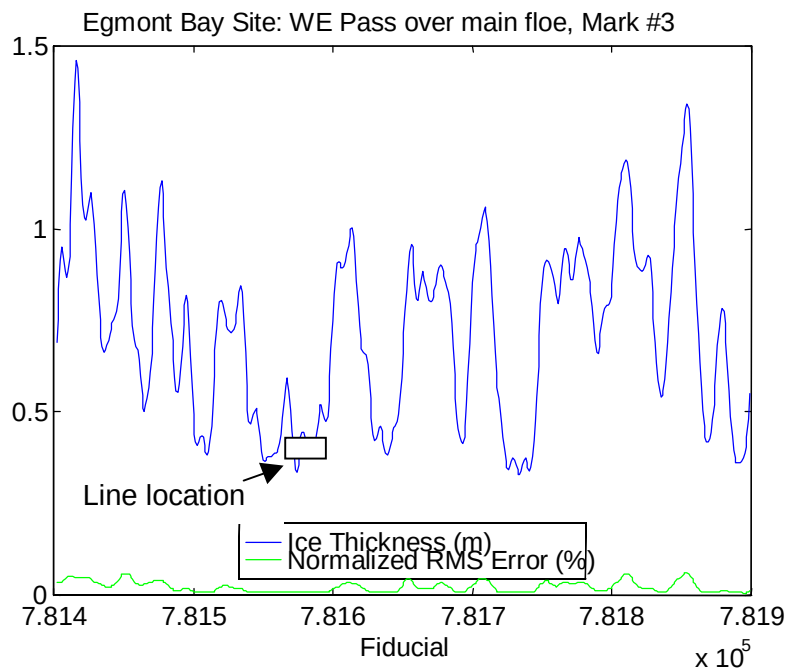


Figure 6.4: Line crossing over third mark on line, passing from E to W. Box marks estimated location of ground truth line.

Two more passes crossed the marked line itself, the first run from E to W passing over the northernmost mark, and the second from W to E passing over the third mark (Figs 6.3 and 6.4). In the absence of airborne imagery it was difficult to precisely locate the point where the profile crossed the ground truth line. The best estimates for the locations of these crossings are indicated on the figures.

The principal point of interest in these two profiles is that they extend knowledge of the highly variable character of the ice thickness observed along the marked line into the third dimension. Despite its gentle surface relief, this floe was clearly a complex structure formed from smaller floes that were rafted and sutured together, then smoothed by weathering.

7. Summary

The 1998 EIS field program was executed between February 21 and March 24. The principal objectives were:

1. to test and correct modifications made to the laser hardware and software in 1997 so that improved high-frequency laser data could be acquired and stored; and
2. to deliver real-time and processed EIS data and plots to the Canadian Ice Service; and to collect EIS data to validate ice signatures seen in RADARSAT imagery.

The EIS system was calibrated and tested on February 22. Spikes in ice thickness generated by laser altimeter signal dropouts over open water were analysed and a post-processing spike rejection method was tested. Ten missions were executed, including calibration and training flights. Survey flights continued after the departure of one of the authors (Holladay).

On Friday, March 13, the system was damaged by a static discharge during a snow shower. This problem was too serious for correction by DFO personnel on site. One of the authors (Holladay) returned to PEI on Saturday, 14 March and remained until Thursday, 19 March. By the end of this time, the sensor's transmitter had been partially rebuilt, the real-time laser spike elimination software was in place, system operation was essentially optimal, and a considerable amount of profiling had been completed during 8 missions.

System problems encountered in 1998 fell into three categories:

1. the first generated by static discharge,
2. the second by problems in the power and tow cables, and
3. the third by a change in the character of the Optech Alpha (new in 1997) laser altimeter output over open water compared to the previous IBEO PS100E unit. The altimeter problem was exacerbated by an error in the bird 1997 software when the radar snow sensor was installed into the system.

Cabling problems often had to be solved by locating and correcting faults as they occurred. In a few cases, it was possible to identify and correct incipient cabling problems before they caused system failures. Static discharge issues were also addressed on a case-by-case basis. A long series of flights with nominal operation following the last static-damage repair suggests that the most troublesome cabling and static-discharge weaknesses of the system have been corrected.

The laser altimeter glitches were addressed by a change to the bird computer software, which now inspects the laser data and passes it on to the helicopter computer only when it is valid. Post-processing correction software for data recorded prior to the bird software change was prepared and demonstrated to eliminate virtually all spikes in ice thickness.

The field calibration, prepared on February 22, is consistent with calibration checks performed during post-processing and with surface measurements made on the Egmont Bay marked floe. For this reason, it was not necessary to recalibrate any data (FLT010-086) acquired after the real-time calibration was updated on February 22. Flight files FLT004-007 were re-calibrated in post-processing to utilise the same February 22 calibration factors.

Approximately 1520 line kilometres of data were acquired during this field program. These data were post-processed using the same inversion control parameters as were used for the 1996 and 1997 datasets in order to maintain year-to-year consistency in the results. A spike rejection filter was used to correct data files that were affected by laser spikes. The flight data files have been presented as statistical summaries (Appendix B) and as flight path and profile maps (Appendices C and D). Detailed “standard plot” profiles have been archived digitally.

Recommended maintenance for the EIS system before the 1999 field season includes the following:

1. Replace serial interface chip (used for GPS-to-bird computer traffic), replace spare parts used during the 1998 field program and provide spares for the serial interface chip.
2. Replace the Molex tow cable connectors with more robust ones (lower priority).

Prior to routine flying of the system, and before any modifications to the bird's EM subsystems, a careful calibration over a marked line on level land-fast ice should be performed in order to determine whether the system's calibration has changed significantly. This should assist with assessment of changes in system calibration with time.

It would be useful to reconsider the possibility of performing system calibrations over open water. This has been problematic in the past, owing to frequent problems with signal return in the laser altimeter. The relatively high quality of laser altitudes obtained during this year's field suggests that the procedure might be able to yield good results for Coast Guard operational purposes over water that is fairly smooth (though not flat and glassy). However, an initial test performed using this year's data identified systematic differences between ice-based and water-surface-based calibrations that should be thoroughly investigated before changing the calibration methodology.

At a lower level of priority, it would be useful to equip the system with a flight-path monitoring camera and recording system. This is primarily used for registering airborne data to features such as marked lines on the ice surface, particularly those located on drifting ice. It is useful during analysis of long survey traverses as well. If integrating a digital “Video-GPS” package into the EIS system were to prove impractical for some reason, the same video camera mounted in a pod and recorded on the existing CG S-VHS VCR would be sufficient. Suitable cabling would have to be procured to interface with the video annotation board in the system computer.

Acknowledgements

The authors gratefully acknowledge the efforts of Coast Guard personnel in Charlottetown, particularly Ron Moores and Ian Henderson. André Maillet provided Coast Guard liaison and, with CIS personnel Syd Thompson and Colin Stock participated in the airborne and surface data acquisition. James Lee provided crucial technical support during the preparation and field operations phases of the program. Rob Moucha wrote and supported the some portions of the DFO field processing software package and processed much of the data presented in this report. Support for this project was provided by the Panel on Energy Research and Development and by the Canadian Coast Guard.

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Appendix A: Surface Measurements

Gulf of St. Lawrence 1998 Ice Station Data

Station 17.1

Clear, -10°C
Light NW winds

Land-fast ice off Point Gage

-46 53.85°N, 64 14.87°W

-Ice thickness 60, 45 and 59cm.

-no snow

Ice Salinities (depth/ppt):

5cm/3ppt, 15cm/4ppt, 20cm/5ppt and 35cm/ 8ppt.

Station 18.2

Clear, -2°C
Light NE winds

Pack ice off Point Gage

-46 57.71°N, 64 21.99°W

-Ice thickness 50, 44 and 44cm.

-no snow

Ice Salinities (depth/ppt):

5cm/7ppt, 15cm/3ppt, 25cm/5ppt and 35cm/7ppt.

Station 18.3

Clear, -2°C
Light NE winds

Pack ice off Point Gage

-46 57.39°N, 64 24.63°W

-Ice thickness 30 and 30cm.

-rough snow covered floe 4cm of snow

Ice Salinities (depth/ppt):

snow/1ppt, 5cm/1ppt, 15cm/0ppt and 25cm/1ppt.

Station 18.4

Clear, -2°C
Light NE winds

Pack ice Northumberland Strait, northwest of bridge

-46 17.10°N, 63 50.14°W

-Ice thickness 2+m, 500mx500m rafted floe

-3cm snow

-GPS beacon #2755 (15:20)

-Ice Salinities (depth/ppt):

5cm/3ppt, 15cm/4ppt, 20cm/5ppt and 35cm/ 8ppt.

Station 18.5

Clear, -2°C
Light NE winds

Pack ice Northumberland Strait, southwest of bridge
-46 14.5°N, 63 53.00°W (guess!)
-Ice thickness 39cm, 500mx500m smooth floe
-no snow
-GPS beacon #2756 (15:35)
-Ice Salinities (depth/ppt):
5cm/9ppt, 15cm/7ppt and 25cm/8ppt

Station 18.6

Clear, -2°C
Light NE winds

Pack ice Northumberland Strait, southeast of bridge
-46 07.44°N, 63 41.03°W
-Ice thickness 2+m, 150mx250m rafted floe
-no snow
-GPS beacon #2754 (15:45)
no ice Salinities

Station 18.7

Clear, -2°C
Light NE winds

Pack ice Northumberland Strait, northeast of bridge
-46 10.54°N, 63 38.77°W
-Ice thickness 2+m, 150mx150m rafted floe
-3cm snow
-GPS beacon #2757 (16:10)
-Ice Salinities (depth/ppt):
5cm/1ppt and 15cm/4ppt

Station 20-1

Cloudy, 0°C
Light w winds

Calibration Line in Hillsborough Bay

-46 05.1°N, 63 02.9°W in 13.8 to 14.2 m of water.

-200m line with bags and holes at 20 and 5m intervals.

-Ridge to the NE at ~200m from end of the line (two bags).

-Water 2-3cm on surface of ice.

Distance	Site #	Thickness	Distance	Site #	Thickness
0	1*	36	100	21*	36
5	2	36	105	22	38
10	3	37	110	23	40
15	4	37	115	24	36
20	5*	38	120	25*	36
25	6	35	125	26	39
30	7	37	130	27	36
35	8	38	135	28	36
40	9*	37	140	29*	37
45	10	39	145	30	38
50	11	35	150	31	39
55	12	36	155	32	38
60	13*	38	160	33*	36
65	14	36	165	34	39
70	15	38	170	35	36
75	16	40	175	36	39
80	17*	35	180	37*	38
85	18	35	185	38	38
90	19	37	190	39	38
95	20	35	195	40	38
			200	41**	40

* indicates a marker bag place at the site

Station 22.1

Clear, -4°C
20km/hr westerly winds

Calibration line (10:30).

-Surface water frozen, trace of snow.

-Checked ice thickness at every 40m site.

-0m/36cm; 40m/40cm; 80m/38cm; 120m/39cm; 160m/36cm; 200m/35cm.

Station 22.6

Clear, -4°C
10km/hr westerly winds

Calibration line (16:00)

- measured distance to ridge (200m) from double end bags.
- depths/ice thickness at every 50m from end of the line to ridge.
50m/ 13.2m/ 41cm; 100m/ 13.1m/ 45cm; 150m/ 12.8m/ 52cm;
180m/x/52cm
- no sounding at ridge or ice thickness but several freeboards:
distance from and before the ridge 10m/35cm; 15m/23cm and 20m/10cm
- ice thickness behind ridge: 20m/50cm and 40m/50cm

Station 20.2

Cloudy, 0°C
Light W winds

Pack ice Northumberland Strait, northeast of bridge

- 46 07.95°N, 63 35.04°W
- Ice thickness 2+m, 100mx150m rafted floe
- Rough floe, no snow
- GPS beacon #4459 (15:15)

Station 20.3

Cloudy, 0°C
Light W winds

Pack ice Northumberland Strait, southeast of bridge

- 46 05.27°N, 63 37.34°W
- Ice thickness 2+m, 50mx50m rafted floe
- Very rough floe, no snow
- GPS beacon #4458 (15:30)

Station 21-1

Clear, -1°C
Light W winds

Pack ice off Cape Gage

- 46 59.14°N, 64 36.53°W
- Ice thickness: 38, 44 and 52cm
- Rough 200mx200m floe, spots of hard snow mostly flat slippery ice.
- Deployed GPS beacon #26381 (11:30)

Station 21-2

Overcast, 0°C
Light W winds

Pack ice off northern coast of PEI (temporary land-fast ice)

- 46 27.5°N, 62 56.4°W.
- Bright area on Radarsat image.
- Rough wind generated rubble pile 1km wide.
- Blocks 20cm thick have sharp edges.
- 2+m thick rafted pans.

Station 22.2

Clear -2 to 0°C
10km/hr westerly winds

Ice pressure station #1 (11:45)

- round floe 300mx300m made of mostly flat ice with some snow patches.
- Ice thickness 50cm/ 52cm/ 53cm and 50cm.
- Lat. 46 41.47°N , Long 64 30.92°W .
- GPS beacon #3124, 3d pressure beacon #1055 and 1d pressure beacon #22191.
- Salinities depth/ppt:
2cm/0ppt; 10cm/2ppt; 20cm/6ppt.
- Salinities from ice at pressure sensors; #22191/ 4ppt and 1155/ 4ppt.

Station 22.3

Clear -2 to 0°C
10km/hr westerly winds

GPS beacon at ice pressure station #1 (13:00)

- North corner of triangle, GPS beacon #3123.
- Round floe 500mx500m made of mostly flat ice with some snow patches
- Ice thickness 58cm and 60cm
- Lat. 46 43.76°N , Long 64 32.49°W

Station 22.4

Clear -2 to 0°C
10km/hr westerly winds

GPS beacon at ice pressure station #1 (13:00)

- Southeast corner of triangle, GPS beacon #3121.
- Round floe 400mx400m made of rough ice with some snow patches
- Ice thickness 34cm and 38cm
- Lat. 46 40.18°N , Long 64 26.79°W

Station 22.5

Clear -2 to 0°C
10km/hr westerly winds

GPS beacon at ice pressure station #1 (13:00)

- Southeast corner of triangle, GPS beacon #3122.
- Round floe 500mx500m made of mostly flat ice with some snow patches.
- Ice thickness 76cm and 80cm.
- Lat. 46 38.57°N , Long 64 33.93°W

Station 23.1

Clear -1°C
Light westerly winds

Ice pressure station #2 (11:07)

- Oval 100mx200m floe; beacons on thicker top segment
- Ice thickness 55cm/ 65cm and 65cm, no snow.
- Lat. 46 29.46°N , Long 64 23.13°W.
- GPS beacon #8541, 3d pressure beacon #2364 and 1d pressure beacon #1053.
- Pressure beacon 30m from edge facing 200°.
- Salinities depth/ppt:
2cm/0ppt; 15cm/6ppt; 30cm/10ppt.

Beacons recovered on March 24 after one month.

- Beacons on a temporary land-fast ice along the NB shore.
- Ice rafted over 2m thick with some wet layers.
- Beacons along with 8542 still together on 5x7m pan in between rubble field.
- Beacons all tilted as if rain melted ice surface around before frozen in again
- Both beacons were very loose in the surface ice and could be pulled out.
- 3d pressure beacon sensor top 7cm and bottom 17cm from ice surface.
- 1d pressure beacon sensor top 5cm and bottom 15cm from ice surface.
- Ice surface rough covered with snow up to 20cm deep

Station 23.2

Clear -1°C
Light westerly winds

GPS beacon at ice pressure station #2 (11:15).

- North corner of triangle, GPS beacon #8543.
- Rough floe 200mx200m with some snow patches.
- Ice thickness 35cm and 40cm.
- Lat. 46 32.06°N , Long 64 23.59°W.

Station 23.3

Clear -1°C
Light westerly winds

- GPS beacon at ice pressure station #2 (11:29).
- Southwest corner of triangle, GPS beacon #8542.
- Large round floe 500mx500m made of rough ice with some snow patches
- Ice thickness 50cm and 50cm, snow patches.
- Lat. 46 26.31°N , Long 64 25.39°W.

Station 23.4

Clear -1°C
Light westerly winds

- GPS beacon at ice pressure Station #2 (14:44).
- Southeast corner of triangle, GPS beacon #4457.
- Round floe 500mx500m made of mostly flat ice with some snow patches.
- Ice thickness 50cm and 50cm.
- Lat. 46 29.31°N , Long 64 19.06°W

Station 11.1 and 11.2

Cloudy, -1°C
15km/hr westerly winds

- Seal herd locations north of Cape North
- GPS beacons placed out by A. Maillet in afternoon Feb. 11, 1998.
- beacons #26368 centre and #26378 southeastern end.

Station 11.3

Cloudy, -1°C
15km/hr westerly winds

- Hooded seal herd location north of Summerside.
- GPS beacon #26382 placed out by M. Hamel and G. Stenson.

Station 14.1

Clear, -10°C
10km/hr Westerly winds

- Pancake ice rubble north of Cape North.
- Placed Seimac beacon on pancake ice, beacon #26380.
- Largest floe 3m, mostly smaller. Ice thickness 1.5m at floes 40cm between floes.
- Composite floes 2kmx2km, other similar floes in area.
- 50% water in area, old ice 20% and pancake ice 30%.

Station 18-1

Clear, -6°C
Calm

Calibration Line SE of Point Egmont at 46 19.91°N, 64 04.5°W

- First visit in morning landed on rafted section of floe
- Ice thickness 64/75/75cm south of three end bags, floe 1.03km wide.
- Thin floe to NW: ice thickness 15/15/15cm with 10cm of snow drifts
- Ship track in between at edge of old floe.
- Second visit in afternoon with film crew.
- Old floe has snow drifts to 26cm approximately 20m wide.
- End bags (three) at SE end approximately 300m from edge
- NW end of line ends in wide rubble field 200-300m wide.

Distance	Snow	Thickness	Distance	Snow	Thickness
-100	15	125	200*	10	34
-80	5	146	220	10	39
-60	0	160	235*	--	--
-40	26	50	240	10	38
-20	0	136	260	0	125
0***	12	34	270*	--	--
10	20	37	350	12	42
20	1	40	370	0	35
30	20	48	390	0	120+
40*	18	75	410	13	120+
50	17	68	430	0	120+
60	9	64	450	0	52
70	8	50	470	0	120+
80*	1	36	490	10	46
90	15	32	510	0	58
110	12	40	530	7	34
130*	15	32	550	0	36
140*	15	30	570	15	32
160	15	30	590	10	32
180	15	32	650	rubble starts	

Appendix B: Statistical Summary Tables

B-2

DATE: FEB21 FLIGHT #: 04

Total Length: 23.306 km

Line Number	Start FID	End FID	Start		End		No. of Smples ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	52989300	53019600	46.1379	-63.1881	46.1313	-63.1731	217	1.378	0.47	0.406		
Total	52989300	53019600	46.1379	-63.1881	46.1313	-63.1731	234	1.378	0.47	0.406	0.10	4.53
10020	53194100	53239900	46.0906	-63.0919	46.0802	-63.0714	235	2.000	0.03	0.052		
	53239900	53287200	46.0802	-63.0714	46.0836	-63.0462	356	2.003	0.39	0.305		
	53287200	53334500	46.0836	-63.0462	46.0862	-63.0208	325	1.997	0.38	0.225		
	53334500	53352400	46.0862	-63.0208	46.0886	-63.0115	180	0.775	0.13	0.136		
Total	53194100	53352400	46.0906	-63.0919	46.0886	-63.0115	1173	6.775	0.26	0.268	0.10	4.32
10030	53399000	53455500	46.0864	-63.0186	46.0837	-63.0439	497	2.001	0.36	0.319		
	53455500	53478400	46.0837	-63.0439	46.0826	-63.0543	199	0.819	0.44	0.374		
Total	53399000	53478400	46.0864	-63.0186	46.0826	-63.0543	713	2.820	0.38	0.338	0.10	3.55
10040	53605600	53659800	46.0815	-63.0574	46.0848	-63.0322	461	2.000	0.46	0.277		
	53659800	53660400	46.0848	-63.0322	46.0848	-63.0319	7	0.019	0.01	0.000		
Total	53605600	53660400	46.0815	-63.0574	46.0848	-63.0319	485	2.020	0.45	0.280	0.10	3.68
10050	53700800	53764800	46.0856	-63.0295	46.0860	-63.0536	579	2.001	0.43	0.234		
	53764800	53819100	46.0860	-63.0536	46.1030	-63.0617	322	2.003	0.48	0.206		
	53819100	53872100	46.1030	-63.0617	46.1204	-63.0677	314	1.998	0.36	0.159		
	53872100	53924500	46.1204	-63.0677	46.1379	-63.0729	288	2.002	0.80	2.137		
	53924500	53976600	46.1379	-63.0729	46.1555	-63.0781	101	1.999	0.15	0.093		
Total	53700800	53985400	46.0856	-63.0295	46.1582	-63.0789	1783	10.313	0.49	0.970	0.10	3.63

DATE: FEB21 FLIGHT #: 05

Total Length: 4.190 km

Line Number	Start FID	End FID	Start		End		No. of Smples ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	60060900	60114300	46.1331	-63.1993	46.1190	-63.2153	419	2.003	1.62	2.820		
	60114300	60117400	46.1190	-63.2153	46.1183	-63.2162	25	0.111	0.01	0.009		
Total	60060900	60117400	46.1331	-63.1993	46.1183	-63.2162	473	2.114	1.53	2.766	0.10	3.74
10020	60252900	60306200	46.0822	-63.2583	46.0688	-63.2755	267	2.002	1.13	0.513		
	60306200	60356300	46.0688	-63.2755	46.0562	-63.2937	211	2.001	1.05	0.467		
	60356300	60406600	46.0562	-63.2937	46.0443	-63.3128	323	1.997	1.29	0.600		
	60406600	60456600	46.0443	-63.3128	46.0325	-63.3321	235	2.003	1.17	0.572		
	60456600	60508600	46.0325	-63.3321	46.0243	-63.3544	377	1.996	1.43	0.431		
	60508600	60564700	46.0243	-63.3544	46.0308	-63.3773	365	2.001	1.16	0.585		
	60564700	60618600	46.0308	-63.3773	46.0423	-63.3969	368	2.001	1.26	0.651		
	60618600	60671600	46.0423	-63.3969	46.0535	-63.4171	257	2.002	1.11	0.472		
	60671600	60723600	46.0535	-63.4171	46.0641	-63.4378	277	1.999	1.11	0.446		
	60723600	60775300	46.0641	-63.4378	46.0745	-63.4589	227	2.000	1.16	0.548		
	60775300	60803400	46.0745	-63.4589	46.0797	-63.4706	174	1.084	1.16	0.522		
Total	60252900	60803400	46.0822	-63.2583	46.0797	-63.4706	3482	21.086	1.20	0.548	0.10	3.84
10030	61004200	61067600	46.0743	-63.4486	46.0817	-63.4717	446	2.003	0.89	0.406		
	61067600	61123400	46.0817	-63.4717	46.0923	-63.4924	349	2.000	0.97	0.457		
	61123400	61177200	46.0923	-63.4924	46.1030	-63.5131	253	2.001	1.20	0.449		
	61177200	61230800	46.1030	-63.5131	46.1133	-63.5342	191	1.997	0.87	0.282		
	61230800	61283000	46.1133	-63.5342	46.1239	-63.5549	270	2.002	0.94	0.336		
	61283000	61335200	46.1239	-63.5549	46.1344	-63.5759	215	1.999	0.95	0.359		
	61335200	61386600	46.1344	-63.5759	46.1450	-63.5968	168	2.002	0.87	0.266		
	61386600	61437800	46.1450	-63.5968	46.1557	-63.6174	148	1.998	0.86	0.256		
	61437800	61489600	46.1557	-63.6174	46.1669	-63.6375	151	2.000	0.79	0.218		
	61489600	61540600	46.1669	-63.6375	46.1781	-63.6576	202	2.002	0.44	0.197		
	61540600	61592800	46.1781	-63.6576	46.1897	-63.6773	186	1.997	0.49	0.236		
	61592800	61643000	46.1897	-63.6773	46.2012	-63.6971	188	2.002	0.53	0.171		
	61643000	61693200	46.2012	-63.6971	46.2124	-63.7171	41	2.000	0.37	0.220		
	61693200	61723400	46.2124	-63.7171	46.2194	-63.7288	160	1.192	0.40	0.171		
Total	61004200	61723400	46.0743	-63.4486	46.2194	-63.7288	3505	27.195	0.81	0.405	0.10	3.79

DATE: FEB21 FLIGHT #: 05

10040	61783900	61833900	46.2321	-63.7506	46.2430	-63.7712	294	2.003	0.53	0.184		
	61833900	61884900	46.2430	-63.7712	46.2527	-63.7929	270	1.999	0.46	0.183		
	61884900	61936600	46.2527	-63.7929	46.2629	-63.8141	248	2.002	0.50	0.183		
	61936600	61988600	46.2629	-63.8141	46.2713	-63.8368	221	1.997	0.41	0.164		
	61988600	62041800	46.2713	-63.8368	46.2797	-63.8595	265	2.001	0.38	0.230		
	62041800	62094800	46.2797	-63.8595	46.2882	-63.8822	276	2.002	0.63	0.670		
	62094800	62148800	46.2882	-63.8822	46.2976	-63.9041	234	1.997	0.74	0.381		
	62148800	62200400	46.2976	-63.9041	46.3072	-63.9259	246	2.001	0.59	0.366		
	62200400	62252100	46.3072	-63.9259	46.3154	-63.9488	335	2.002	0.67	0.432		
	62252100	62304600	46.3154	-63.9488	46.3232	-63.9720	254	2.000	0.55	0.205		
	62304600	62357900	46.3232	-63.9720	46.3316	-63.9947	286	2.001	0.77	0.334		
	62357900	62411400	46.3316	-63.9947	46.3404	-64.0171	338	1.997	0.71	0.339		
	62411400	62464300	46.3404	-64.0171	46.3499	-64.0391	238	2.002	0.78	0.413		
	62464300	62516200	46.3499	-64.0391	46.3597	-64.0607	311	2.001	0.69	0.173		
	62516200	62567800	46.3597	-64.0607	46.3689	-64.0829	232	1.999	0.76	0.274		
	62567800	62618100	46.3689	-64.0829	46.3774	-64.1056	285	2.001	0.77	0.308		
	62618100	62669200	46.3774	-64.1056	46.3857	-64.1285	222	2.000	0.82	0.264		
	62669200	62719800	46.3857	-64.1285	46.3945	-64.1510	122	2.000	0.56	0.269		
	62719800	62771200	46.3945	-64.1510	46.4051	-64.1719	351	2.002	0.85	0.393		
	Total	61783900	62771200	46.2321	-63.7506	46.4051	-64.1719	6450	41.818	0.65		

DATE: FEB21 FLIGHT #: 07

Total Length: 23.572 km

Line Number	Start FID	End FID	Start		End		No. of Smples ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	63350500	63409500	46.4237	-64.2067	46.4339	-64.2278	442	2.002	0.76	0.650		
	63409500	63465900	46.4339	-64.2278	46.4432	-64.2497	356	2.000	0.48	0.291		
	63465900	63520500	46.4432	-64.2497	46.4510	-64.2730	296	1.998	0.88	0.809		
	63520500	63570400	46.4510	-64.2730	46.4602	-64.2952	335	2.000	0.51	0.309		
	63570400	63589400	46.4602	-64.2952	46.4643	-64.3042	167	0.832	0.31	0.151		
Total	63350500	63589400	46.4237	-64.2067	46.4643	-64.3042	1703	8.833	0.62	0.560	0.10	3.72
10020	63609500	63653600	46.4698	-64.3092	46.4789	-64.2886	262	2.002	0.77	1.058		
	63653600	63695600	46.4789	-64.2886	46.4834	-64.2634	186	2.001	0.73	0.287		
	63695600	63737200	46.4834	-64.2634	46.4860	-64.2378	310	2.001	0.42	0.312		
	63737200	63778000	46.4860	-64.2378	46.4881	-64.2120	276	2.000	0.76	0.520		
	63778000	63819900	46.4881	-64.2120	46.4906	-64.1863	203	2.000	0.45	0.225		
	63819900	63861900	46.4906	-64.1863	46.4932	-64.1607	153	2.000	0.52	0.348		
	63861900	63903000	46.4932	-64.1607	46.4963	-64.1351	276	2.000	0.73	0.545		
	63903000	63918400	46.4963	-64.1351	46.4975	-64.1257	114	0.735	1.25	0.740		
Total	63609500	63918400	46.4698	-64.3092	46.4975	-64.1257	1968	14.739	0.67	0.608	0.10	4.86

DATE: FEB22 FLIGHT #: 11

Total Length: 10.849 km

Line Number	Start FID	End FID	Start		End		No. of Smples ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	62033200	62070600	46.1580	-63.0505	46.1410	-63.0420	345	2.003	0.10	0.103		
	62070600	62086400	46.1410	-63.0420	46.1339	-63.0388	159	0.831	0.03	0.026		
Total	62033200	62086400	46.1580	-63.0505	46.1339	-63.0388	503	2.833	0.08	0.093	0.11	5.63
10020	62172400	62213500	46.0962	-63.0302	46.0784	-63.0267	377	2.003	0.62	0.310		
	62213500	62246400	46.0784	-63.0267	46.0641	-63.0235	272	1.613	1.89	3.386		
Total	62172400	62246400	46.0962	-63.0302	46.0641	-63.0235	670	3.617	1.15	2.291	0.10	4.88
10030	62398100	62447400	46.0870	-63.0308	46.0828	-63.0502	464	1.600	9.16	2.723		
Total	62398100	62447400	46.0870	-63.0308	46.0828	-63.0502	470	1.600	9.16	2.723	0.10	3.24
10040	62500000	62538400	46.0834	-63.0487	46.0851	-63.0320	364	1.317	0.18	0.207		
Total	62500000	62538400	46.0834	-63.0487	46.0851	-63.0320	370	1.317	0.18	0.207	0.10	3.42
10050	62577600	62625200	46.0856	-63.0280	46.0834	-63.0466	447	1.482	0.24	0.345		
Total	62577600	62625200	46.0856	-63.0280	46.0834	-63.0466	455	1.482	0.24	0.345	0.10	3.11

DATE: FEB22 FLIGHT #: 10

Total Length: 17.539 km

Line Number	Start FID	End FID	Start		End		No. of Smples ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	58058200	58098000	46.1614	-63.0501	46.1441	-63.0435	399	2.002	0.10	0.066		
	58098000	58136400	46.1441	-63.0435	46.1268	-63.0369	385	1.998	0.08	0.114		
	58136400	58174500	46.1268	-63.0369	46.1095	-63.0295	366	2.003	0.20	0.245		
	58174500	58182400	46.1095	-63.0295	46.1060	-63.0279	80	0.413	0.21	0.393		
Total	58058200	58182400	46.1614	-63.0501	46.1060	-63.0279	1231	6.416	0.13	0.190	0.10	5.16
10020	58322500	58373400	46.0825	-63.0537	46.0852	-63.0303	483	1.851	0.32	0.396		
Total	58322500	58373400	46.0825	-63.0537	46.0852	-63.0303	491	1.851	0.32	0.396	0.10	3.63
10030	58414000	58475100	46.0859	-63.0267	46.0832	-63.0520	575	2.003	0.35	0.243		
	58475100	58485400	46.0832	-63.0520	46.0824	-63.0562	104	0.341	0.16	0.094		
Total	58414000	58485400	46.0859	-63.0267	46.0824	-63.0562	688	2.343	0.32	0.236	0.10	3.28
10040	58528400	58581200	46.0825	-63.0555	46.0855	-63.0302	487	2.003	0.34	0.214		
	58581200	58591400	46.0855	-63.0302	46.0856	-63.0251	96	0.393	0.23	0.187		
Total	58528400	58591400	46.0825	-63.0555	46.0856	-63.0251	594	2.396	0.32	0.214	0.10	3.8
10050	58725000	58764400	46.0852	-63.0333	46.0830	-63.0473	395	1.136	0.25	0.212		
Total	58725000	58764400	46.0852	-63.0333	46.0830	-63.0473	395	1.136	0.25	0.212	0.10	2.87
10060	58795300	58850400	46.0800	-63.0545	46.0848	-63.0339	509	1.756	0.35	0.264		
Total	58795300	58850400	46.0800	-63.0545	46.0848	-63.0339	518	1.756	0.35	0.264	0.10	3.18
10070	59131100	59187000	46.1649	-63.0531	46.1770	-63.0650	560	1.641	0.11	0.165		
Total	59131100	59187000	46.1649	-63.0531	46.1770	-63.0650	560	1.641	0.11	0.165	0.10	2.93

DATE: FEB22 FLIGHT #: 12

Total Length: 68.079 km

Line Number	Start FID	End FID	Start		End		No. of Smples ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	62882700	62933500	46.0152	-63.1374	46.0187	-63.1626	275	2.002	0.72	0.714		
	62933500	62982900	46.0187	-63.1626	46.0225	-63.1877	282	1.998	0.76	0.497		
	62982900	63033200	46.0225	-63.1877	46.0276	-63.2125	278	2.002	0.72	0.393		
	63033200	63084500	46.0276	-63.2125	46.0329	-63.2371	322	2.001	0.97	0.454		
	63084500	63136400	46.0329	-63.2371	46.0382	-63.2617	320	1.998	0.71	0.404		
	63136400	63189700	46.0382	-63.2617	46.0439	-63.2861	340	2.001	1.09	0.728		
	63189700	63242400	46.0439	-63.2861	46.0493	-63.3106	402	1.998	0.97	0.477		
	63242400	63295900	46.0493	-63.3106	46.0539	-63.3355	299	2.001	1.03	0.487		
	63295900	63347600	46.0539	-63.3355	46.0580	-63.3605	343	1.999	0.93	0.415		
	63347600	63401200	46.0580	-63.3605	46.0612	-63.3857	321	2.000	0.74	0.447		
	63401200	63453900	46.0612	-63.3857	46.0649	-63.4108	314	2.001	0.90	0.365		
	63453900	63504700	46.0649	-63.4108	46.0684	-63.4360	289	1.999	0.72	0.396		
	63504700	63554600	46.0684	-63.4360	46.0721	-63.4612	344	2.003	0.44	0.277		
	63554600	63604800	46.0721	-63.4612	46.0762	-63.4862	233	1.997	0.75	0.410		
	63604800	63654700	46.0762	-63.4862	46.0797	-63.5114	226	2.002	0.77	0.319		
	63654700	63705700	46.0797	-63.5114	46.0824	-63.5367	211	1.999	0.66	0.372		
	63705700	63733400	46.0824	-63.5367	46.0838	-63.5502	90	1.059	0.69	0.362		
Total	62882700	63733400	46.0152	-63.1374	46.0838	-63.5502	5530	33.061	0.81	0.492	0.10	3.89
10020	63882500	63935700	46.0791	-63.5446	46.0893	-63.5657	215	2.000	0.21	0.100		
	63935700	63989900	46.0893	-63.5657	46.1020	-63.5838	214	2.000	0.32	0.147		
	63989900	64042600	46.1020	-63.5838	46.1145	-63.6022	317	2.003	0.25	0.137		
	64042600	64099700	46.1145	-63.6022	46.1272	-63.6202	315	1.999	0.38	0.189		
	64099700	64153500	46.1272	-63.6202	46.1395	-63.6388	349	1.999	0.16	0.138		
	64153500	64207100	46.1395	-63.6388	46.1519	-63.6574	272	2.002	0.31	0.422		
	64207100	64260900	46.1519	-63.6574	46.1642	-63.6762	338	1.999	0.42	0.314		
	64260900	64313900	46.1642	-63.6762	46.1762	-63.6953	311	2.001	0.79	0.515		
	64313900	64367100	46.1762	-63.6953	46.1882	-63.7143	208	1.999	0.32	0.127		
	64367100	64415400	46.1882	-63.7143	46.1988	-63.7315	186	1.785	0.86	0.935		
Total	63882500	64415400	46.0791	-63.5446	46.1988	-63.7315	3188	19.787	0.39	0.423	0.10	3.76

DATE: FEB22 FLIGHT #: 12

10030	64529700	64581800	46.2221	-63.7717	46.2329	-63.7925	323	2.003	1.17	0.613		
	64581800	64636700	46.2329	-63.7925	46.2428	-63.8139	351	1.998	1.20	0.397		
	64636700	64690300	46.2428	-63.8139	46.2527	-63.8354	350	2.000	1.31	0.546		
	64690300	64739800	46.2527	-63.8354	46.2623	-63.8573	344	2.003	1.23	0.508		
	64739800	64788600	46.2623	-63.8573	46.2717	-63.8793	289	1.998	1.10	0.518		
	64788600	64835400	46.2717	-63.8793	46.2806	-63.8991	364	1.821	0.78	0.373		
Total	64529700	64835400	46.2221	-63.7717	46.2806	-63.8991	2240	11.822	1.13	0.527	0.10	3.88
10040	64964700	65020100	46.3018	-63.9463	46.3116	-63.9679	408	2.003	1.11	0.525		
	65020100	65059400	46.3116	-63.9679	46.3184	-63.9831	334	1.406	0.26	0.168		
Total	64964700	65059400	46.3018	-63.9463	46.3184	-63.9831	782	3.409	0.73	0.586	0.10	3.60

DATE: FEB22 FLIGHT #: 15

Total Length: 8.105 km

Line Number	Start FID	End FID	Start		End		No. of Smples ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	71607600	71654400	46.0820	-63.0555	46.0847	-63.0356	405	1.587	0.44	0.289		
Total	71607600	71654400	46.0820	-63.0555	46.0847	-63.0356	420	1.587	0.44	0.289	0.10	3.38
10020	71781600	71816200	46.0852	-63.0279	46.0838	-63.0429	319	1.190	0.33	0.222		
Total	71781600	71816200	46.0852	-63.0279	46.0838	-63.0429	325	1.190	0.33	0.222	0.10	3.43
10040	71861600	71904400	46.0814	-63.0517	46.0844	-63.0340	374	1.445	0.33	0.200		
Total	71861600	71904400	46.0814	-63.0517	46.0844	-63.0340	388	1.445	0.33	0.200	0.10	3.37
10050	71952200	72002400	46.0848	-63.0331	46.0839	-63.0423	489	0.748	0.29	0.221		
Total	71952200	72002400	46.0848	-63.0331	46.0839	-63.0423	493	0.748	0.29	0.221	0.10	1.49
10060	72134400	72171400	46.0824	-63.0515	46.0848	-63.0375	357	1.139	0.37	0.184		
Total	72134400	72171400	46.0824	-63.0515	46.0848	-63.0375	361	1.139	0.37	0.184	0.10	3.07
10070	72134400	72171400	46.0824	-63.0515	46.0848	-63.0375	357	1.139	0.37	0.184		
Total	72134400	72171400	46.0824	-63.0515	46.0848	-63.0375	361	1.139	0.37	0.184	0.10	3.07
10080	72206700	72238400	46.0853	-63.0336	46.0837	-63.0443	318	0.857	0.32	0.236		
Total	72206700	72238400	46.0853	-63.0336	46.0837	-63.0443	318	0.857	0.32	0.236	0.10	2.70

DATE: FEB23 FLIGHT #: 16

Total Length: 5.513 km

Line Number	Start FID	End FID	Start		End		No. of Smples ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	50691100	50750300	46.0859	-63.0317	46.0829	-63.0569	465	2.002	0.36	0.302		
	50750300	50760400	46.0829	-63.0569	46.0820	-63.0618	73	0.394	0.17	0.167		
Total	50691100	50760400	46.0859	-63.0317	46.0820	-63.0618	566	2.396	0.34	0.295	0.10	3.45
10020	50801100	50848400	46.0826	-63.0534	46.0859	-63.0302	419	1.849	0.28	0.357		
Total	50801100	50848400	46.0826	-63.0534	46.0859	-63.0302	433	1.849	0.28	0.357	0.10	3.90
10030	50968000	51006300	46.0855	-63.0309	46.0836	-63.0468	334	1.268	0.40	0.421		
Total	50968000	51006300	46.0855	-63.0309	46.0836	-63.0468	344	1.268	0.40	0.421	0.10	3.30

DATE: FEB23 FLIGHT #: 17

Total Length: 117.087 km

Line Number	Start FID	End FID	Start		End		No. of Smples ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	51992000	52033600	46.4486	-63.0775	46.4666	-63.0770	230	2.003	0.62	0.309		
	52033600	52076500	46.4666	-63.0770	46.4845	-63.0780	276	2.000	0.80	0.636		
	52076500	52120400	46.4845	-63.0780	46.5024	-63.0799	342	2.001	0.50	0.474		
	52120400	52164200	46.5024	-63.0799	46.5201	-63.0830	212	1.997	0.51	0.327		
	52164200	52209100	46.5201	-63.0830	46.5376	-63.0883	295	2.001	0.54	0.546		
	52209100	52253900	46.5376	-63.0883	46.5548	-63.0960	303	2.002	0.41	0.302		
	52253900	52298900	46.5548	-63.0960	46.5716	-63.1049	202	1.997	0.24	0.121		
	52298900	52344500	46.5716	-63.1049	46.5886	-63.1132	188	2.003	0.23	0.082		
	52344500	52381400	46.5886	-63.1132	46.6026	-63.1209	219	1.669	0.54	0.488		
Total	51992000	52381400	46.4486	-63.0775	46.6026	-63.1209	2552	17.673	0.50	0.452	0.10	4.54

DATE: FEB23 FLIGHT #: 17

10020	52522900	52569300	46.6159	-63.1261	46.6331	-63.1335	378	2.000	0.41	0.285		
	52569300	52613300	46.6331	-63.1335	46.6504	-63.1401	406	2.001	0.17	0.045		
	52613300	52658200	46.6504	-63.1401	46.6676	-63.1473	317	2.002	0.26	0.223		
	52658200	52702400	46.6676	-63.1473	46.6847	-63.1551	311	1.998	0.36	0.335		
	52702400	52746500	46.6847	-63.1551	46.7017	-63.1635	275	2.001	0.28	0.319		
	52746500	52791600	46.7017	-63.1635	46.7185	-63.1727	317	2.000	0.39	0.337		
	52791600	52837400	46.7185	-63.1727	46.7351	-63.1824	253	2.001	0.29	0.232		
	52837400	52883100	46.7351	-63.1824	46.7515	-63.1929	274	1.998	0.45	0.251		
	52883100	52928300	46.7515	-63.1929	46.7677	-63.2041	328	2.003	0.55	0.535		
	52928300	52974100	46.7677	-63.2041	46.7839	-63.2152	391	1.998	0.29	0.188		
	52974100	52982400	46.7839	-63.2152	46.7866	-63.2171	39	0.340	0.16	0.148		
	Total	52522900	52982400	46.6159	-63.1261	46.7866	-63.2171	3523	20.341	0.34	0.313	0.10 4.43
10030	53119600	53165200	46.7931	-63.2194	46.8103	-63.2268	369	2.000	0.16	0.147		
	53165200	53211800	46.8103	-63.2268	46.8272	-63.2352	439	2.001	0.07	0.067		
	53211800	53258800	46.8272	-63.2352	46.8434	-63.2463	419	2.002	0.14	0.109		
	53258800	53305100	46.8434	-63.2463	46.8594	-63.2579	433	1.998	0.21	0.283		
	53305100	53351400	46.8594	-63.2579	46.8747	-63.2716	387	2.000	0.28	0.316		
	53351400	53398600	46.8747	-63.2716	46.8902	-63.2848	445	2.002	0.09	0.166		
	53398600	53444800	46.8902	-63.2848	46.9058	-63.2975	386	2.000	0.12	0.161		
	53444800	53490700	46.9058	-63.2975	46.9217	-63.3097	358	2.000	0.21	0.220		
	53490700	53539000	46.9217	-63.3097	46.9374	-63.3221	324	2.002	0.15	0.133		
	53539000	53585400	46.9374	-63.3221	46.9525	-63.3344	434	1.925	0.08	0.081		
	Total	53119600	53585400	46.7931	-63.2194	46.9525	-63.3344	4137	19.929	0.15	0.193	0.10 4.28
10040	53895000	53943300	46.9662	-63.3519	46.9829	-63.3612	456	2.002	0.17	0.215		
	53943300	53989900	46.9829	-63.3612	46.9991	-63.3725	325	1.999	0.26	0.126		
	53989900	54035300	46.9991	-63.3725	47.0148	-63.3851	372	2.005	0.19	0.164		
	54035300	54052700	47.0148	-63.3851	47.0203	-63.3902	168	0.729	0.10	0.096		
	Total	53895000	54052700	46.9662	-63.3519	47.0203	-63.3902	1369	6.734	0.19	0.175	0.10 4.27
10050	54199400	54246000	47.0127	-63.4000	46.9965	-63.4111	384	2.002	0.15	0.137		
	54246000	54292200	46.9965	-63.4111	46.9800	-63.4216	324	2.002	0.14	0.121		
	54292200	54337000	46.9800	-63.4216	46.9639	-63.4328	355	1.997	0.16	0.109		
	54337000	54382800	46.9639	-63.4328	46.9476	-63.4440	368	2.003	0.25	0.107		
	54382800	54429300	46.9476	-63.4440	46.9317	-63.4557	429	1.997	0.10	0.055		
	54429300	54474600	46.9317	-63.4557	46.9158	-63.4680	284	2.002	0.15	0.099		
	54474600	54520600	46.9158	-63.4680	46.9001	-63.4804	315	2.000	0.19	0.081		
	54520600	54566400	46.9001	-63.4804	46.8840	-63.4919	336	2.000	0.20	0.114		
	54566400	54611700	46.8840	-63.4919	46.8675	-63.5021	293	1.999	0.27	0.074		
	54611700	54657400	46.8675	-63.5021	46.8512	-63.5129	390	2.002	0.09	0.076		
	54657400	54702200	46.8512	-63.5129	46.8357	-63.5259	392	1.997	0.09	0.088		
	54702200	54747500	46.8357	-63.5259	46.8197	-63.5377	390	1.999	0.12	0.092		
	54747500	54794900	46.8197	-63.5377	46.8038	-63.5495	433	2.001	0.18	0.144		
	54794900	54840800	46.8038	-63.5495	46.7881	-63.5622	337	2.000	0.20	0.170		
	54840800	54888000	46.7881	-63.5622	46.7721	-63.5736	212	1.999	0.32	0.305		
	54888000	54933600	46.7721	-63.5736	46.7562	-63.5859	211	2.000	0.41	0.539		
	54933600	54979800	46.7562	-63.5859	46.7407	-63.5989	266	2.002	0.84	0.658		
	54979800	55025800	46.7407	-63.5989	46.7249	-63.6110	454	1.998	0.14	0.126		
	55025800	55072600	46.7249	-63.6110	46.7088	-63.6226	397	2.003	0.32	0.272		
	Total	54199400	55072600	47.0127	-63.4000	46.7088	-63.6226	9137	49.613	0.24	0.349	0.10 4.39
10060	55499800	55542400	46.5602	-63.7284	46.5440	-63.7395	319	2.004	0.33	0.136		
	55542400	55559400	46.5440	-63.7395	46.5375	-63.7439	164	0.794	0.14	0.154		
	Total	55499800	55559400	46.5602	-63.7284	46.5375	-63.7439	508	2.797	0.27	0.168	0.10 4.69

DATE: FEB23 FLIGHT #: 18

Total Length: 42.510 km

Line Number	Start FID	End FID	Start		End		No. of Smpls ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	59369200	59424800	46.3315	-63.8821	46.3162	-63.8693	379	2.002	0.65	0.556		
	59424800	59469400	46.3162	-63.8693	46.3020	-63.8534	262	2.004	0.88	0.404		
	59469400	59513100	46.3020	-63.8534	46.2883	-63.8367	277	1.997	1.10	0.566		
	59513100	59553800	46.2883	-63.8367	46.2746	-63.8202	180	1.999	1.39	0.782		
	59553800	59594100	46.2746	-63.8202	46.2603	-63.8045	135	2.000	1.05	0.705		
	59594100	59634800	46.2603	-63.8045	46.2462	-63.7886	167	1.999	1.31	0.599		
	59634800	59674700	46.2462	-63.7886	46.2323	-63.7722	204	2.004	0.99	0.552		
	59674700	59714700	46.2323	-63.7722	46.2183	-63.7561	134	1.998	1.05	0.614		
	59714700	59721400	46.2183	-63.7561	46.2160	-63.7536	6	0.320	0.05	0.068		
Total	59369200	59721400	46.3315	-63.8821	46.2160	-63.7536	2001	16.323	0.99	0.632	0.10	4.68
10020	59871800	59919100	46.2049	-63.7439	46.1941	-63.7233	140	2.001	1.07	0.712		
	59919100	59959800	46.1941	-63.7233	46.1833	-63.7026	122	2.002	1.03	0.730		
	59959800	59999700	46.1833	-63.7026	46.1722	-63.6824	163	2.001	1.25	0.879		
	59999700	60039400	46.1722	-63.6824	46.1610	-63.6622	216	1.996	1.15	0.453		
	60039400	60078900	46.1610	-63.6622	46.1495	-63.6424	116	2.000	0.79	0.601		
	60078900	60117500	46.1495	-63.6424	46.1382	-63.6223	104	2.003	0.85	0.711		
	60117500	60157400	46.1382	-63.6223	46.1270	-63.6022	191	1.999	0.42	0.483		
	60157400	60180400	46.1270	-63.6022	46.1204	-63.5905	128	1.160	0.69	0.771		
Total	59871800	60180400	46.2049	-63.7439	46.1204	-63.5905	1459	15.163	0.91	0.718	0.10	4.95
10030	60291500	60338500	46.1215	-63.5889	46.1092	-63.5697	179	2.028	3.11	3.577		
	60338500	60380600	46.1092	-63.5697	46.0974	-63.5508	200	1.977	1.56	0.870		
	60380600	60420800	46.0974	-63.5508	46.0864	-63.5303	185	1.998	0.34	0.412		
	60420800	60459600	46.0864	-63.5303	46.0759	-63.5095	170	2.002	0.54	0.440		
	60459600	60500100	46.0759	-63.5095	46.0652	-63.4889	199	1.996	0.31	0.316		
	60500100	60520300	46.0652	-63.4889	46.0600	-63.4781	76	1.023	0.46	0.372		
Total	60291500	60520300	46.1215	-63.5889	46.0600	-63.4781	1216	11.024	1.11	1.893	0.10	4.88

DATE: FEB23 FLIGHT #: 19

Total Length: 79.115 km

Line Number	Start FID	End FID	Start		End		No. of Smpls ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	70312800	70363400	46.0849	-63.3299	46.0800	-63.3547	359	2.000	0.92	0.462		
	70363400	70410100	46.0800	-63.3547	46.0750	-63.3794	303	2.000	1.14	0.509		
	70410100	70454700	46.0750	-63.3794	46.0697	-63.4041	178	2.002	1.19	0.348		
	70454700	70499600	46.0697	-63.4041	46.0651	-63.4291	187	2.001	0.88	0.364		
	70499600	70543800	46.0651	-63.4291	46.0608	-63.4541	133	2.001	0.77	0.444		
	70543800	70547400	46.0608	-63.4541	46.0604	-63.4560	22	0.149	1.30	0.706		
Total	70312800	70547400	46.0849	-63.3299	46.0604	-63.4560	1389	10.152	1.00	0.473	0.10	4.36
10020	70671500	70720900	46.0540	-63.4750	46.0635	-63.4969	236	2.003	0.46	0.327		
	70720900	70767700	46.0635	-63.4969	46.0727	-63.5190	155	2.001	0.69	0.298		
	70767700	70814600	46.0727	-63.5190	46.0817	-63.5413	152	1.996	0.44	0.249		
	70814600	70861100	46.0817	-63.5413	46.0912	-63.5633	198	2.004	0.90	0.346		
	70861100	70905900	46.0912	-63.5633	46.1007	-63.5851	199	1.999	0.46	0.195		
	70905900	70951400	46.1007	-63.5851	46.1101	-63.6071	223	1.998	0.66	0.593		
	70951400	70997100	46.1101	-63.6071	46.1197	-63.6289	268	2.000	1.01	0.354		
	70997100	71042800	46.1197	-63.6289	46.1290	-63.6510	186	2.001	0.89	0.294		
	71042800	71088000	46.1290	-63.6510	46.1386	-63.6728	218	1.998	0.85	0.288		
	71088000	71133800	46.1386	-63.6728	46.1470	-63.6956	175	2.002	0.88	0.395		
	71133800	71180400	46.1470	-63.6956	46.1543	-63.7191	151	1.999	0.94	0.538		
	71180400	71225400	46.1543	-63.7191	46.1609	-63.7430	60	1.999	0.50	0.514		
	71225400	71229400	46.1609	-63.7430	46.1615	-63.7451	21	0.170	0.82	0.370		
Total	70671500	71229400	46.0540	-63.4750	46.1615	-63.7451	2679	24.170	0.74	0.426	0.10	4.46
10030	71358600	71409500	46.1600	-63.7473	46.1686	-63.7700	42	2.003	1.30	0.614		
	71409500	71447400	46.1686	-63.7700	46.1766	-63.7870	108	1.592	0.92	0.707		
Total	71358600	71447400	46.1600	-63.7473	46.1766	-63.7870	197	3.595	1.02	0.701	0.13	5.29

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10040	71500700	71546000	46.1885	-63.8063	46.2006	-63.8255	233	2.001	1.29	0.417		
	71546000	71592800	46.2006	-63.8255	46.2126	-63.8446	279	2.000	1.17	0.385		
	71592800	71639500	46.2126	-63.8446	46.2241	-63.8644	269	2.000	1.30	0.330		
	71639500	71686700	46.2241	-63.8644	46.2351	-63.8847	381	2.003	1.57	0.399		
	71686700	71734100	46.2351	-63.8847	46.2463	-63.9049	324	1.997	1.19	0.337		
	71734100	71780900	46.2463	-63.9049	46.2580	-63.9245	230	2.002	1.07	0.425		
	71780900	71827100	46.2580	-63.9245	46.2695	-63.9442	313	1.997	1.43	0.479		
	71827100	71875000	46.2695	-63.9442	46.2811	-63.9639	347	2.003	1.16	0.511		
	71875000	71922500	46.2811	-63.9639	46.2930	-63.9831	340	1.999	1.24	0.536		
	71922500	71969600	46.2930	-63.9831	46.3048	-64.0027	143	2.002	0.91	0.447		
	71969600	72016600	46.3048	-64.0027	46.3161	-64.0226	368	1.996	0.76	0.505		
	72016600	72062300	46.3161	-64.0226	46.3271	-64.0431	284	2.003	0.96	0.551		
	72062300	72110100	46.3271	-64.0431	46.3377	-64.0640	305	1.998	1.24	0.643		
	72110100	72156600	46.3377	-64.0640	46.3482	-64.0849	422	1.999	0.53	0.377		
	72156600	72202600	46.3482	-64.0849	46.3592	-64.1052	287	2.000	1.05	0.502		
	72202600	72251000	46.3592	-64.1052	46.3711	-64.1246	200	2.001	1.28	0.358		
	72251000	72299000	46.3711	-64.1246	46.3836	-64.1432	293	2.002	1.02	0.357		
	72299000	72346800	46.3836	-64.1432	46.3965	-64.1612	232	1.998	1.16	0.672		
	72346800	72396100	46.3965	-64.1612	46.4109	-64.1782	194	2.077	1.29	0.631		
	Total	71500700	72396100	46.1885	-63.8063	46.4109	-64.1782	6431	41.198	1.12		

DATE: FEB23 FLIGHT #: 20

Total Length: 62.157 km

Line Number	Start FID	End FID	Start		End		No. of Smples ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	59581700	59628100	46.5467	-64.3154	46.5612	-64.3313	226	2.027	0.27	0.255		
	59628100	59673700	46.5612	-64.3313	46.5754	-64.3466	247	1.974	0.52	0.507		
	59673700	59719200	46.5754	-64.3466	46.5899	-64.3619	260	2.002	0.32	0.368		
	59719200	59764000	46.5899	-64.3619	46.6041	-64.3778	234	2.000	0.16	0.216		
	59764000	59796400	46.6041	-64.3778	46.6134	-64.3895	199	1.376	1.27	0.844		
Total	59581700	59796400	46.5467	-64.3154	46.6134	-64.3895	1229	9.379	0.48	0.608	0.11	4.97
10020	60047500	60093100	46.6982	-64.4214	46.7161	-64.4199	276	2.003	0.59	0.862		
	60093100	60140400	46.7161	-64.4199	46.7335	-64.4137	362	2.001	0.68	0.390		
	60140400	60187600	46.7335	-64.4137	46.7500	-64.4038	309	1.997	0.58	0.494		
	60187600	60235600	46.7500	-64.4038	46.7646	-64.3888	375	2.000	0.49	0.383		
	60235600	60283700	46.7646	-64.3888	46.7789	-64.3730	307	1.999	0.3	0.263		
	60283700	60329100	46.7789	-64.3730	46.7937	-64.3582	318	2.003	0.38	0.290		
	60329100	60375600	46.7937	-64.3582	46.8088	-64.3441	246	2.001	0.77	0.552		
	60375600	60422500	46.8088	-64.3441	46.8239	-64.3301	203	1.996	0.62	0.619		
	60422500	60469600	46.8239	-64.3301	46.8385	-64.3149	184	2.003	0.68	0.713		
	60469600	60515200	46.8385	-64.3149	46.8528	-64.2990	302	1.998	0.9	0.856		
	60515200	60561500	46.8528	-64.2990	46.8671	-64.2833	274	2.002	0.92	0.490		
	60561500	60607300	46.8671	-64.2833	46.8820	-64.2688	288	1.999	0.75	0.385		
	60607300	60651900	46.8820	-64.2688	46.8967	-64.2540	295	1.999	0.44	0.375		
	60651900	60695800	46.8967	-64.2540	46.9112	-64.2385	307	2.001	0.55	0.638		
	60695800	60740200	46.9112	-64.2385	46.9254	-64.2226	292	1.998	0.46	0.301		
	60740200	60784800	46.9254	-64.2226	46.9387	-64.2050	321	2.001	0.48	0.338		
	60784800	60829100	46.9387	-64.2050	46.9517	-64.1869	274	2.000	0.46	0.407		
	60829100	60873800	46.9517	-64.1869	46.9647	-64.1690	287	1.999	0.84	0.346		
	60873800	60917600	46.9647	-64.1690	46.9776	-64.1506	345	2.001	0.3	0.190		
Total	60047500	60917600	46.6982	-64.4214	46.9776	-64.1506	8469	52.778	0.5	0.505	0.10	4.55

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DATE: FEB24 FLIGHT #: 22

Total Length: 236.604 km

Line Number	Start FID	End FID	Start		End		No. of Smples ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	46498400	46547300	46.4355	-63.1871	46.4532	-63.1912	244	2.002	0.66	0.467		
	46547300	46595600	46.4532	-63.1912	46.4709	-63.1946	311	1.999	1.04	0.553		
	46595600	46641700	46.4709	-63.1946	46.4887	-63.1978	256	2.003	0.69	0.326		
	46641700	46686800	46.4887	-63.1978	46.5064	-63.2010	317	1.998	0.36	0.318		
	46686800	46732400	46.5064	-63.2010	46.5242	-63.2043	233	2.002	0.48	0.354		
	46732400	46777600	46.5242	-63.2043	46.5419	-63.2087	201	2.000	0.76	0.617		
	46777600	46823600	46.5419	-63.2087	46.5596	-63.2121	199	2.000	0.65	0.593		
	46823600	46838000	46.5596	-63.2121	46.5652	-63.2131	103	0.623	0.60	0.614		
Total	46498400	46838000	46.4355	-63.1871	46.5652	-63.2131	2143	14.626	0.66	0.520	0.10	4.31
10020	47001200	47052700	46.5620	-63.2095	46.5792	-63.2163	302	2.001	0.40	0.399		
	47052700	47101700	46.5792	-63.2163	46.5969	-63.2212	283	2.003	0.42	0.357		
	47101700	47149500	46.5969	-63.2212	46.6144	-63.2265	290	1.999	0.69	0.443		
	47149500	47196100	46.6144	-63.2265	46.6320	-63.2316	256	2.000	0.76	0.564		
	47196100	47244200	46.6320	-63.2316	46.6496	-63.2363	224	2.001	0.53	0.504		
	47244200	47292500	46.6496	-63.2363	46.6672	-63.2410	223	1.997	0.37	0.501		
	47292500	47340700	46.6672	-63.2410	46.6850	-63.2439	210	2.003	0.28	0.316		
	47340700	47388300	46.6850	-63.2439	46.7028	-63.2466	62	1.999	0.45	0.923		
	47388300	47436400	46.7028	-63.2466	46.7208	-63.2478	146	2.001	0.48	0.629		
	47436400	47485200	46.7208	-63.2478	46.7387	-63.2475	307	1.998	0.30	0.356		
	47485200	47533100	46.7387	-63.2475	46.7566	-63.2487	316	2.003	0.27	0.268		
	47533100	47581800	46.7566	-63.2487	46.7744	-63.2498	209	1.996	0.45	0.420		
	47581800	47630200	46.7744	-63.2498	46.7923	-63.2509	402	2.002	0.28	0.324		
	47630200	47679700	46.7923	-63.2509	46.8103	-63.2512	350	2.001	0.22	0.328		
	47679700	47729500	46.8103	-63.2512	46.8282	-63.2513	456	1.998	0.12	0.156		
	47729500	47749000	46.8282	-63.2513	46.8353	-63.2512	196	0.791	0.03	0.051		
Total	47001200	47749000	46.5620	-63.2095	46.8353	-63.2512	4745	30.792	0.36	0.434	0.10	4.18
10030	47916600	47955800	46.8389	-63.2523	46.8419	-63.2781	376	2.005	0.19	0.183		
	47955800	47992400	46.8419	-63.2781	46.8447	-63.3040	314	1.998	0.19	0.291		
	47992400	48029200	46.8447	-63.3040	46.8475	-63.3298	270	2.001	0.21	0.409		
	48029200	48065600	46.8475	-63.3298	46.8511	-63.3554	328	1.998	0.20	0.220		
	48065600	48103100	46.8511	-63.3554	46.8551	-63.3810	323	2.003	0.15	0.120		
	48103100	48139600	46.8551	-63.3810	46.8596	-63.4063	306	1.996	0.18	0.225		
	48139600	48176400	46.8596	-63.4063	46.8636	-63.4319	318	2.000	0.11	0.131		
	48176400	48213400	46.8636	-63.4319	46.8674	-63.4575	297	2.001	0.16	0.368		
	48213400	48250000	46.8674	-63.4575	46.8707	-63.4833	295	1.999	0.17	0.224		
	48250000	48286700	46.8707	-63.4833	46.8744	-63.5090	271	1.998	0.24	0.261		
	48286700	48323600	46.8744	-63.5090	46.8780	-63.5347	304	2.004	0.33	0.298		
	48323600	48361100	46.8780	-63.5347	46.8822	-63.5601	297	1.997	0.24	0.333		
	48361100	48398500	46.8822	-63.5601	46.8863	-63.5857	358	2.000	0.11	0.250		
	48398500	48434500	46.8863	-63.5857	46.8900	-63.6113	328	2.002	0.19	0.201		
	48434500	48472000	46.8900	-63.6113	46.8934	-63.6371	270	1.999	0.24	0.427		
	48472000	48508800	46.8934	-63.6371	46.8975	-63.6626	321	1.999	0.04	0.036		
	48508800	48545900	46.8975	-63.6626	46.9013	-63.6883	324	2.004	0.16	0.179		
	48545900	48582700	46.9013	-63.6883	46.9044	-63.7141	312	1.998	0.10	0.246		
	48582700	48618700	46.9044	-63.7141	46.9081	-63.7398	312	2.001	0.06	0.275		
Total	47916600	48618700	46.8389	-63.2523	46.9081	-63.7398	6710	41.730	0.17	0.265	0.10	5.42
10040	48841400	48881300	46.9145	-63.7962	46.9192	-63.8215	328	2.002	0.22	0.296		
	48881300	48920000	46.9192	-63.8215	46.9234	-63.8470	344	1.999	0.08	0.116		
	48920000	48958200	46.9234	-63.8470	46.9267	-63.8728	125	2.000	0.16	0.337		
	48958200	48995100	46.9267	-63.8728	46.9298	-63.8987	309	2.003	0.05	0.115		
	48995100	49033000	46.9298	-63.8987	46.9323	-63.9246	270	2.000	0.07	0.164		
	49033000	49070200	46.9323	-63.9246	46.9345	-63.9506	259	2.000	0.11	0.184		
	49070200	49107800	46.9345	-63.9506	46.9368	-63.9765	310	1.997	0.15	0.212		
	49107800	49138400	46.9368	-63.9765	46.9386	-63.9973	217	1.603	1.99	2.969		
Total	48841400	49138400	46.9145	-63.7962	46.9386	-63.9973	2286	15.604	0.31	1.114	0.10	5.31

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10050	49544000	49583100	46.9696	-64.2199	46.9735	-64.2455	233	2.003	0.42	0.485		
	49583100	49620200	46.9735	-64.2455	46.9760	-64.2715	82	2.000	0.72	0.839		
	49620200	49656000	46.9760	-64.2715	46.9777	-64.2976	174	1.997	0.70	0.535		
	49656000	49692900	46.9777	-64.2976	46.9803	-64.3235	277	2.004	0.55	0.447		
	49692900	49728700	46.9803	-64.3235	46.9839	-64.3493	230	2.001	0.37	0.279		
	49728700	49765300	46.9839	-64.3493	46.9878	-64.3749	328	1.998	0.27	0.186		
	49765300	49802100	46.9878	-64.3749	46.9910	-64.4008	233	2.000	0.34	0.544		
	49802100	49839100	46.9910	-64.4008	46.9940	-64.4266	189	1.999	0.62	0.501		
	49839100	49875700	46.9940	-64.4266	46.9969	-64.4525	256	1.999	0.57	0.375		
	49875700	49911700	46.9969	-64.4525	47.0001	-64.4784	319	2.000	0.54	0.372		
	49911700	49947400	47.0001	-64.4784	47.0026	-64.5028	295	1.881	0.45	0.323		
Total	49544000	49947400	46.9696	-64.2199	47.0026	-64.5028	2765	21.883	0.48	0.444	0.10	5.54
10060	50112800	50159400	47.0076	-64.5036	46.9905	-64.4959	380	2.001	0.54	0.377		
	50159400	50207200	46.9905	-64.4959	46.9734	-64.4882	381	2.001	0.63	0.443		
	50207200	50254600	46.9734	-64.4882	46.9561	-64.4813	365	2.000	0.53	0.378		
	50254600	50303700	46.9561	-64.4813	46.9392	-64.4727	390	1.999	0.57	0.535		
	50303700	50349800	46.9392	-64.4727	46.9221	-64.4649	342	2.000	0.57	0.440		
	50349800	50396000	46.9221	-64.4649	46.9052	-64.4561	304	2.000	0.72	0.578		
	50396000	50442900	46.9052	-64.4561	46.8884	-64.4472	376	2.002	0.76	0.521		
	50442900	50489700	46.8884	-64.4472	46.8715	-64.4384	433	1.998	0.58	0.357		
	50489700	50536000	46.8715	-64.4384	46.8551	-64.4280	267	1.999	0.78	0.544		
	50536000	50582800	46.8551	-64.4280	46.8384	-64.4184	286	2.001	0.80	0.403		
	50582800	50583400	46.8384	-64.4184	46.8382	-64.4183	7	0.023	0.71	0.000		
Total	50112800	50583400	47.0076	-64.5036	46.8382	-64.4183	3704	20.026	0.64	0.467	0.10	4.28
10070	50734400	50777800	46.8374	-64.4218	46.8225	-64.4361	255	2.002	0.86	0.315		
	50777800	50820300	46.8225	-64.4361	46.8071	-64.4496	266	2.002	0.84	0.608		
	50820300	50865400	46.8071	-64.4496	46.7908	-64.4633	61	2.097	0.83	0.396		
	50865400	50905500	46.7908	-64.4633	46.7760	-64.4755	187	1.900	0.94	0.523		
	50905500	50947000	46.7760	-64.4755	46.7608	-64.4893	398	2.000	0.67	0.212		
	50947000	50989100	46.7608	-64.4893	46.7457	-64.5034	417	2.003	0.66	0.148		
	50989100	51031200	46.7457	-64.5034	46.7302	-64.5166	227	1.997	0.70	0.645		
	51031200	51074600	46.7302	-64.5166	46.7143	-64.5285	340	2.001	1.06	0.475		
	51074600	51116500	46.7143	-64.5285	46.6983	-64.5402	262	2.000	0.67	0.569		
	51116500	51159500	46.6983	-64.5402	46.6822	-64.5518	134	1.998	0.67	0.467		
	51159500	51201600	46.6822	-64.5518	46.6663	-64.5638	205	2.000	0.76	0.634		
Total	50734400	51211400	46.6663	-64.5638	46.6627	-64.5668	39	0.463	0.65	0.230		
Total	50734400	51211400	46.8374	-64.4218	46.6627	-64.5668	2997	22.464	0.78	0.475	0.10	4.89
10080	51369400	51419200	46.6643	-64.5680	46.6478	-64.5579	159	2.003	0.97	1.291		
	51419200	51465700	46.6478	-64.5579	46.6317	-64.5467	293	1.998	0.63	0.507		
	51465700	51511400	46.6317	-64.5467	46.6151	-64.5370	291	2.001	0.79	0.450		
	51511400	51558800	46.6151	-64.5370	46.5985	-64.5272	356	2.000	0.73	0.355		
	51558800	51607500	46.5985	-64.5272	46.5823	-64.5161	382	2.002	0.78	0.289		
	51607500	51657200	46.5823	-64.5161	46.5669	-64.5029	293	1.999	0.50	0.368		
	51657200	51706500	46.5669	-64.5029	46.5523	-64.4877	371	2.001	0.49	0.313		
	51706500	51755900	46.5523	-64.4877	46.5374	-64.4733	285	1.997	0.54	0.431		
	51755900	51804700	46.5374	-64.4733	46.5228	-64.4583	230	2.003	0.53	0.487		
	51804700	51853000	46.5228	-64.4583	46.5080	-64.4435	195	1.997	0.34	0.343		
	51853000	51901600	46.5080	-64.4435	46.4933	-64.4286	233	2.001	0.55	0.565		
Total	51901600	51949200	46.4933	-64.4286	46.4781	-64.4149	296	2.001	0.64	0.496		
	51949200	51995900	46.4781	-64.4149	46.4629	-64.4013	377	1.998	0.75	0.273		
	51995900	52044500	46.4629	-64.4013	46.4476	-64.3876	423	2.003	0.64	0.412		
	52044500	52092300	46.4476	-64.3876	46.4325	-64.3738	458	1.996	0.84	0.264		
	52092300	52139400	46.4325	-64.3738	46.4170	-64.3608	387	2.003	0.73	0.288		
	52139400	52185900	46.4170	-64.3608	46.4012	-64.3485	314	1.997	0.52	0.351		
	52185900	52234100	46.4012	-64.3485	46.3862	-64.3343	341	2.001	0.76	0.477		
	52234100	52283500	46.3862	-64.3343	46.3714	-64.3197	304	2.001	0.41	0.283		
	52283500		46.3714	-64.3197								
Total	51369400	52283500	46.6643	-64.5680	46.3714	-64.3197	6512	38.308	0.65	0.460	0.10	4.19

DATE: FEB24 FLIGHT #: 22

10090	52464000	52519900	46.3669	-64.3235	46.3610	-64.2995	340	2.003	0.81	0.370		
	52519900	52572600	46.3610	-64.2995	46.3533	-64.2762	274	2.001	0.67	0.476		
	52572600	52624200	46.3533	-64.2762	46.3456	-64.2530	254	1.999	0.64	0.419		
	52624200	52677200	46.3456	-64.2530	46.3385	-64.2293	319	2.000	0.62	0.434		
	52677200	52730600	46.3385	-64.2293	46.3438	-64.2052	433	2.000	0.65	0.385		
	52730600	52783100	46.3438	-64.2052	46.3507	-64.1813	343	1.998	0.71	0.505		
	52783100	52834800	46.3507	-64.1813	46.3571	-64.1572	310	2.000	0.66	0.444		
	52834800	52886000	46.3571	-64.1572	46.3630	-64.1328	391	2.002	0.65	0.487		
	52886000	52937600	46.3630	-64.1328	46.3690	-64.1083	320	2.001	0.95	0.468		
	52937600	52989600	46.3690	-64.1083	46.3754	-64.0842	261	2.003	1.09	0.585		
	52989600	53042700	46.3754	-64.0842	46.3830	-64.0609	189	1.995	0.75	0.615		
	53042700	53094300	46.3830	-64.0609	46.3841	-64.0353	337	2.003	1.05	0.425		
	53094300	53144100	46.3841	-64.0353	46.3823	-64.0096	390	2.000	0.52	0.469		
	53144100	53193800	46.3823	-64.0096	46.3841	-63.9839	476	1.999	0.02	0.061		
	53193800	53242400	46.3841	-63.9839	46.3903	-63.9597	464	2.002	0.03	0.262		
	53242400	53271400	46.3903	-63.9597	46.3948	-63.9461	291	1.167	0.07	0.064		
Total	52464000	53271400	46.3669	-64.3235	46.3948	-63.9461	5810	31.171	0.58	0.531	0.10	3.88

DATE: MAR16 FLIGHT #: 47

Total Length: 54.647 km

Line Number	Start FID	End FID	Start		End		No. of Smples ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	32876200	32922900	46.1608	-63.1441	46.1466	-63.1598	414	2.002	0.87	0.418		
	32922900	32967000	46.1466	-63.1598	46.1322	-63.1752	311	1.998	0.65	0.476		
	32967000	32971400	46.1322	-63.1752	46.1308	-63.1767	45	0.194	0.02	0.031		
Total	32876200	32971400	46.1608	-63.1441	46.1308	-63.1767	802	4.195	0.73	0.477	0.10	4.41
10020	33151800	33199200	46.0732	-63.2310	46.0630	-63.2523	371	2.004	0.98	0.412		
	33199200	33245200	46.0630	-63.2523	46.0526	-63.2731	308	1.998	0.64	0.507		
	33245200	33290500	46.0526	-63.2731	46.0412	-63.2929	377	2.000	0.86	0.412		
	33290500	33337300	46.0412	-63.2929	46.0304	-63.3136	254	2.004	0.67	0.440		
	33337300	33383300	46.0304	-63.3136	46.0209	-63.3354	361	1.996	1.28	0.433		
	33383300	33429300	46.0209	-63.3354	46.0121	-63.3578	346	1.999	1.19	0.532		
	33429300	33474700	46.0121	-63.3578	46.0048	-63.3813	390	2.002	1.36	0.391		
	33474700	33481400	46.0048	-63.3813	46.0040	-63.3844	54	0.264	1.19	0.723		
Total	33151800	33481400	46.0732	-63.2310	46.0040	-63.3844	2609	14.266	1.03	0.523	0.10	4.38
10030	33594700	33650600	46.0023	-63.3921	46.0119	-63.4137	375	2.001	0.84	0.635		
	33650600	33703300	46.0119	-63.4137	46.0228	-63.4341	255	2.001	0.11	0.164		
	33703300	33756100	46.0228	-63.4341	46.0349	-63.4530	218	1.999	0.76	0.637		
	33756100	33807300	46.0349	-63.4530	46.0480	-63.4704	356	2.000	1.43	0.845		
	33807300	33857900	46.0480	-63.4704	46.0608	-63.4883	341	1.999	0.89	0.419		
	33857900	33908800	46.0608	-63.4883	46.0728	-63.5074	428	2.001	0.98	0.383		
	33908800	33958800	46.0728	-63.5074	46.0852	-63.5259	335	2.001	0.82	0.416		
	33958800	34009300	46.0852	-63.5259	46.0974	-63.5447	415	1.999	1.05	0.435		
	34009300	34059200	46.0974	-63.5447	46.1088	-63.5646	419	1.998	0.73	0.214		
	34059200	34109600	46.1088	-63.5646	46.1195	-63.5852	361	2.002	0.89	0.349		
	34109600	34158500	46.1195	-63.5852	46.1309	-63.6052	428	2.001	1.2	0.526		
	34158500	34170400	46.1309	-63.6052	46.1336	-63.6097	96	0.461	1.21	0.865		
Total	33594700	34170400	46.0023	-63.3921	46.1336	-63.6097	4337	22.464	0.92	0.578	0.10	3.91
10040	34279100	34338200	46.1328	-63.6067	46.1441	-63.6267	406	2.004	1.29	0.456		
	34338200	34392500	46.1441	-63.6267	46.1552	-63.6469	398	1.997	1.32	0.491		
	34392500	34446300	46.1552	-63.6469	46.1668	-63.6666	285	2.001	1.34	0.628		
	34446300	34499600	46.1668	-63.6666	46.1777	-63.6871	299	2.001	1.14	0.312		
	34499600	34552600	46.1777	-63.6871	46.1880	-63.7081	365	1.998	1.25	0.492		
	34552600	34607800	46.1880	-63.7081	46.1990	-63.7286	320	2.000	1.14	0.335		
	34607800	34654400	46.1990	-63.7286	46.2082	-63.7465	343	1.722	1.28	0.407		
Total	34279100	34654400	46.1328	-63.6067	46.2082	-63.7465	2659	13.722	1.25	0.461	0.10	3.68

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DATE: MAR16 FLIGHT #: 48

Total Length: 24.060 km

Line Number	Start FID	End FID	Start		End		No. of Smpls ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	49291500	49336100	46.2457	-63.7098	46.2306	-63.7236	278	2.004	0.82	1.088		
	49336100	49379900	46.2306	-63.7236	46.2158	-63.7380	323	1.998	0.66	0.336		
	49379900	49423200	46.2158	-63.7380	46.2022	-63.7549	288	2.002	1.22	0.407		
	49423200	49467900	46.2022	-63.7549	46.1893	-63.7728	334	1.998	1.19	0.421		
	49467900	49513100	46.1893	-63.7728	46.1765	-63.7909	301	2.002	1.22	0.515		
	49513100	49555400	46.1765	-63.7909	46.1650	-63.8085	404	1.871	1.25	0.843		
Total	49291500	49555400	46.2457	-63.7098	46.1650	-63.8085	2058	11.875	1.07	0.699	0.10	4.52
10020	49677500	49733700	46.1627	-63.8174	46.1762	-63.8006	540	2.001	6.42	3.945		
	49733700	49786800	46.1762	-63.8006	46.1890	-63.7827	490	1.999	1.55	0.477		
	49786800	49812400	46.1890	-63.7827	46.1949	-63.7746	235	0.907	1.00	0.487		
Total	49677500	49812400	46.1627	-63.8174	46.1949	-63.7746	1287	4.908	3.53	3.615	0.10	3.64
10030	49829600	49882500	46.1986	-63.7696	46.2116	-63.7519	458	2.004	1.46	0.486		
	49882500	49934500	46.2116	-63.7519	46.2254	-63.7355	475	1.998	1.16	0.756		
	49934500	49987900	46.2254	-63.7355	46.2394	-63.7194	416	2.000	0.97	0.421		
	49987900	50022400	46.2394	-63.7194	46.2485	-63.7095	252	1.275	0.87	0.592		
Total	49829600	50022400	46.1986	-63.7696	46.2485	-63.7095	1678	7.277	1.15	0.620	0.10	3.77

DATE: MAR16 FLIGHT #: 51

Total Length: 68.942 km

Line Number	Start FID	End FID	Start		End		No. of Smpls ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	53996600	54035300	46.6013	-64.4317	46.5847	-64.4222	166	2.000	0.52	0.343		
	54035300	54073300	46.5847	-64.4222	46.5682	-64.4118	250	2.003	0.52	0.231		
	54073300	54110800	46.5682	-64.4118	46.5517	-64.4018	28	1.998	0.14	0.073		
	54110800	54148400	46.5517	-64.4018	46.5352	-64.3916	78	2.000	0.07	0.076		
	54148400	54185500	46.5352	-64.3916	46.5188	-64.3808	137	2.004	0.01	0.000		
	54185500	54223100	46.5188	-64.3808	46.5027	-64.3694	138	1.998	0.01	0.000		
	54223100	54261700	46.5027	-64.3694	46.4872	-64.3565	210	1.999	0.01	0.018		
	54261700	54275400	46.4872	-64.3565	46.4819	-64.3515	52	0.697	0.01	0.001		
Total	53996600	54275400	46.6013	-64.4317	46.4819	-64.3515	1280	14.698	0.22	0.302	0.10	5.32
10020	54382600	54424600	46.4788	-64.3432	46.4681	-64.3224	182	2.000	0.01	0.006		
	54424600	54465600	46.4681	-64.3224	46.4579	-64.3011	150	2.001	0.14	0.090		
	54465600	54506600	46.4579	-64.3011	46.4477	-64.2797	119	2.002	0.26	0.169		
	54506600	54546700	46.4477	-64.2797	46.4382	-64.2577	142	1.998	0.13	0.159		
	54546700	54586500	46.4382	-64.2577	46.4291	-64.2354	166	1.999	0.29	0.379		
	54586500	54626600	46.4291	-64.2354	46.4198	-64.2131	303	2.003	0.83	0.414		
	54626600	54666600	46.4198	-64.2131	46.4099	-64.1916	282	2.001	0.61	0.440		
	54666600	54706900	46.4099	-64.1916	46.3989	-64.1710	251	1.999	0.85	0.306		
	54706900	54745600	46.3989	-64.1710	46.3882	-64.1503	260	1.999	0.86	0.289		
	54745600	54784700	46.3882	-64.1503	46.3775	-64.1295	217	2.001	0.77	0.336		
	54784700	54825600	46.3775	-64.1295	46.3670	-64.1085	335	1.997	0.85	0.309		
	54825600	54866700	46.3670	-64.1085	46.3563	-64.0878	219	2.000	0.81	0.350		
	54866700	54906900	46.3563	-64.0878	46.3459	-64.0667	126	1.999	0.62	0.364		
	54906900	54948800	46.3459	-64.0667	46.3360	-64.0451	316	2.002	0.68	0.414		
	54948800	54989200	46.3360	-64.0451	46.3263	-64.0233	230	2.001	0.79	0.478		
	54989200	55029900	46.3263	-64.0233	46.3168	-64.0014	285	1.998	1.00	0.539		
	55029900	55071400	46.3168	-64.0014	46.3068	-63.9799	260	2.002	0.86	0.456		
	55071400	55112600	46.3068	-63.9799	46.2966	-63.9586	357	2.000	1.04	0.580		
	55112600	55155300	46.2966	-63.9586	46.2874	-63.9365	318	1.998	1.23	0.581		
Total	54382600	55155300	46.4788	-64.3432	46.2874	-63.9365	7905	54.244	0.92	0.583	0.10	4.94

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DATE: MAR16 FLIGHT #: 52

Total Length: 21.096 km

Line Number	Start FID	End FID	Start		End		Number of Samples ICE	Length of Line/Seg. (km)	Ice Thickness		Average Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	55674700	55714000	46.2018	-63.7369	46.1912	-63.7161	291	2.003	1.49	0.537		
	55714000	55751200	46.1912	-63.7161	46.1801	-63.6957	239	2.001	1.08	0.367		
	55751200	55788100	46.1801	-63.6957	46.1689	-63.6756	234	1.996	1.13	0.545		
	55788100	55825100	46.1689	-63.6756	46.1578	-63.6552	195	2.003	1.02	0.474		
	55825100	55862700	46.1578	-63.6552	46.1473	-63.6342	270	2.003	1.33	0.71		
	55862700	55899900	46.1473	-63.6342	46.1374	-63.6128	300	1.998	1.24	0.384		
	55899900	55938900	46.1374	-63.6128	46.1281	-63.5906	215	2	0.83	0.444		
	55938900	55976500	46.1281	-63.5906	46.1197	-63.5679	228	1.997	0.86	0.467		
	55976500	56017200	46.1197	-63.5679	46.1121	-63.5445	211	2	0.52	0.453		
	56017200	56055100	46.1121	-63.5445	46.1055	-63.5206	202	2.001	0.01	0.005		
	56055100	56075400	46.1055	-63.5206	46.1026	-63.5071	99	1.094	0.01	0.001		
Total	55674700	56075400	46.2018	-63.7369	46.1026	-63.5071	2782	21.096	0.96	0.639	0.10	5.27

DATE: MAR17 FLIGHT #: 62

Total Length: 7.114 km

Line Number	Start FID	End FID	Start		End		No. of Smpls ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	44041000	44093200	46.7614	-63.3790	46.7755	-63.3950	335	2.001	0.57	0.423		
	44093200	44143000	46.7755	-63.3950	46.7900	-63.4104	457	2.002	0.52	0.107		
	44143000	44190600	46.7900	-63.4104	46.7985	-63.4327	278	1.999	0.23	0.169		
	44190600	44218400	46.7985	-63.4327	46.8013	-63.4467	180	1.112	0.48	0.167		
Total	44041000	44218400	46.7614	-63.3790	46.8013	-63.4467	1364	7.114	0.46	0.280	0.10	4.02

DATE: MAR17 FLIGHT #: 63

Total Length: 14.012 km

Line Number	Start FID	End FID	Start		End		No. of Smpls ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	44380600	44430700	46.8077	-63.4452	46.8146	-63.4692	439	2.004	0.58	0.131		
	44430700	44477800	46.8146	-63.4692	46.8215	-63.4932	191	1.998	0.50	0.101		
	44477800	44525500	46.8215	-63.4932	46.8279	-63.5176	298	2.001	0.53	0.107		
	44525500	44573000	46.8279	-63.5176	46.8337	-63.5423	314	1.998	0.50	0.085		
	44573000	44620400	46.8337	-63.5423	46.8403	-63.5665	277	2.003	0.41	0.082		
	44620400	44667900	46.8403	-63.5665	46.8464	-63.5910	434	1.998	0.52	0.085		
	44667900	44715300	46.8464	-63.5910	46.8514	-63.6161	255	2.001	0.53	0.183		
	44715300	44762900	46.8514	-63.6161	46.8587	-63.6399	330	1.997	0.37	0.167		
	44762900	44810200	46.8587	-63.6399	46.8673	-63.6628	365	2.001	0.49	0.116		
	44810200	44857000	46.8673	-63.6628	46.8746	-63.6867	389	2.003	0.55	0.080		
	44857000	44904800	46.8746	-63.6867	46.8815	-63.7107	409	1.998	0.59	0.075		
	44904800	44952700	46.8815	-63.7107	46.8889	-63.7344	373	2.001	0.53	0.122		
	44952700	45001400	46.8889	-63.7344	46.8968	-63.7578	389	2.001	0.58	0.084		
	45001400	45048200	46.8968	-63.7578	46.9050	-63.7811	292	1.997	0.48	0.158		
	45048200	45095500	46.9050	-63.7811	46.9130	-63.8044	349	2.002	0.46	0.229		
	45095500	45142700	46.9130	-63.8044	46.9216	-63.8274	249	1.999	0.57	0.264		
	45142700	45189900	46.9216	-63.8274	46.9308	-63.8499	390	2.001	0.58	0.270		
	45189900	45236900	46.9308	-63.8499	46.9389	-63.8732	338	1.998	0.57	0.250		
	45236900	45283900	46.9389	-63.8732	46.9459	-63.8972	471	2.001	0.52	0.207		
Total	44380600	45283900	46.8077	-63.4452	46.9459	-63.8972	7761	45.531	0.53	0.251	0.10	4.31

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DATE: MAR17 FLIGHT #: 56

Total Length: 4.354 km

Line Number	Start FID	End FID	Start		End		No. of Smples ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	35208500	35248800	46.5015	-62.4621	46.5077	-62.4377	321	2	0.96	0.473		
	35248800	35290700	46.5077	-62.4377	46.5134	-62.413	359	2.005	1	0.448		
	35290700	35297800	46.5134	-62.413	46.5144	-62.4087	65	0.349	0.09	0.098		
Total	35208500	35297800	46.5015	-62.4621	46.5144	-62.4087	781	4.354	0.9	0.507	0.10	4.87

DATE: MAR17 FLIGHT #: 64

Total Length: 21.153 km

Line Number	Start FID	End FID	Start		End		No. of Smples ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	60087600	60136500	46.9943	-64.0796	47.0009	-64.1038	385	2.000	0.80	0.391		
	60136500	60182700	47.0009	-64.1038	47.0080	-64.1278	263	2.004	0.77	0.262		
	60182700	60227700	47.0080	-64.1278	47.0149	-64.1519	319	2.000	0.55	0.202		
	60227700	60272500	47.0149	-64.1519	47.0221	-64.1758	195	1.996	0.41	0.215		
	60272500	60317300	47.0221	-64.1758	47.0296	-64.1996	207	2.000	0.57	0.357		
	60317300	60362000	47.0296	-64.1996	47.0365	-64.2238	187	2.002	0.92	0.428		
	60362000	60406900	47.0365	-64.2238	47.0423	-64.2486	298	2.002	0.92	0.339		
	60406900	60451500	47.0423	-64.2486	47.0489	-64.2729	287	1.998	0.89	0.241		
	60451500	60496100	47.0489	-64.2729	47.0556	-64.2972	270	2.002	0.99	0.261		
	60496100	60540700	47.0556	-64.2972	47.0621	-64.3216	293	1.996	0.92	0.317		
	60540700	60566400	47.0621	-64.3216	47.0657	-64.3357	205	1.152	0.92	0.503		
Total	60087600	60566400	46.9943	-64.0796	47.0657	-64.3357	3311	21.153	0.79	0.369	0.10	4.42

DATE: MAR17 FLIGHT #: 65

Total Length: 30.719 km

Line Number	Start FID	End FID	Start		End		No. of Smples ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	60701300	60746000	47.0766	-64.3314	47.0590	-64.3364	335	2.003	0.72	0.378		
	60746000	60790600	47.0590	-64.3364	47.0416	-64.3427	321	2.000	0.61	0.225		
	60790600	60832800	47.0416	-64.3427	47.0244	-64.3496	301	1.997	0.86	0.310		
	60832800	60876800	47.0244	-64.3496	47.0070	-64.3579	253	2.040	0.88	0.355		
	60876800	60921400	47.0070	-64.3579	46.9905	-64.3671	168	1.964	0.70	0.292		
	60921400	60964300	46.9905	-64.3671	46.9734	-64.3747	255	1.999	1.06	0.577		
	60964300	61007600	46.9734	-64.3747	46.9561	-64.3815	420	1.998	1.14	0.546		
	61007600	61053400	46.9561	-64.3815	46.9388	-64.3881	403	2.004	0.82	0.580		
	61053400	61093100	46.9388	-64.3881	46.9213	-64.3937	374	1.998	0.89	0.472		
	61093100	61136400	46.9213	-64.3937	46.9040	-64.4008	370	2.001	1.03	0.432		
	61136400	61181100	46.9040	-64.4008	46.8870	-64.4088	310	1.997	1.10	0.500		
	61181100	61223400	46.8870	-64.4088	46.8699	-64.4163	364	2.004	0.57	0.316		
	61223400	61267600	46.8699	-64.4163	46.8528	-64.4243	443	1.996	0.62	0.425		
	61267600	61311300	46.8528	-64.4243	46.8355	-64.4309	414	2.003	0.42	0.326		
	61311300	61355500	46.8355	-64.4309	46.8182	-64.4375	344	1.999	0.97	0.554		
	61355500	61372400	46.8182	-64.4375	46.8121	-64.4404	110	0.717	0.83	0.700		
Total	60701300	61372400	47.0766	-64.3314	46.8121	-64.4404	5486	30.719	0.82	0.495	0.10	4.60

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DATE: MAR17 FLIGHT #: 66

Total Length: 29.945 km

Line Number	Start FID	End FID	Start		End		No. of Smpls ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	61501700	61547900	46.8156	-64.4333	46.7985	-64.4408	263	2.003	1.32	0.575		
	61547900	61592700	46.7985	-64.4408	46.7812	-64.4474	275	1.998	1.25	0.615		
	61592700	61635900	46.7812	-64.4474	46.7636	-64.4524	297	1.999	0.83	0.568		
	61635900	61680200	46.7636	-64.4524	46.7459	-64.4571	374	2.001	1.60	0.633		
	61680200	61724400	46.7459	-64.4571	46.7281	-64.4604	400	2.001	1.27	0.776		
	61724400	61767300	46.7281	-64.4604	46.7103	-64.4634	189	1.999	1.02	0.500		
	61767300	61810100	46.7103	-64.4634	46.6925	-64.4661	283	2.003	1.07	0.435		
	61810100	61853300	46.6925	-64.4661	46.6747	-64.4681	356	1.999	0.87	0.327		
	61853300	61897000	46.6747	-64.4681	46.6568	-64.4696	224	1.998	0.97	0.527		
	61897000	61939800	46.6568	-64.4696	46.6388	-64.4699	264	2.000	0.47	0.338		
	61939800	61982900	46.6388	-64.4699	46.6210	-64.4725	336	2.002	0.58	0.401		
	61982900	62026400	46.6210	-64.4725	46.6036	-64.4784	248	1.999	0.72	0.434		
	62026400	62068600	46.6036	-64.4784	46.5861	-64.4843	311	1.999	1.42	0.484		
	62068600	62111300	46.5861	-64.4843	46.5686	-64.4900	177	2.000	1.49	0.697		
	62111300	62153400	46.5686	-64.4900	46.5517	-64.4958	147	1.944	0.59	0.672		
Total	61501700	62153400	46.8156	-64.4333	46.5517	-64.4958	4421	29.945	1.05	0.645	0.11	5.15

DATE: MAR17 FLIGHT #: 69

Total Length: 11.528 km

Line Number	Start FID	End FID	Start		End		No. of Smpls ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	53498700	53545900	46.3362	-64.3267	46.3361	-64.3007	317	2.003	1.21	0.747		
	53545900	53589300	46.3361	-64.3007	46.3352	-64.2748	237	2.001	1.28	0.362		
	53589300	53631800	46.3352	-64.2748	46.3331	-64.2491	236	2.000	1.01	0.419		
	53631800	53673800	46.3331	-64.2491	46.3310	-64.2235	309	1.996	0.92	0.366		
	53673800	53717600	46.3310	-64.2235	46.3285	-64.1979	335	2.001	1.29	0.440		
	53717600	53749300	46.3285	-64.1979	46.3261	-64.1784	237	1.526	1.34	0.638		
Total	53498700	53749300	46.3362	-64.3267	46.3261	-64.1784	1824	11.528	1.17	0.542	0.10	4.62

EDITED DATE: MAR17 FLIGHT #: 70

Total Length: 19.032 km

Line Number	Start FID	End FID	Start		End		No. of Smpls ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	53891100	53891100	46.3247	-64.1662	46.3185	-64.1419	302	2.000	1.14	0.482		
	53939300	53939300	46.3185	-64.1419	46.3119	-64.1179	267	2.003	0.86	0.589		
	53984900	53984900	46.3119	-64.1179	46.3048	-64.0942	226	1.998	1.15	0.583		
	54029800	54029800	46.3048	-64.0942	46.2977	-64.0705	277	1.999	1.05	0.555		
	54073800	54073800	46.2977	-64.0705	46.2912	-64.0464	250	2.002	1.20	0.501		
	54117700	54117700	46.2912	-64.0464	46.2852	-64.0221	265	1.999	1.15	0.611		
	54161900	54161900	46.2852	-64.0221	46.2787	-63.9980	227	1.999	1.56	0.628		
	54205900	54205900	46.2787	-63.9980	46.2716	-63.9743	352	2.001	1.09	0.541		
	54249000	54249000	46.2716	-63.9743	46.2643	-63.9507	217	1.999	0.94	0.554		
	54291100	54291100	46.2643	-63.9507	46.2606	-63.9385	206	1.032	1.11	0.356		
Total	53891100	54313000	46.3247	-64.1662	46.2606	-63.9385	2889	19.032	1.12	0.570	0.101	4.79

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DATE: MAR17 FLIGHT #: 71

Total Length: 9.898 km

Line Number	Start FID	End FID	Start		End		No. of Smples ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	69166500	69216100	46.1855	-63.8005	46.1943	-63.7782	122	2.000	1.08	0.632		
	69216100	69261700	46.1943	-63.7782	46.2072	-63.7604	219	2.003	1.43	0.525		
	69261700	69305100	46.2072	-63.7604	46.2207	-63.7433	250	1.999	1.55	0.507		
	69305100	69347800	46.2207	-63.7433	46.2345	-63.7268	216	1.997	1.41	0.491		
	69347800	69389200	46.2345	-63.7268	46.2477	-63.7113	82	1.898	0.94	0.653		
Total	69166500	69389200	46.1855	-63.8005	46.2477	-63.7113	1087	9.898	1.37	0.576	0.10	4.46

DATE: MAR17 FLIGHT #: 72

Total Length: 9.406 km

Line Number	Start FID	End FID	Start		End		No. of Smples ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	69545800	69596600	46.246	-63.709	46.232	-63.724	362	2.003	0.91	0.598		
	69596600	69645000	46.232	-63.724	46.218	-63.740	300	1.997	1.24	0.484		
	69645000	69691400	46.218	-63.740	46.204	-63.757	343	2.003	1.18	0.336		
	69691400	69736900	46.204	-63.757	46.191	-63.775	327	1.997	1.45	0.524		
	69736900	69770000	46.191	-63.775	46.182	-63.787	194	1.405	1.32	0.512		
Total	69545800	69770000	46.246	-63.709	46.182	-63.787	1671	9.406	1.20	0.532	0.10	4.21

DATE: MAR18 FLIGHT #: 74

Total Length: 18.173 km

Line Number	Start FID	End FID	Start		End		No. of Smples ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	63585800	63637400	46.1817	-63.0671	46.1638	-63.0691	517	2.004	0.40	0.398		
	63637400	63662400	46.1638	-63.0691	46.1549	-63.0693	251	0.991	0.51	0.386		
Total	63585800	63662400	46.1817	-63.0671	46.1549	-63.0693	767	2.995	0.44	0.397	0.10	3.90
10020	63780700	63832400	46.1332	-63.0826	46.1511	-63.0851	517	2.003	0.14	0.193		
	63832400	63887500	46.1511	-63.0851	46.1597	-63.1058	509	1.998	0.05	0.055		
	63887500	63945700	46.1597	-63.1058	46.1569	-63.1310	563	2.001	0.06	0.045		
	63945700	63996400	46.1569	-63.1310	46.1506	-63.1520	508	1.768	0.65	0.527		
Total	63780700	63996400	46.1332	-63.0826	46.1506	-63.1520	2094	7.769	0.22	0.372	0.10	3.71
10030	64105100	64150900	46.1432	-63.1576	46.1569	-63.1408	446	2.005	0.51	0.414		
	64150900	64195900	46.1569	-63.1408	46.1714	-63.1255	451	1.998	0.11	0.169		
	64195900	64239800	46.1714	-63.1255	46.1845	-63.1079	440	2.001	0.25	0.387		
	64239800	64270600	46.1845	-63.1079	46.1912	-63.0924	309	1.405	0.37	0.494		
Total	64105100	64270600	46.1432	-63.1576	46.1912	-63.0924	1643	7.409	0.31	0.404	0.10	4.51

DATE: MAR18 FLIGHT #: 75

Total Length: 14.542 km

Line Number	Start FID	End FID	Start		End		No. of Smples ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	70710900	70754500	46.3331	-63.8645	46.3351	-63.8904	437	2.001	0.84	0.50		
	70754500	70799000	46.3351	-63.8904	46.3367	-63.9164	438	2.003	1.19	0.53		
	70799000	70843700	46.3367	-63.9164	46.3377	-63.9423	439	2.000	0.63	0.37		
	70843700	70862700	46.3377	-63.9423	46.3382	-63.9541	191	0.903	0.82	0.42		
Total	70710900	70862700	46.3331	-63.8645	46.3382	-63.9541	1502	6.907	0.88	0.51	0.10	4.60
10020	70971300	71023300	46.3396	-64.0065	46.3379	-64.0325	521	2.003	1.19	0.46		
	71023300	71074000	46.3379	-64.0325	46.3349	-64.0581	508	1.999	1.03	0.51		
	71074000	71124600	46.3349	-64.0581	46.3317	-64.0837	507	2.000	1.20	0.59		
	71124600	71167400	46.3317	-64.0837	46.3295	-64.1047	391	1.633	0.82	0.55		
Total	70971300	71167400	46.3396	-64.0065	46.3295	-64.1047	1924	7.635	1.07	0.55	0.10	3.97

DATE: MAR18 FLIGHT #: 76

Total Length: 52.185 km

Line Number	Start FID	End FID	Start		End		No. of Smples ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	77584400	77627700	46.3286	-64.1263	46.3466	-64.1263	434	2.003	1.03	0.484		
	77627700	77670300	46.3466	-64.1263	46.3645	-64.1248	427	1.999	0.89	0.612		
	77670300	77682400	46.3645	-64.1248	46.3694	-64.1238	122	0.553	0.65	0.383		
Total	77584400	77682400	46.3286	-64.1263	46.3694	-64.1238	981	4.555	0.92	0.546	0.10	4.64
10020	77719600	77770600	46.3694	-64.1237	46.3515	-64.1264	511	2.003	0.90	0.660		
	77770600	77802400	46.3515	-64.1264	46.3401	-64.1271	319	1.269	0.75	0.321		
Total	77719600	77802400	46.3694	-64.1237	46.3401	-64.1271	829	3.272	0.85	0.559	0.10	3.95
10030	77837200	77883900	46.3399	-64.1278	46.3578	-64.1266	468	2.000	0.82	0.507		
	77883900	77913400	46.3578	-64.1266	46.3698	-64.1254	296	1.339	0.78	0.568		
Total	77837200	77913400	46.3399	-64.1278	46.3698	-64.1254	763	3.339	0.80	0.532	0.10	4.38
10040	78048900	78094100	46.3499	-64.1412	46.3488	-64.1152	453	2.003	0.81	0.434		
	78094100	78097400	46.3488	-64.1152	46.3489	-64.1135	34	0.132	0.50	0.526		
Total	78048900	78097400	46.3499	-64.1412	46.3489	-64.1135	486	2.135	0.79	0.447	0.10	4.39
10050	78134500	78191500	46.3469	-64.1105	46.3479	-64.1364	571	2.003	0.77	0.439		
	78191500	78193400	46.3479	-64.1364	46.3478	-64.1373	14	0.066	0.34	0.314		
Total	78134500	78193400	46.3469	-64.1105	46.3478	-64.1373	584	2.069	0.76	0.442	0.10	3.54
10060	78270800	78319100	46.3378	-64.1297	46.3558	-64.1294	484	2.002	0.78	0.374		
	78319100	78351400	46.3558	-64.1294	46.3679	-64.1290	324	1.346	1.04	0.576		
Total	78270800	78351400	46.3378	-64.1297	46.3679	-64.1290	807	3.348	0.88	0.483	0.10	4.15
10070	78497700	78534400	46.3601	-64.1204	46.3663	-64.1338	368	1.257	0.54	0.417		
Total	78497700	78534400	46.3601	-64.1204	46.3663	-64.1338	368	1.257	0.54	0.417	0.10	3.41
10080	78734300	78791700	46.3355	-64.1324	46.3535	-64.1325	575	2.001	0.87	0.416		
	78791700	78838200	46.3535	-64.1325	46.3687	-64.1319	466	1.695	1.01	0.477		
Total	78734300	78838200	46.3355	-64.1324	46.3687	-64.1319	1040	3.696	0.93	0.449	0.10	3.55
10090	78886300	78953700	46.3650	-64.1336	46.3471	-64.1339	671	2.003	0.96	0.407		
	78953700	78993400	46.3471	-64.1339	46.3368	-64.1348	398	1.149	1.12	0.480		
Total	78886300	78993400	46.3650	-64.1336	46.3368	-64.1348	1068	3.152	1.02	0.442	0.10	2.95
10100	79016700	79074900	46.3378	-64.1328	46.3542	-64.1431	583	2.001	0.95	0.515		
	79074900	79128600	46.3542	-64.1431	46.3705	-64.1540	538	1.999	1.17	0.519		
	79128600	79183600	46.3705	-64.1540	46.3872	-64.1637	551	1.999	0.93	0.545		
	79183600	79200200	46.3872	-64.1637	46.3925	-64.1661	167	0.623	0.93	0.389		
Total	79016700	79200200	46.3378	-64.1328	46.3925	-64.1661	1836	6.623	1.01	0.525	0.10	3.61
10110	79414700	79454300	46.3464	-64.1076	46.3451	-64.0816	393	2.003	1.06	0.509		
	79454300	79498300	46.3451	-64.0816	46.3445	-64.0556	441	2.000	1.10	0.574		
	79498300	79544000	46.3445	-64.0556	46.3432	-64.0297	458	1.998	0.71	0.468		
	79544000	79589100	46.3432	-64.0297	46.3417	-64.0037	452	2.002	0.80	0.520		
	79589100	79633400	46.3417	-64.0037	46.3399	-63.9778	440	2.001	0.66	0.549		
	79633400	79676200	46.3399	-63.9778	46.3378	-63.9520	429	2.001	6.86	4.313		
	79676200	79717500	46.3378	-63.9520	46.3357	-63.9262	414	1.998	1.20	0.482		
	79717500	79755800	46.3357	-63.9262	46.3348	-63.9002	384	2.000	0.63	0.471		
	79755800	79793100	46.3348	-63.9002	46.3339	-63.8742	374	2.000	0.86	0.561		
Total	79414700	79807400	46.3464	-64.1076	46.3339	-63.8646	3920	18.739	1.51	2.413	0.10	4.78

DATE: MAR19 FLIGHT #: 77

Total Length: 38.650 km

Line Number	Start FID	End FID	Start		End		No. of Smples ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	49125500	49165000	46.0877	-63.2942	46.0799	-63.3176	392	2.002	0.03	0.030		
	49165000	49194400	46.0799	-63.3176	46.0740	-63.3345	290	1.460	0.03	0.031		
Total	49125500	49194400	46.0877	-63.2942	46.0740	-63.3345	681	3.462	0.03	0.030	0.10	5.08
10020	49328700	49373200	46.0880	-63.3986	46.0956	-63.4221	446	2.002	0.03	0.038		
	49373200	49414000	46.0956	-63.4221	46.1036	-63.4453	409	1.998	0.06	0.086		
	49414000	49456700	46.1036	-63.4453	46.1118	-63.4683	428	2.000	0.10	0.115		
	49456700	49497600	46.1118	-63.4683	46.1195	-63.4918	396	2.001	0.17	0.137		
	49497600	49540000	46.1195	-63.4918	46.1272	-63.5152	425	2.000	0.25	0.260		
	49540000	49581400	46.1272	-63.5152	46.1347	-63.5388	415	2.002	0.73	0.619		
	49581400	49623100	46.1347	-63.5388	46.1427	-63.5620	409	2.001	0.81	0.631		
	49623100	49664400	46.1427	-63.5620	46.1505	-63.5854	414	2.000	0.17	0.314		
	49664400	49706000	46.1505	-63.5854	46.1581	-63.6088	417	1.996	0.17	0.260		
	49706000	49747900	46.1581	-63.6088	46.1655	-63.6325	419	2.001	0.36	0.360		
	49747900	49788700	46.1655	-63.6325	46.1721	-63.6566	409	1.999	0.35	0.391		
	49788700	49829000	46.1721	-63.6566	46.1776	-63.6812	396	1.999	0.38	0.437		
	49829000	49870400	46.1776	-63.6812	46.1830	-63.7060	411	2.002	0.58	0.474		
	49870400	49911100	46.1830	-63.7060	46.1874	-63.7312	335	2.001	0.59	0.503		
	49911100	49952600	46.1874	-63.7312	46.1898	-63.7569	407	2.001	0.35	0.495		
	49952600	49994300	46.1898	-63.7569	46.1844	-63.7810	408	1.996	0.01	0.001		
	49994300	50036300	46.1844	-63.7810	46.1724	-63.8004	409	2.001	0.02	0.028		
	50036300	50062400	46.1724	-63.8004	46.1644	-63.8106	262	1.187	0.68	0.767		
Total	49328700	50062400	46.0880	-63.3986	46.1644	-63.8106	7198	35.188	0.31	0.457	0.10	4.89

DATE: MAR19 FLIGHT #: 78

Total Length: 25.149 km

Line Number	Start FID	End FID	Start		End		No. of Smples ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	50289100	50335100	46.1615	-63.8114	46.1752	-63.7946	458	2.001	0.45	0.645		
	50335100	50380500	46.1752	-63.7946	46.1884	-63.7770	455	2.002	0.02	0.032		
	50380500	50425000	46.1884	-63.7770	46.2017	-63.7595	446	1.997	0.16	0.300		
	50425000	50470400	46.2017	-63.7595	46.2153	-63.7426	422	2.000	0.42	0.443		
	50470400	50515800	46.2153	-63.7426	46.2292	-63.7261	447	2.002	0.23	0.303		
	50515800	50559700	46.2292	-63.7261	46.2436	-63.7106	440	1.999	0.52	0.296		
	50559700	50569400	46.2436	-63.7106	46.2467	-63.7074	98	0.427	0.43	0.227		
Total	50289100	50569400	46.1615	-63.8114	46.2467	-63.7074	2760	12.429	0.30	0.418	0.10	4.5
10020	50713000	50758200	46.2540	-63.7101	46.2384	-63.7223	453	2.003	0.70	0.366		
	50758200	50802500	46.2384	-63.7223	46.2242	-63.7382	444	1.998	0.55	0.426		
	50802500	50846500	46.2242	-63.7382	46.2103	-63.7546	429	2.001	0.23	0.357		
	50846500	50888200	46.2103	-63.7546	46.1969	-63.7719	418	2.000	0.61	0.559		
	50888200	50930400	46.1969	-63.7719	46.1841	-63.7902	423	2.003	0.01	0.016		
	50930400	50972400	46.1841	-63.7902	46.1710	-63.8079	421	1.998	0.40	0.875		
	50972400	50987400	46.1710	-63.8079	46.1661	-63.8140	151	0.717	0.28	0.268		
Total	50713000	50987400	46.2540	-63.7101	46.1661	-63.8140	2733	12.720	0.41	0.543	0.10	4.65

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DATE: MAR19 FLIGHT #: 79

Total Length: 40.190 km

Line Number	Start FID	End FID	Start		End		No. of Smpls ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	51504400	51550100	46.2161	-63.7656	46.2226	-63.7897	458	2.002	1.28	0.794		
	51550100	51594500	46.2226	-63.7897	46.2299	-63.8135	429	1.999	1.19	0.694		
	51594500	51637800	46.2299	-63.8135	46.2379	-63.8367	422	2.002	1.39	0.850		
	51637800	51682600	46.2379	-63.8367	46.2458	-63.8600	449	1.997	1.14	0.544		
	51682600	51726400	46.2458	-63.8600	46.2530	-63.8839	439	2.003	1.37	0.576		
	51726400	51771000	46.2530	-63.8839	46.2600	-63.9078	447	1.997	1.40	0.635		
	51771000	51815300	46.2600	-63.9078	46.2672	-63.9316	444	1.999	1.60	0.511		
	51815300	51859500	46.2672	-63.9316	46.2746	-63.9553	443	2.003	1.16	0.656		
	51859500	51903700	46.2746	-63.9553	46.2816	-63.9792	443	1.997	1.10	0.372		
	51903700	51946800	46.2816	-63.9792	46.2882	-64.0033	432	1.999	0.89	0.494		
	51946800	51990200	46.2882	-64.0033	46.2943	-64.0278	435	2.001	1.26	0.631		
	51990200	52033100	46.2943	-64.0278	46.3004	-64.0522	426	2.000	1.16	0.538		
	52033100	52075500	46.3004	-64.0522	46.3072	-64.0763	425	1.999	1.14	0.535		
	52075500	52118100	46.3072	-64.0763	46.3141	-64.1004	427	2.004	1.08	0.615		
	52118100	52160400	46.3141	-64.1004	46.3212	-64.1243	424	1.999	1.20	0.536		
	52160400	52203200	46.3212	-64.1243	46.3277	-64.1485	429	2.001	1.35	0.672		
	52203200	52228400	46.3277	-64.1485	46.3320	-64.1628	253	1.195	1.05	0.694		
Total	51504400	52228400	46.2161	-63.7656	46.3320	-64.1628	7209	33.199	1.23	0.637	0.10	4.61
10020	52366400	52417600	46.3528	-64.1330	46.3626	-64.1112	500	2.001	0.90	0.382		
	52417600	52469700	46.3626	-64.1112	46.3724	-64.0893	522	2.001	0.76	0.345		
	52469700	52519300	46.3724	-64.0893	46.3825	-64.0679	486	1.998	0.51	0.331		
	52519300	52543600	46.3825	-64.0679	46.3872	-64.0569	232	0.990	0.10	0.116		
Total	52366400	52543600	46.3528	-64.1330	46.3872	-64.0569	1737	6.991	0.64	0.422	0.10	4.02

DATE: MAR19 FLIGHT #: 80

Total Length: 74.503 km

Line Number	Start FID	End FID	Start		End		No. of Smpls ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	55722600	55748400	46.3663	-64.1509	46.3592	-64.1657	259	1.382	1.30	0.657		
Total	55722600	55748400	46.3663	-64.1509	46.3592	-64.1657	259	1.382	1.30	0.657	0.1	5.34
10020	55893100	55935700	46.3703	-64.2303	46.3860	-64.2429	427	2.005	1.05	0.491		
	55935700	55977100	46.3860	-64.2429	46.4019	-64.2549	415	1.996	1.19	0.683		
	55977100	56020000	46.4019	-64.2549	46.4180	-64.2666	424	2.000	0.86	0.568		
	56020000	56063200	46.4180	-64.2666	46.4339	-64.2788	433	2.002	0.87	0.464		
	56063200	56105700	46.4339	-64.2788	46.4498	-64.2908	426	1.999	0.82	0.526		
	56105700	56149100	46.4498	-64.2908	46.4656	-64.3034	435	2.001	0.25	0.348		
	56149100	56191400	46.4656	-64.3034	46.4811	-64.3164	424	2.001	0.17	0.198		
	56191400	56234300	46.4811	-64.3164	46.4967	-64.3295	430	1.997	0.34	0.370		
	56234300	56277400	46.4967	-64.3295	46.5121	-64.3429	432	2.000	0.46	0.510		
	56277400	56319400	46.5121	-64.3429	46.5276	-64.3560	421	2.003	1.26	0.503		
	56319400	56361300	46.5276	-64.3560	46.5433	-64.3687	420	2.000	1.27	0.595		
	56361300	56403900	46.5433	-64.3687	46.5592	-64.3810	427	1.999	1.13	0.558		
	56403900	56445500	46.5592	-64.3810	46.5748	-64.3939	417	1.999	0.58	0.522		
	56445500	56486400	46.5748	-64.3939	46.5906	-64.4064	408	2.003	0.52	0.375		
	56486400	56526900	46.5906	-64.4064	46.6063	-64.4190	374	2.000	0.32	0.341		
	56526900	56566700	46.6063	-64.4190	46.6220	-64.4317	396	1.997	0.50	0.443		
	56566700	56609300	46.6220	-64.4317	46.6383	-64.4446	395	2.068	0.55	0.305		
	56609300	56650400	46.6383	-64.4446	46.6540	-64.4556	176	1.932	0.08	0.299		
	56650400	56679400	46.6540	-64.4556	46.6651	-64.4630	291	1.360	0.45	0.706		
Total	55893100	56679400	46.3703	-64.2303	46.6651	-64.4630	7553	37.362	0.69	0.604	0.10	4.95

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10030	56829500	56873300	46.7192	-64.4433	46.7365	-64.4363	433	2.001	0.84	0.479		
	56873300	56918800	46.7365	-64.4363	46.7540	-64.4306	456	2.000	1.02	0.597		
	56918800	56965400	46.7540	-64.4306	46.7717	-64.4257	467	2.001	0.88	0.511		
	56965400	57011200	46.7717	-64.4257	46.7895	-64.4226	459	1.998	0.49	0.421		
	57011200	57056700	46.7895	-64.4226	46.8071	-64.4169	456	2.001	1.03	0.613		
	57056700	57102500	46.8071	-64.4169	46.8245	-64.4105	453	2.000	0.93	0.688		
	57102500	57147600	46.8245	-64.4105	46.8420	-64.4048	452	2.001	1.11	0.775		
	57147600	57193800	46.8420	-64.4048	46.8596	-64.3992	459	2.001	1.28	0.781		
	57193800	57240500	46.8596	-64.3992	46.8772	-64.3940	468	1.999	0.67	0.474		
	57240500	57288700	46.8772	-64.3940	46.8949	-64.3898	483	1.997	0.55	0.615		
	57288700	57337000	46.8949	-64.3898	46.9126	-64.3848	484	2.003	0.53	0.370		
	57337000	57385300	46.9126	-64.3848	46.9301	-64.3791	484	2.001	1.08	0.628		
	57385300	57432600	46.9301	-64.3791	46.9477	-64.3735	474	1.999	1.58	0.565		
	57432600	57479700	46.9477	-64.3735	46.9653	-64.3685	472	1.997	0.75	0.657		
	57479700	57528000	46.9653	-64.3685	46.9829	-64.3634	484	2.003	0.82	0.449		
	57528000	57576000	46.9829	-64.3634	47.0007	-64.3595	481	1.997	0.82	0.486		
	57576000	57624000	47.0007	-64.3595	47.0186	-64.3572	481	2.002	0.54	0.373		
	57624000	57666000	47.0186	-64.3572	47.0343	-64.3558	421	1.756	0.33	0.273		
Total	56829500	57666000	46.7192	-64.4433	47.0343	-64.3558	8350	35.759	0.85	0.635	0.10	4.28

DATE: MAR19 FLIGHT #: 81

Total Length: 99.724 km

Line Number	Start FID	End FID	Start		End		No. of Smpls ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	Spacing	
											(s)	(m)
10010	57926500	57972500	47.0292	-64.2361	47.0251	-64.2104	461	2.001	0.65	0.280		
	57972500	58019400	47.0251	-64.2104	47.0216	-64.1845	470	2.000	0.72	0.326		
	58019400	58066300	47.0216	-64.1845	47.0177	-64.1588	470	2.001	0.55	0.201		
	58066300	58114400	47.0177	-64.1588	47.0131	-64.1334	482	1.999	0.53	0.259		
	58114400	58161500	47.0131	-64.1334	47.0085	-64.1079	472	2.000	0.57	0.168		
	58161500	58208500	47.0085	-64.1079	47.0048	-64.0821	471	2.000	0.52	0.241		
	58208500	58255000	47.0048	-64.0821	47.0011	-64.0563	466	2.001	0.73	0.327		
	58255000	58267100	47.0011	-64.0563	47.0002	-64.0501	122	0.485	2.01	1.010		
Total	57926500	58267100	47.0292	-64.2361	47.0002	-64.0501	3407	14.487	0.66	0.417	0.10	4.25
10020	58444800	58490100	46.9813	-63.9575	46.9780	-63.9316	447	2.001	0.01	0.007		
	58490100	58536200	46.9780	-63.9316	46.9741	-63.9059	431	2.002	0.01	0.018		
	58536200	58582600	46.9741	-63.9059	46.9697	-63.8803	465	2.000	0.18	0.170		
	58582600	58628400	46.9697	-63.8803	46.9657	-63.8547	456	2.000	0.03	0.041		
	58628400	58675600	46.9657	-63.8547	46.9616	-63.8291	473	2.000	0.14	0.170		
	58675600	58721700	46.9616	-63.8291	46.9573	-63.8035	462	1.999	0.23	0.258		
	58721700	58767000	46.9573	-63.8035	46.9527	-63.7781	454	1.999	0.25	0.228		
	58767000	58813500	46.9527	-63.7781	46.9488	-63.7524	466	2.000	0.38	0.308		
	58813500	58860500	46.9488	-63.7524	46.9440	-63.7271	471	2.002	0.29	0.229		
	58860500	58906800	46.9440	-63.7271	46.9387	-63.7020	464	1.998	0.20	0.257		
	58906800	58954100	46.9387	-63.7020	46.9335	-63.6767	472	2.002	0.21	0.332		
	58954100	59000500	46.9335	-63.6767	46.9276	-63.6519	465	2.002	0.60	0.244		
	59000500	59047600	46.9276	-63.6519	46.9217	-63.6271	472	1.998	0.71	0.345		
	59047600	59092400	46.9217	-63.6271	46.9157	-63.6024	449	1.999	0.74	0.235		
	59092400	59139000	46.9157	-63.6024	46.9099	-63.5776	467	1.999	0.55	0.322		
	59139000	59185000	46.9099	-63.5776	46.9038	-63.5529	461	2.002	0.58	0.201		
	59185000	59232900	46.9038	-63.5529	46.8977	-63.5282	480	1.998	0.58	0.189		
	59232900	59272400	46.8977	-63.5282	46.8923	-63.5076	396	1.678	0.49	0.146		
Total	58444800	59272400	46.9813	-63.9575	46.8923	-63.5076	8234	35.678	0.34	0.327	0.10	4.33

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10030	59492600	59538800	46.8601	-63.3987	46.8537	-63.3740	463	2.003	0.21	0.182		
	59538800	59586100	46.8537	-63.3740	46.8472	-63.3496	474	1.998	0.18	0.215		
	59586100	59632900	46.8472	-63.3496	46.8405	-63.3252	469	2.001	0.17	0.204		
	59632900	59679900	46.8405	-63.3252	46.8338	-63.3009	471	2.001	0.17	0.197		
	59679900	59727500	46.8338	-63.3009	46.8277	-63.2762	477	1.998	0.17	0.091		
	59727500	59774500	46.8277	-63.2762	46.8214	-63.2516	471	1.999	0.19	0.077		
	59774500	59811400	46.8214	-63.2516	46.8162	-63.2329	369	1.536	0.16	0.164		
Total	59492600	59811400	46.8601	-63.3987	46.8162	-63.2329	3188	13.537	0.18	0.170	0.10	4.25
10040	59852200	59892800	46.8009	-63.2289	46.7829	-63.2285	407	2.003	0.11	0.173		
	59892800	59933400	46.7829	-63.2285	46.7650	-63.2268	407	2.001	0.32	0.174		
	59933400	59975700	46.7650	-63.2268	46.7472	-63.2233	424	2.000	0.32	0.201		
	59975700	60018100	46.7472	-63.2233	46.7296	-63.2180	425	1.998	0.17	0.132		
	60018100	60060700	46.7296	-63.2180	46.7121	-63.2123	427	1.999	0.44	0.192		
	60060700	60102300	46.7121	-63.2123	46.6943	-63.2084	417	2.002	0.29	0.144		
	60102300	60143600	46.6943	-63.2084	46.6764	-63.2067	414	2.000	0.21	0.156		
	60143600	60183400	46.6764	-63.2067	46.6584	-63.2057	399	2.001	0.10	0.129		
	60183400	60223900	46.6584	-63.2057	46.6406	-63.2030	406	1.998	0.10	0.098		
	60223900	60265700	46.6406	-63.2030	46.6229	-63.1978	419	2.003	0.17	0.096		
	60265700	60306300	46.6229	-63.1978	46.6052	-63.1937	407	1.999	0.18	0.059		
	60306300	60322400	46.6052	-63.1937	46.5983	-63.1925	162	0.769	0.05	0.053		
Total	59852200	60322400	46.8009	-63.2289	46.5983	-63.1925	4703	22.771	0.21	0.181	0.10	4.84
10050	60493000	60530000	46.5267	-63.1738	46.5089	-63.1698	371	2.002	0.10	0.077		
	60530000	60573400	46.5089	-63.1698	46.4911	-63.1663	435	1.999	0.28	0.181		
	60573400	60613700	46.4911	-63.1663	46.4734	-63.1616	404	2.002	0.20	0.131		
	60613700	60654800	46.4734	-63.1616	46.4557	-63.1582	412	1.997	0.40	0.158		
	60654800	60694400	46.4557	-63.1582	46.4378	-63.1554	397	2.000	0.27	0.230		
	60694400	60706400	46.4378	-63.1554	46.4325	-63.1546	121	0.598	0.16	0.185		
Total	60493000	60706400	46.5267	-63.1738	46.4325	-63.1546	2135	10.598	0.25	0.192	0.10	4.96
10060	60726400	60772000	46.4241	-63.1516	46.4126	-63.1319	456	2.004	0.41	0.242		
	60772000	60786400	46.4126	-63.1319	46.4074	-63.1284	145	0.649	0.35	0.198		
Total	60726400	60786400	46.4241	-63.1516	46.4074	-63.1284	600	2.653	0.40	0.234	0.10	4.42

DATE: MAR24 FLIGHT #: 82

Total Length: 55.800 km

Line Number	Start FID	End FID	Start		End		No. of Smples ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	68986400	69031700	46.5102	-63.1406	46.5282	-63.1395	454	2.001	0.40	0.298		
	69031700	69050400	46.5282	-63.1395	46.5354	-63.1390	188	0.799	0.13	0.066		
Total	68986400	69050400	46.5102	-63.1406	46.5354	-63.1390	641	2.801	0.32	0.281	0.10	4.37
10020	69168700	69214800	46.5764	-63.1377	46.5942	-63.1406	459	2.001	0.52	0.213		
	69214800	69258900	46.5942	-63.1406	46.6119	-63.1454	425	2.001	0.82	0.287		
	69258900	69302700	46.6119	-63.1454	46.6292	-63.1521	431	2.001	0.56	0.143		
	69302700	69345300	46.6292	-63.1521	46.6462	-63.1607	425	2.000	0.52	0.120		
	69345300	69388300	46.6462	-63.1607	46.6613	-63.1746	431	1.999	0.33	0.097		
	69388300	69432000	46.6613	-63.1746	46.6736	-63.1937	438	2.003	0.15	0.092		
	69432000	69477400	46.6736	-63.1937	46.6822	-63.2159	450	1.996	0.01	0.001		
	69477400	69524700	46.6822	-63.2159	46.6787	-63.2415	474	2.002	0.01	0.003		
	69524700	69571600	46.6787	-63.2415	46.6743	-63.2668	470	2.000	0.02	0.017		
	69571600	69618500	46.6743	-63.2668	46.6711	-63.2926	470	1.999	0.06	0.040		
	69618500	69665900	46.6711	-63.2926	46.6677	-63.3183	475	2.002	0.13	0.038		
	69665900	69712700	46.6677	-63.3183	46.6672	-63.3443	469	1.999	0.15	0.049		
	69712700	69722200	46.6672	-63.3443	46.6678	-63.3493	96	0.387	0.13	0.131		
Total	69168700	69722200	46.5764	-63.1377	46.6678	-63.3493	5501	24.390	0.26	0.284	0.10	4.43

DATE: MAR24 FLIGHT #: 82

10030	69865200	69915300	46.6861	-63.4059	46.6968	-63.4269	502	2.002	0.36	0.058		
	69915300	69966200	46.6968	-63.4269	46.7075	-63.4479	510	1.999	0.31	0.093		
	69966200	70016300	46.7075	-63.4479	46.7187	-63.4684	502	2.000	0.35	0.061		
	70016300	70066200	46.7187	-63.4684	46.7302	-63.4887	500	2.003	0.28	0.094		
	70066200	70114800	46.7302	-63.4887	46.7410	-63.5095	487	1.999	0.26	0.051		
	70114800	70164700	46.7410	-63.5095	46.7519	-63.5304	500	1.998	0.26	0.052		
	70164700	70217400	46.7519	-63.5304	46.7625	-63.5515	528	2.001	0.23	0.064		
	70217400	70270300	46.7625	-63.5515	46.7737	-63.5721	530	2.002	0.20	0.060		
	70270300	70318700	46.7737	-63.5721	46.7855	-63.5918	485	1.999	0.19	0.069		
	70318700	70367600	46.7855	-63.5918	46.7974	-63.6115	490	2.001	0.12	0.079		
	70367600	70415100	46.7974	-63.6115	46.8096	-63.6307	476	1.997	0.04	0.069		
	70415100	70465100	46.8096	-63.6307	46.8218	-63.6500	501	2.001	0.01	0.029		
	70465100	70512600	46.8218	-63.6500	46.8350	-63.6678	476	2.000	0.02	0.021		
	70512600	70547400	46.8350	-63.6678	46.8444	-63.6808	349	1.442	0.14	0.069		
Total	69865200	70547400	46.6861	-63.4059	46.8444	-63.6808	6823	27.443	0.20	0.131	0.10	4.02
10040	70562100	70589400	46.8484	-63.6861	46.8560	-63.6965	274	1.166	0.14	0.101		
Total	70562100	70589400	46.8484	-63.6861	46.8560	-63.6965	274	1.166	0.14	0.101	0.10	4.26

DATE: MAR24 FLIGHT #: 83

Total Length: 43.027 km

Line Number	Start FID	End FID	Start		End		No. of Smples ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	71081700	71132300	47.0451	-63.7557	47.0578	-63.7744	507	2.001	0.12	0.077		
	71132300	71180800	47.0578	-63.7744	47.0700	-63.7937	486	2.002	0.07	0.028		
	71180800	71229500	47.0700	-63.7937	47.0822	-63.8131	488	1.998	0.16	0.060		
	71229500	71277500	47.0822	-63.8131	47.0929	-63.8342	481	2.000	0.22	0.056		
	71277500	71324200	47.0929	-63.8342	47.1016	-63.8573	468	2.003	0.16	0.087		
	71324200	71370900	47.1016	-63.8573	47.1088	-63.8814	468	1.997	0.18	0.112		
	71370900	71416700	47.1088	-63.8814	47.1160	-63.9057	459	2.002	0.10	0.075		
	71416700	71463200	47.1160	-63.9057	47.1238	-63.9294	466	1.998	0.05	0.042		
	71463200	71505900	47.1238	-63.9294	47.1313	-63.9514	428	1.878	0.01	0.017		
Total	71081700	71505900	47.0451	-63.7557	47.1313	-63.9514	4243	17.880	0.12	0.094	0.10	4.21
10020	71740700	71790300	47.0895	-64.0459	47.0768	-64.0645	497	2.003	0.07	0.719		
	71790300	71838400	47.0768	-64.0645	47.0636	-64.0823	482	1.998	0.01	0.002		
	71838400	71886200	47.0636	-64.0823	47.0460	-64.0819	345	2.045	0.01	0.000		
	71886200	71928700	47.0460	-64.0819	47.0333	-64.0643	418	1.954	0.01	0.000		
	71928700	71969800	47.0333	-64.0643	47.0277	-64.0403	412	2.001	0.01	0.025		
	71969800	72011600	47.0277	-64.0403	47.0395	-64.0219	419	2.000	0.22	0.105		
	72011600	72052200	47.0395	-64.0219	47.0558	-64.0109	407	2.001	0.30	0.049		
	72052200	72092200	47.0558	-64.0109	47.0715	-63.9985	401	1.999	0.25	0.077		
	72092200	72132200	47.0715	-63.9985	47.0794	-63.9753	401	2.004	0.10	0.059		
	72132200	72171800	47.0794	-63.9753	47.0789	-63.9491	397	1.997	0.04	0.033		
	72171800	72211300	47.0789	-63.9491	47.0779	-63.9227	396	1.999	0.01	0.010		
	72211300	72252600	47.0779	-63.9227	47.0774	-63.8964	414	2.000	0.05	0.054		
	72252600	72275400	47.0774	-63.8964	47.0770	-63.8813	229	1.147	0.10	0.063		
Total	71740700	72275400	47.0895	-64.0459	47.0770	-63.8813	5206	25.147	0.09	0.247	0.10	4.83

B-23

DATE: MAR24 FLIGHT #: 85

Total Length: 57.596 km

Line Number	Start FID	End FID	Start		End		No. of Smples ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	62423400	62464900	46.5666	-63.7623	46.5845	-63.7589	416	2.005	0.28	0.148		
	62464900	62493000	46.5845	-63.7589	46.5960	-63.7548	282	1.323	1.25	2.493		
Total	62423400	62493000	46.5666	-63.7623	46.5960	-63.7548	697	3.329	0.67	1.657	0.10	4.78
10020	62503300	62525400	46.5999	-63.7530	46.6084	-63.7484	222	1.009	1.32	0.584		
Total	62503300	62525400	46.5999	-63.7530	46.6084	-63.7484	222	1.009	1.32	0.584	0.10	4.54
10030	62656600	62697900	46.6540	-63.7159	46.6698	-63.7036	414	2.000	1.74	0.649		
	62697900	62737500	46.6698	-63.7036	46.6850	-63.6896	397	2.000	2.12	0.674		
	62737500	62777400	46.6850	-63.6896	46.6927	-63.6666	391	2.002	0.96	0.726		
	62777400	62821000	46.6927	-63.6666	46.6865	-63.6426	436	2.000	0.71	0.431		
	62821000	62865300	46.6865	-63.6426	46.6768	-63.6206	444	2.000	0.68	0.471		
	62865300	62910100	46.6768	-63.6206	46.6670	-63.5986	449	2.000	0.86	0.777		
	62910100	62954400	46.6670	-63.5986	46.6571	-63.5768	444	2.000	1.71	0.644		
	62954400	62999500	46.6571	-63.5768	46.6473	-63.5548	452	1.998	1.8	0.437		
	62999500	63042800	46.6473	-63.5548	46.6383	-63.5322	434	2.001	1.46	0.627		
	63042800	63086600	46.6383	-63.5322	46.6294	-63.5095	439	1.998	1.32	0.605		
	63086600	63129600	46.6294	-63.5095	46.6211	-63.4862	431	2.001	2.02	0.581		
	63129600	63172000	46.6211	-63.4862	46.6131	-63.4628	425	1.999	1.27	0.917		
	63172000	63215700	46.6131	-63.4628	46.6053	-63.4393	438	2.001	2.14	0.477		
	63215700	63258600	46.6053	-63.4393	46.5949	-63.4180	430	2.002	2.01	0.83		
	63258600	63303400	46.5949	-63.4180	46.5839	-63.3973	449	1.999	0.92	0.638		
	63303400	63347400	46.5839	-63.3973	46.5743	-63.3752	441	2.002	0.57	0.458		
	63347400	63391000	46.5743	-63.3752	46.5660	-63.3521	437	1.998	1.4	0.774		
	63391000	63434700	46.5660	-63.3521	46.5579	-63.3288	438	1.999	1.55	0.751		
	63434700	63476800	46.5579	-63.3288	46.5507	-63.3048	422	2.004	2.05	0.255		
Total	62656600	63476800	46.6540	-63.7159	46.5507	-63.3048	11309	53.258	1.35	0.854	0.10	4.71

DATE: MAR24 FLIGHT #: 86

Total Length: 18.680 km

Line Number	Start FID	End FID	Start		End		No. of Smples ICE	Line Len/Seg (km)	Ice Thickness		Avg Sample Spacing	
			Lat. (deg. N)	Long. (deg. W)	Lat. (deg. N)	Long. (deg. W)			Mean (m)	Stdv. (m)	(s)	(m)
10010	78395800	78436100	46.5002	-63.0252	46.4998	-62.9991	404	2.004	0.48	0.310		
	78436100	78479400	46.4998	-62.9991	46.4987	-62.9730	434	2.000	0.54	0.375		
	78479400	78521500	46.4987	-62.9730	46.4974	-62.9470	422	1.999	0.43	0.169		
	78521500	78566100	46.4974	-62.9470	46.4870	-62.9270	447	2.001	0.45	0.213		
	78566100	78613600	46.4870	-62.9270	46.4695	-62.9222	476	1.997	0.77	0.314		
	78613600	78664000	46.4695	-62.9222	46.4520	-62.9277	501	2.002	0.32	0.425		
	78664000	78716200	46.4520	-62.9277	46.4352	-62.9368	523	2.000	0.01	0.011		
	78716200	78773500	46.4352	-62.9368	46.4261	-62.9569	574	1.999	1.36	1.123		
	78773500	78832200	46.4261	-62.9569	46.4231	-62.9825	588	2.001	1.52	0.833		
	78832200	78852300	46.4231	-62.9825	46.4217	-62.9910	202	0.677	2.18	0.404		
Total	78395800	78852300	46.5002	-63.0252	46.4217	-62.9910	4562	18.680	0.76	0.800	0.10	4.09

GRAND TOTAL ALL FLIGHTS

Total Length: 1520.147 km

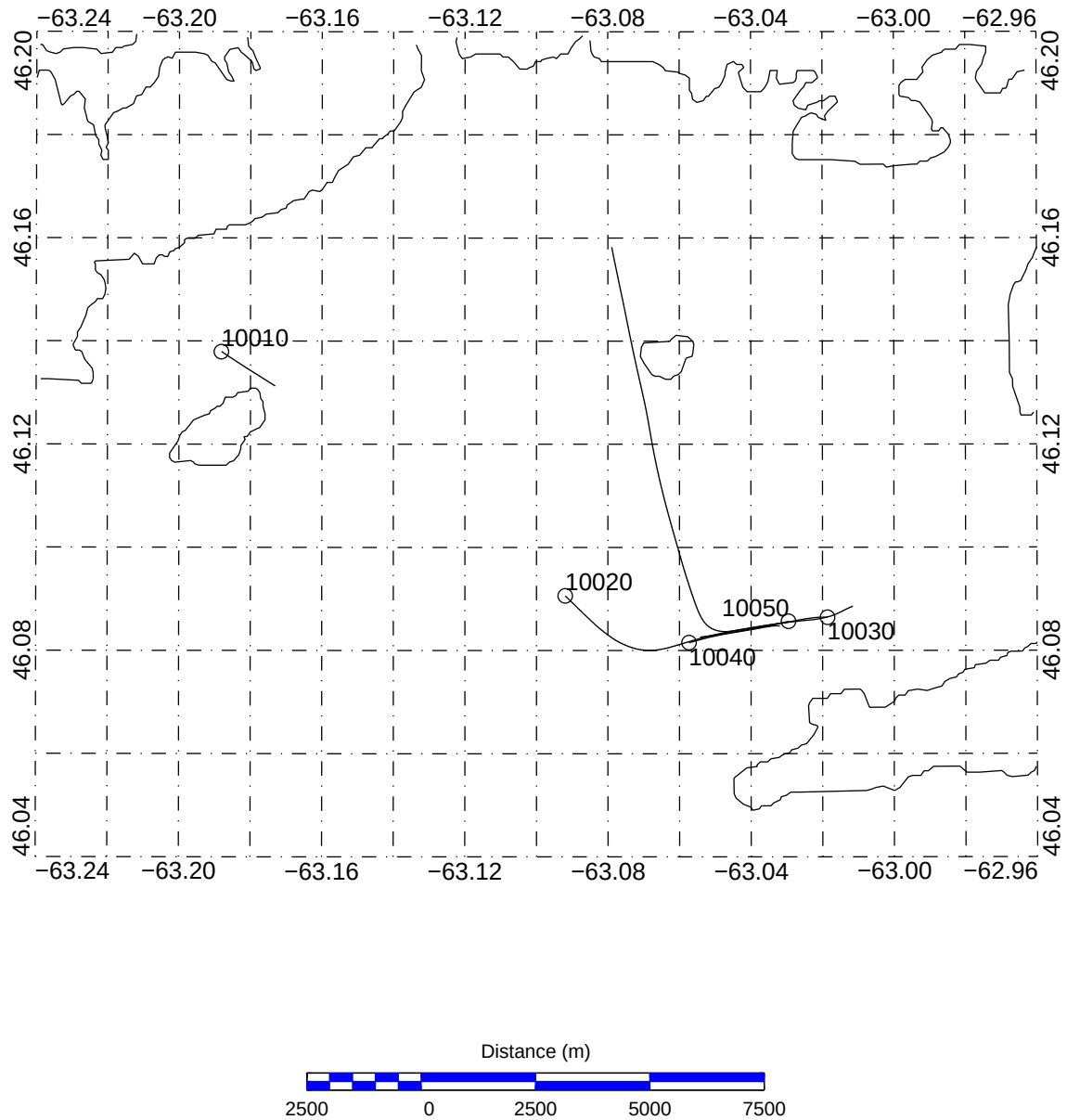
Appendix C: Flight Path Maps

This appendix presents flight path maps generated from the airborne EIS dataset. Although the legends on these maps identify a nominal scale for each map, they have been resized to fit into this document and so are no longer to scale. Distances may be estimated using the scale bar or the latitude/longitude grid.

FLT files 052 and 062-072 have been combined into a single map.

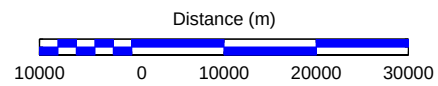
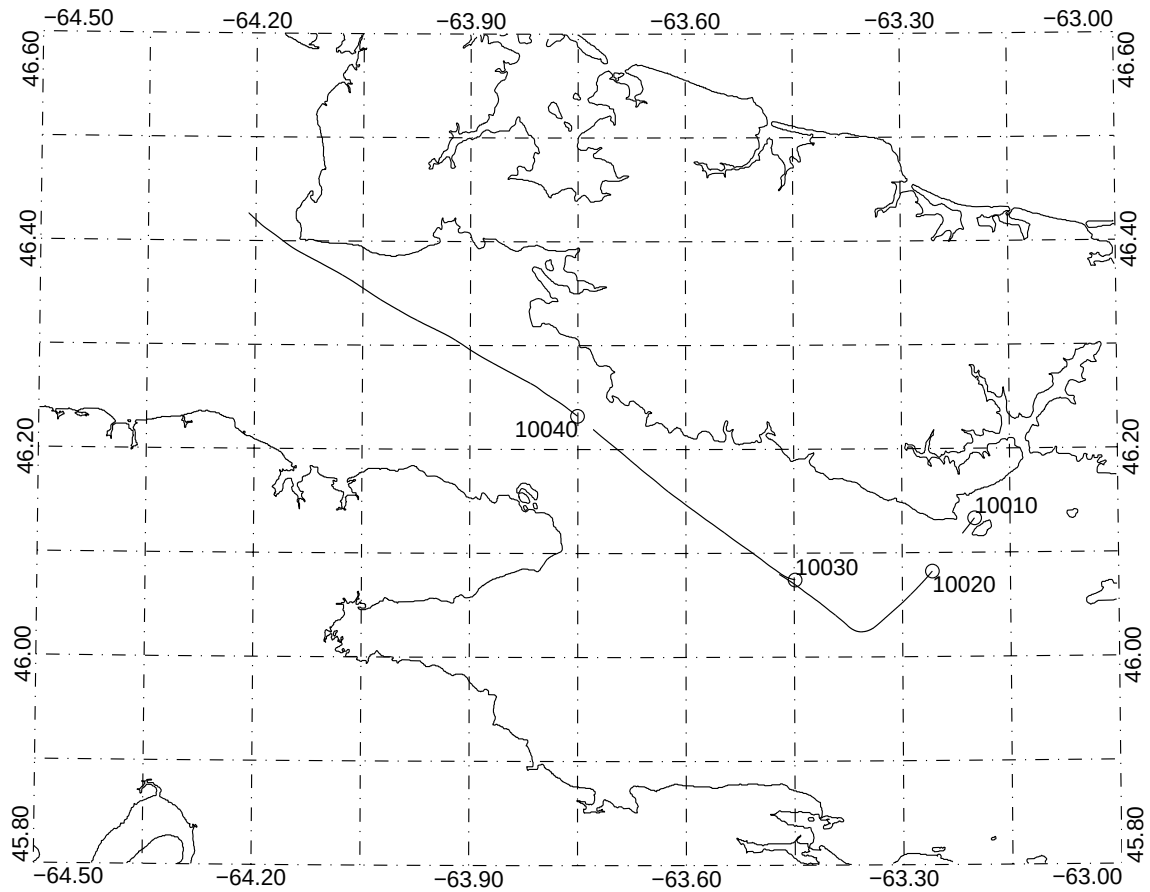
C-2

FEBRUARY 21, 1998 FLIGHT 4
Lambert Conic Proj., Center Long.: -63.10, Lat1 49.00, Lat2 77.00
Map Scale 1:150000



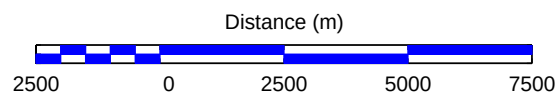
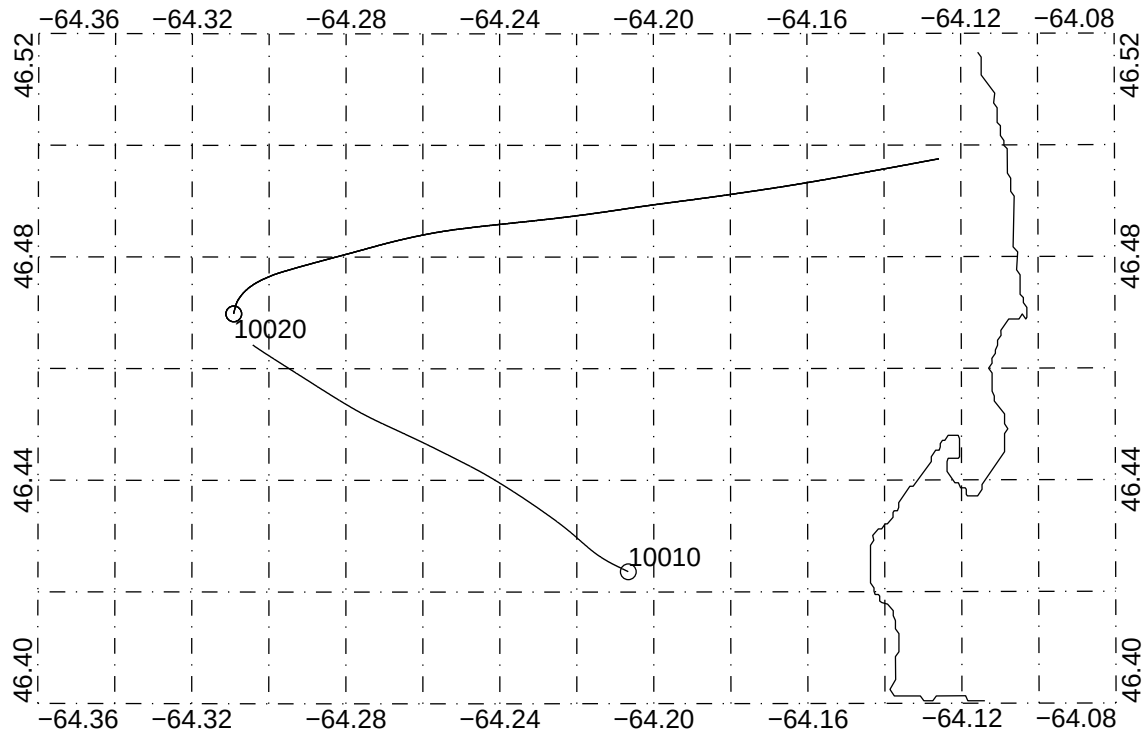
C-3

FEBRUARY 21, 1998 FLIGHT 5
Lambert Conic Proj., Center Long.: -63.70, Lat1 49.00, Lat2 77.00
Map Scale 1:700000



C-4

FEBRUARY 21, 1998 FLIGHT 7
Lambert Conic Proj., Center Long.: -64.26, Lat1 49.00, Lat2 77.00
Map Scale 1:150000

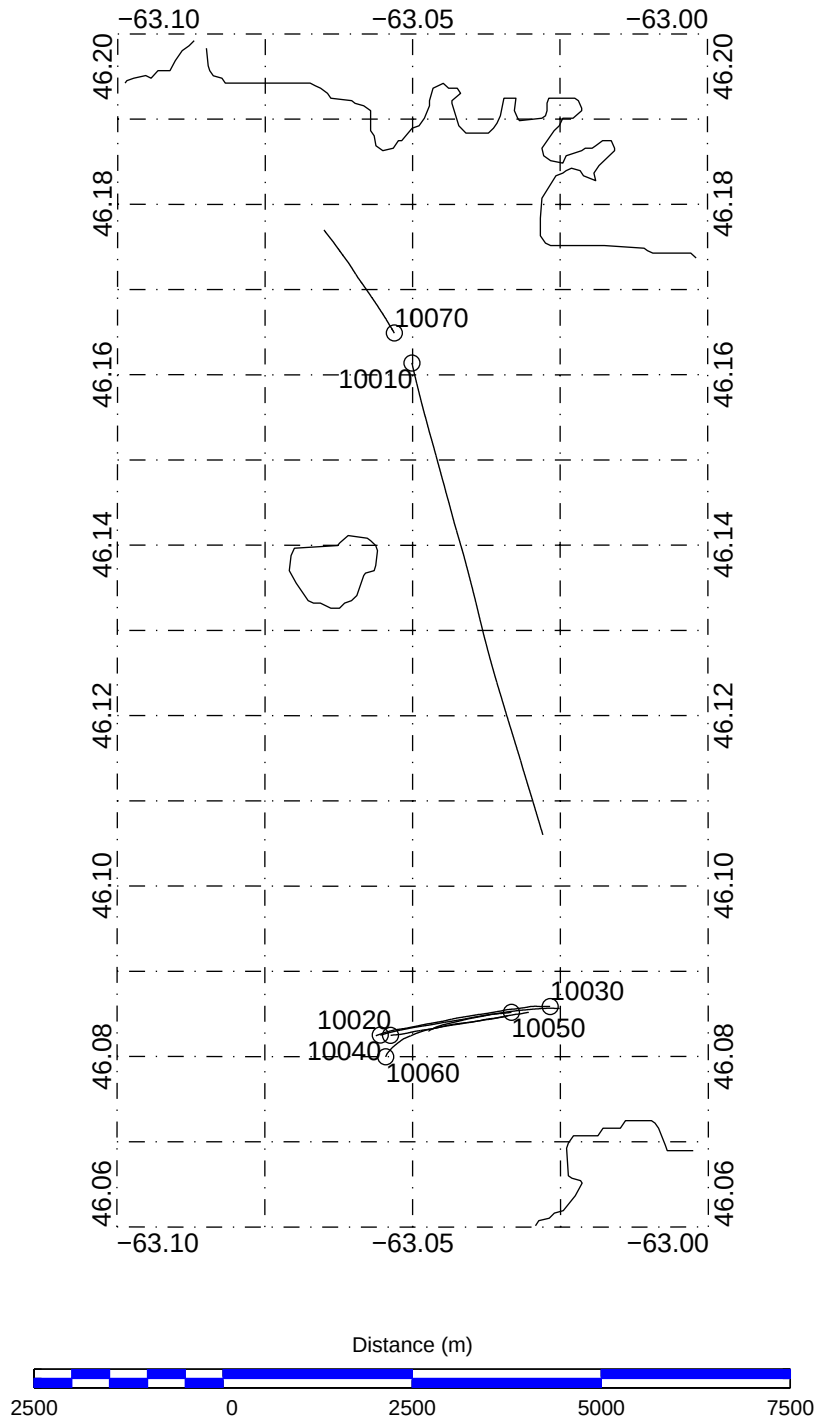


C-5

FEBRUARY 22, 1998 FLIGHT 10

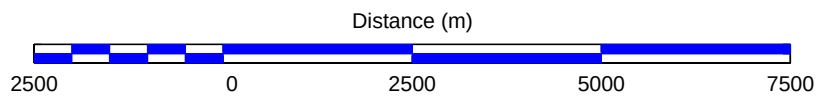
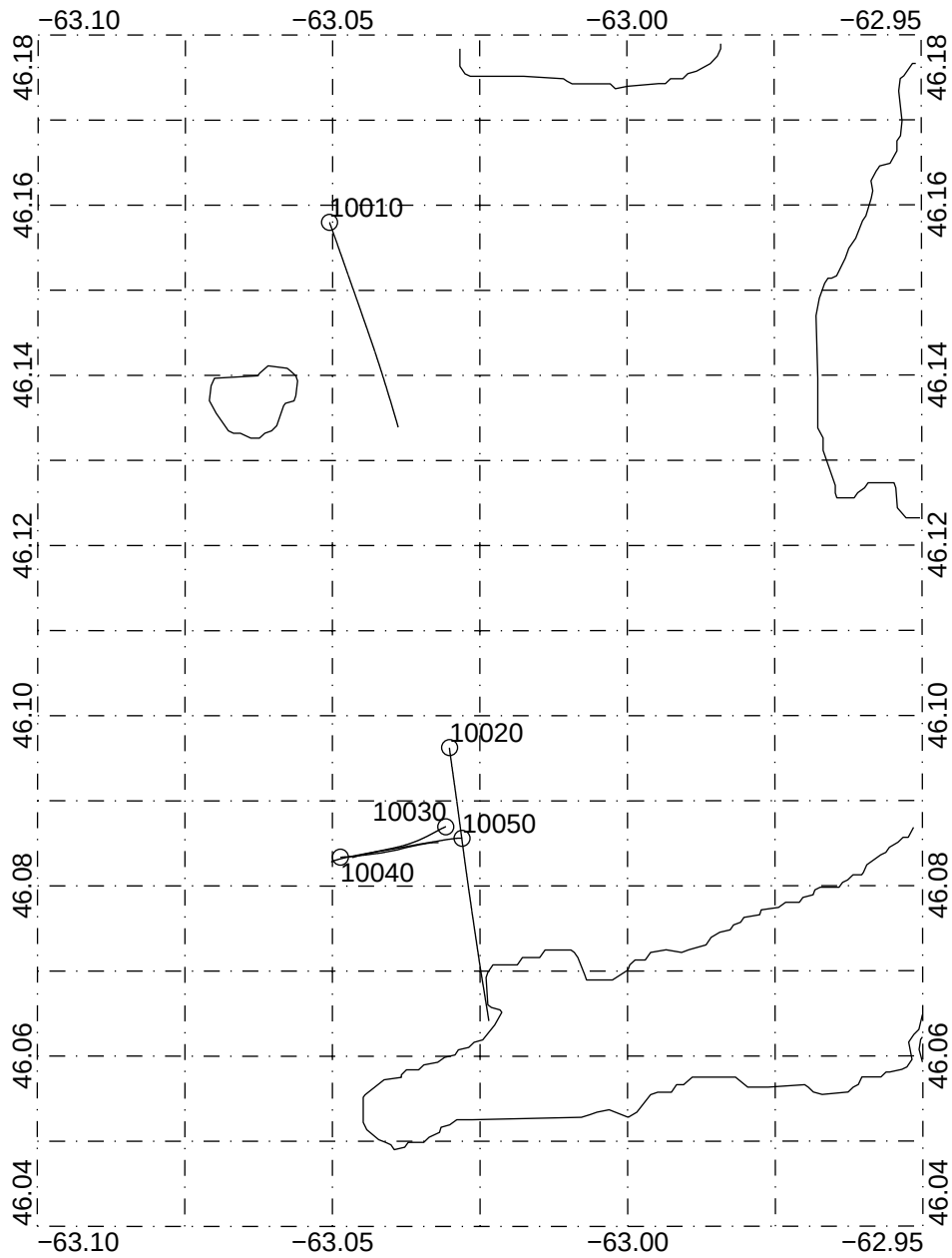
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Map Scale 1:100000



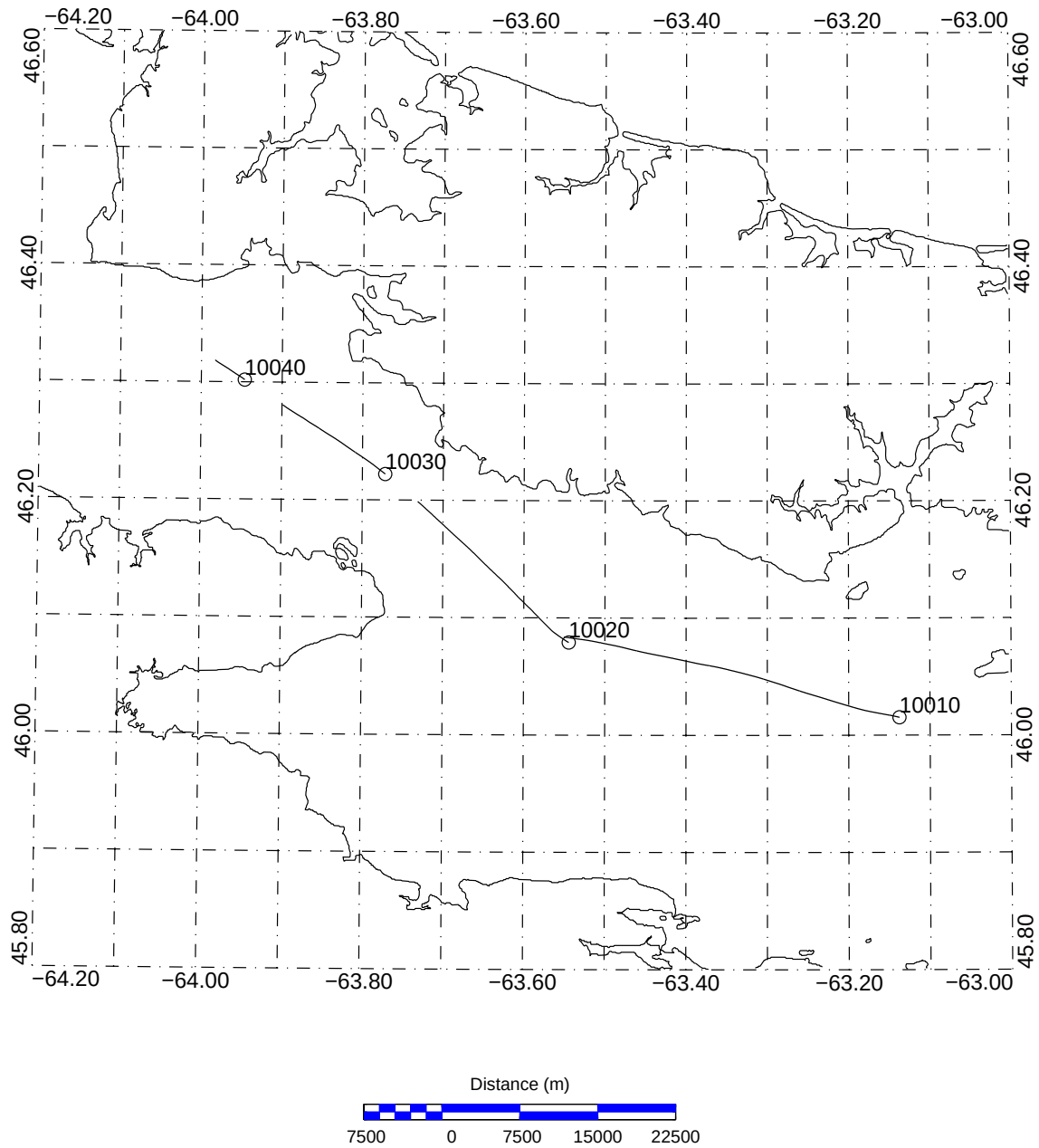
C-6

FEBRUARY 22, 1998 FLIGHT 11
Lambert Conic Proj., Center Long.: -63.04, Lat1 49.00, Lat2 77.00
Map Scale 1:100000



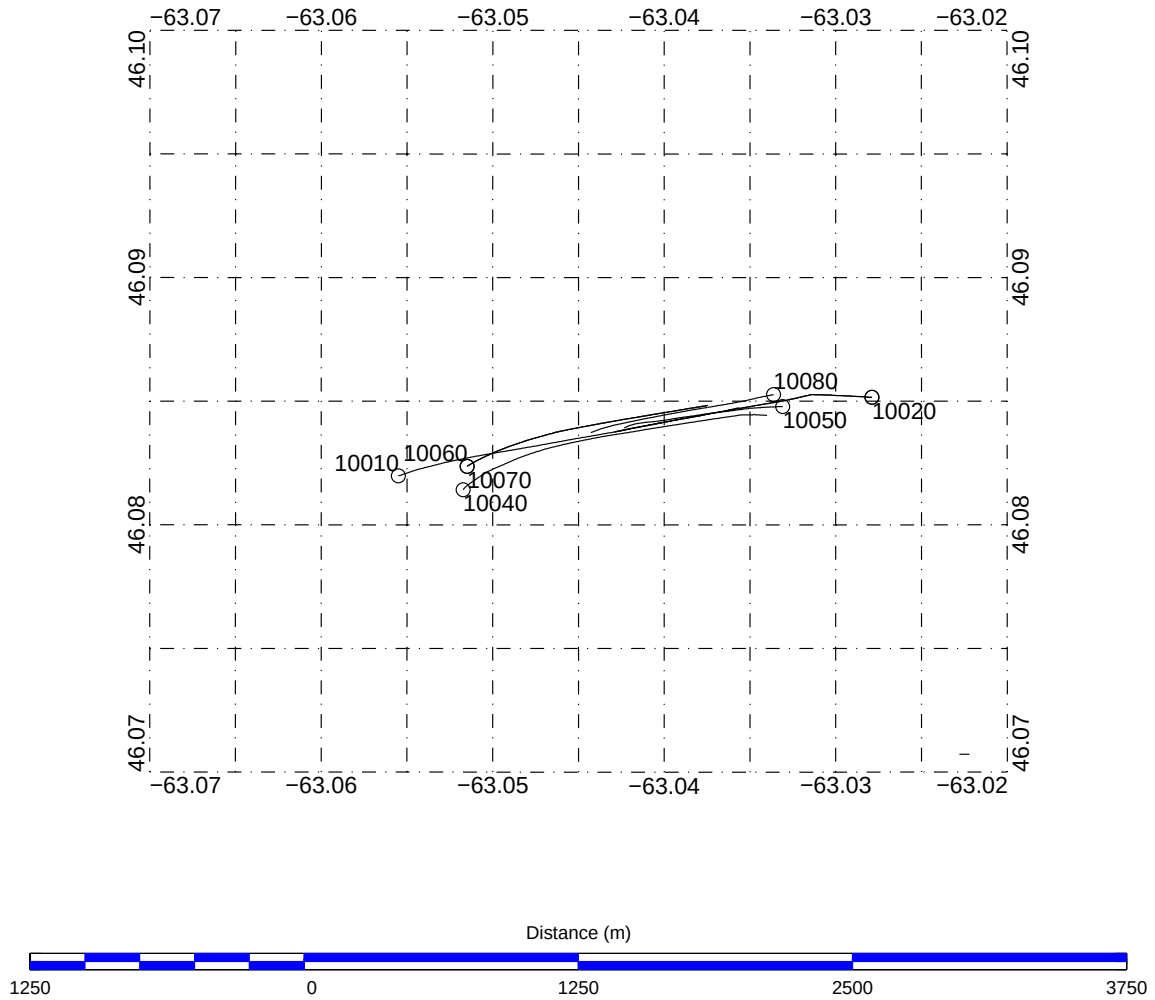
C-7

FEBRUARY 22, 1998 FLIGHT 12
Lambert Conic Proj., Center Long.: -63.34, Lat1 49.00, Lat2 77.00
Map Scale 1:600000



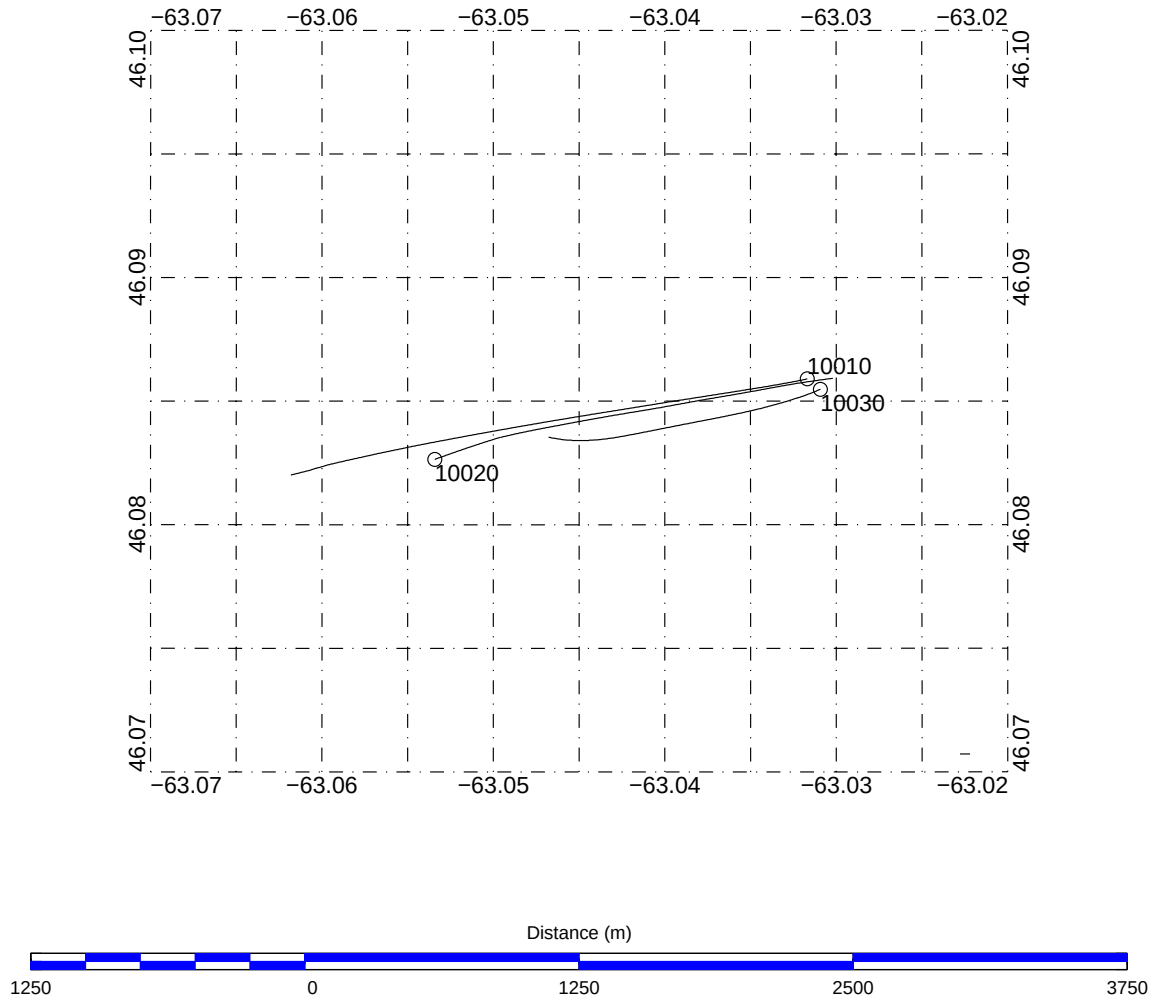
C-8

FEBRUARY 22, 1998 FLIGHT 15
Lambert Conic Proj., Center Long.: -63.04, Lat1 49.00, Lat2 77.00
Map Scale 1:30000



C-9

FEBRUARY 23, 1998 FLIGHT 16
Lambert Conic Proj., Center Long.: -63.05, Lat1 49.00, Lat2 77.00
Map Scale 1:30000

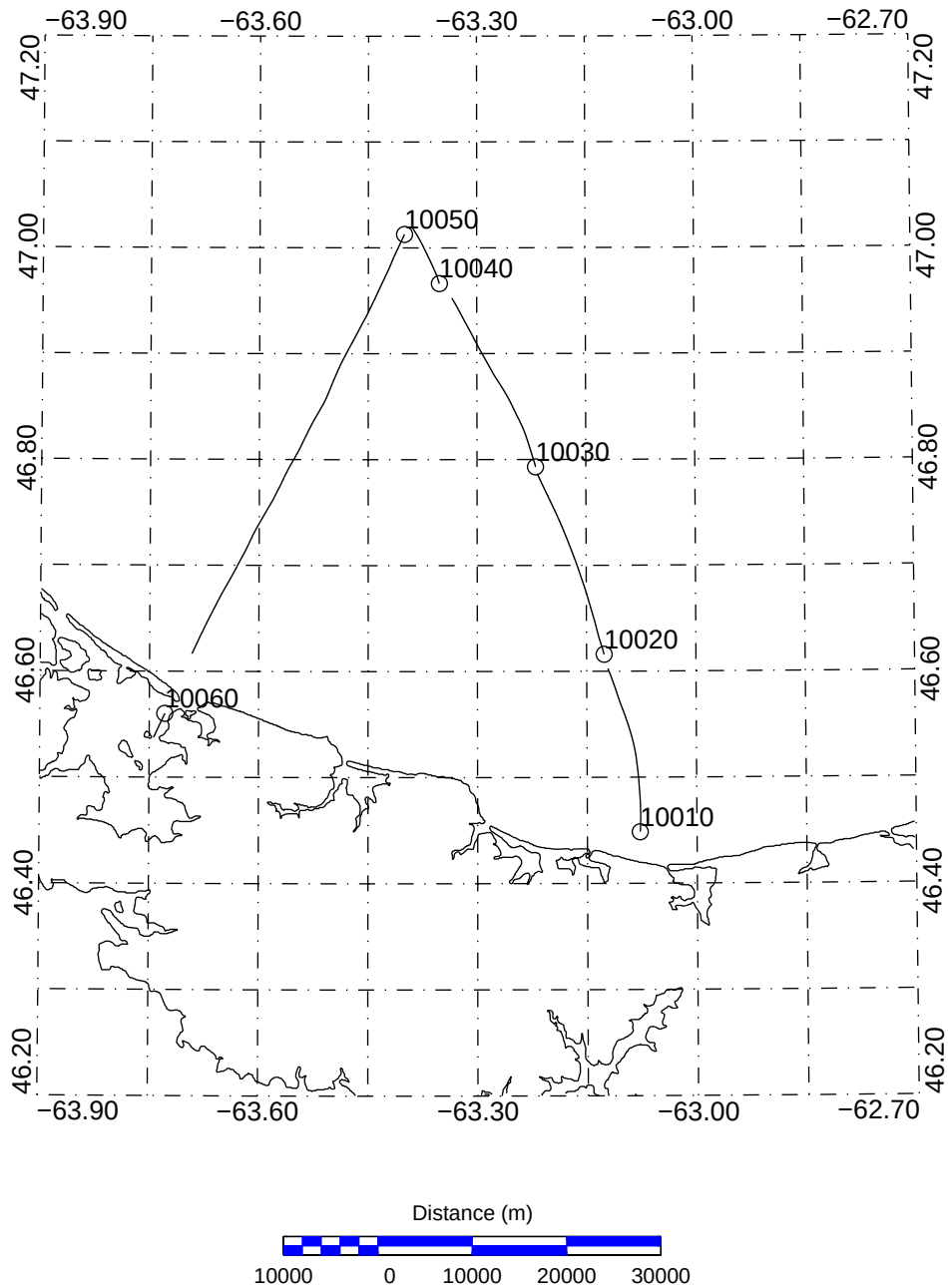


C-10

FEBRUARY 23, 1998 FLIGHT 17

Lambert Conic Proj., Center Long.: -63.40, Lat1 49.00, Lat2 77.00

Map Scale 1:800000

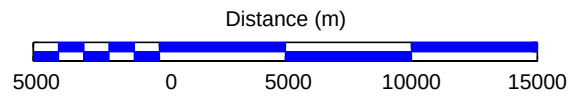
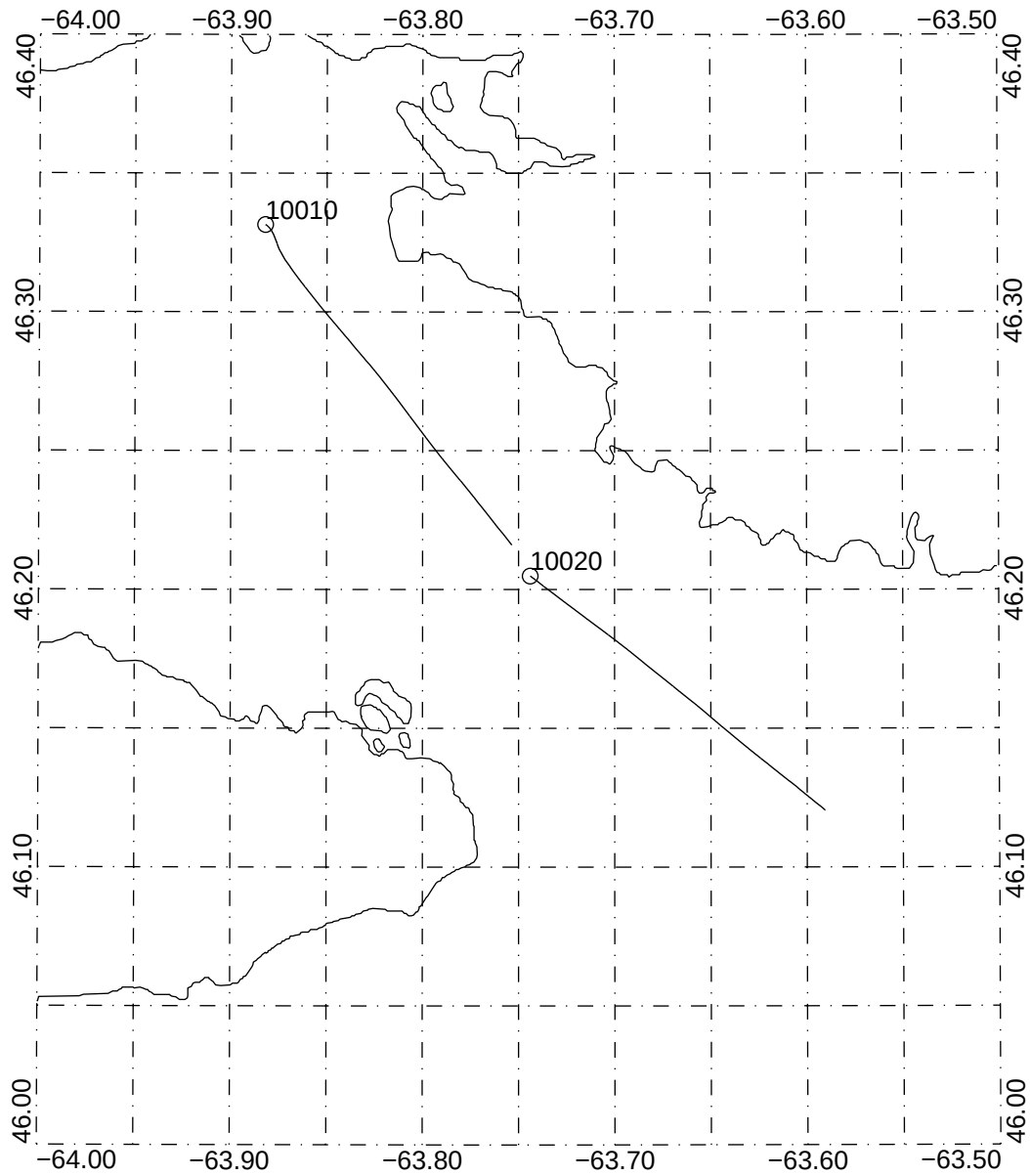


C-11

FEBRUARY 23, 1998 FLIGHT 18

Lambert Conic Proj., Center Long.: -63.75, Lat1 49.00, Lat2 77.00

Map Scale 1:300000

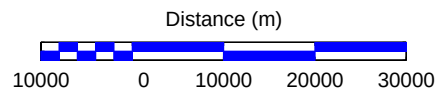
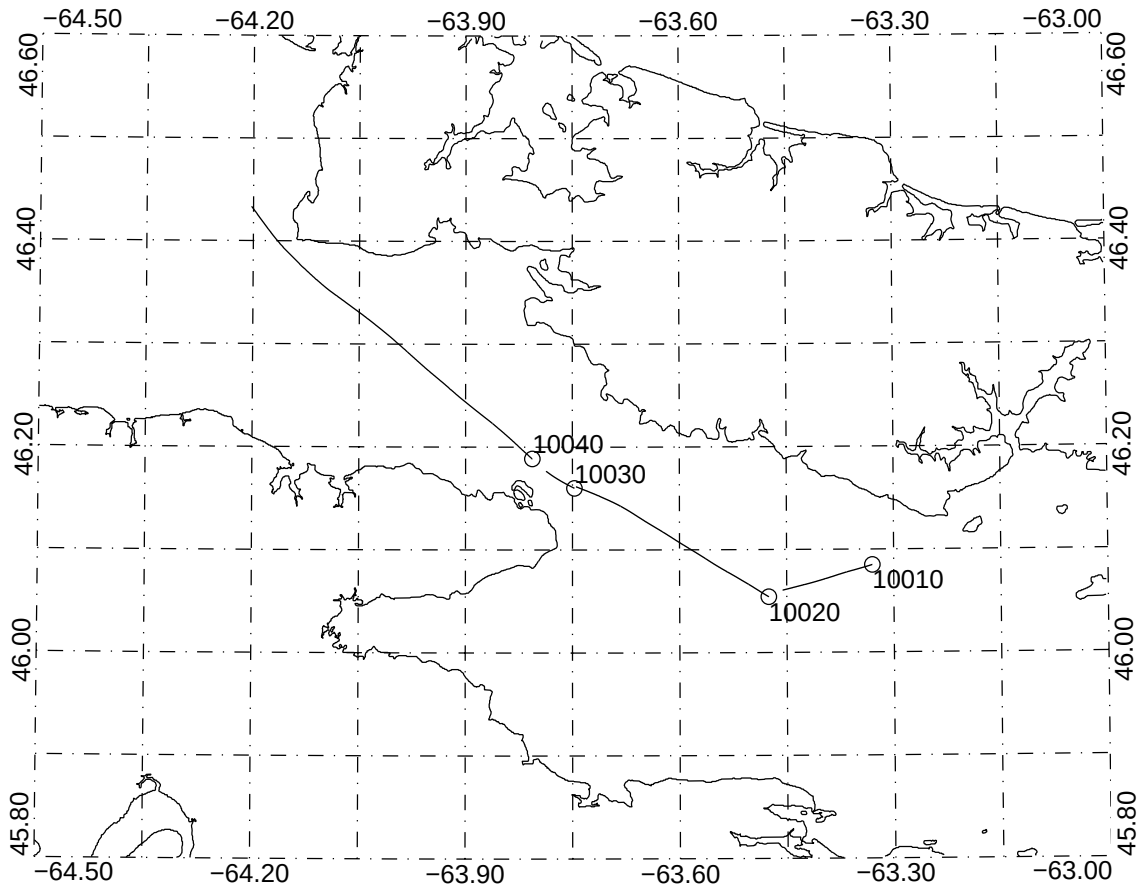


C-12

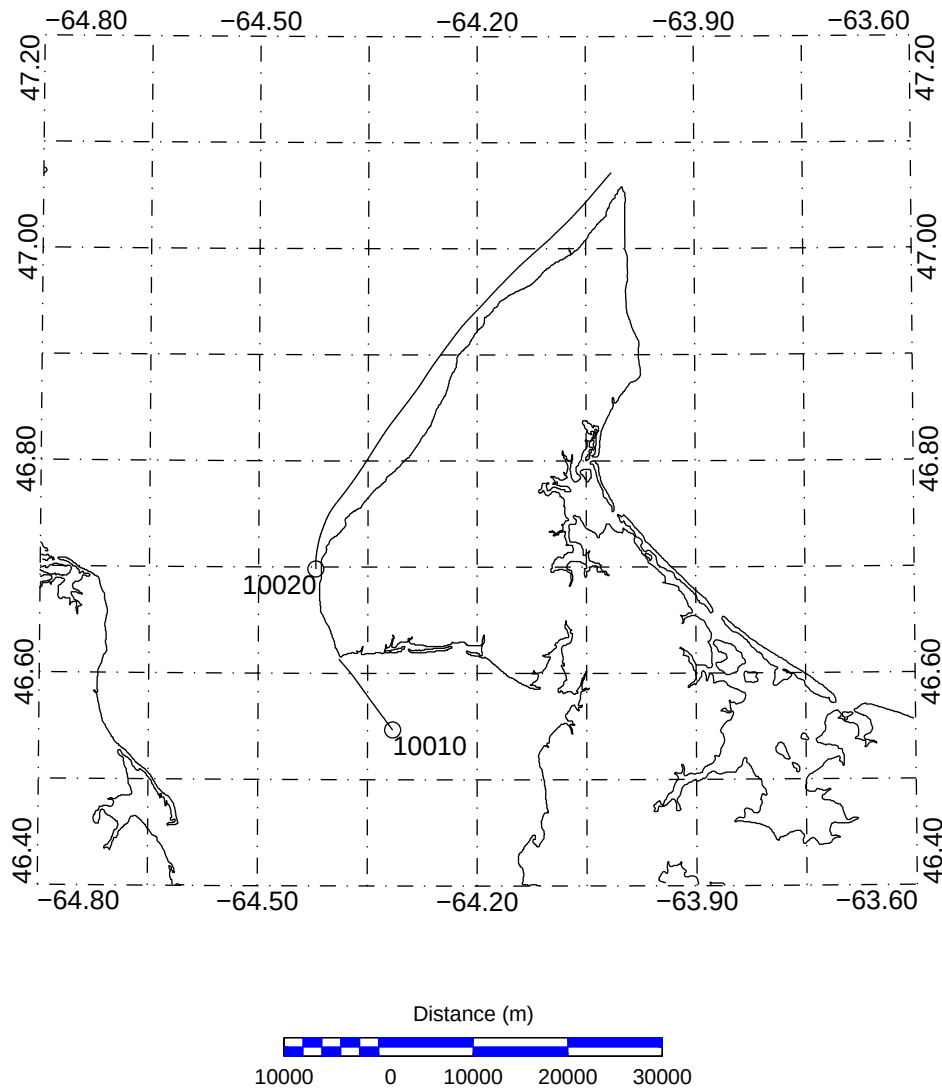
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Lambert Conic Proj., Center Long.: -63.80, Lat1 49.00, Lat2 77.00

Map Scale 1:800000

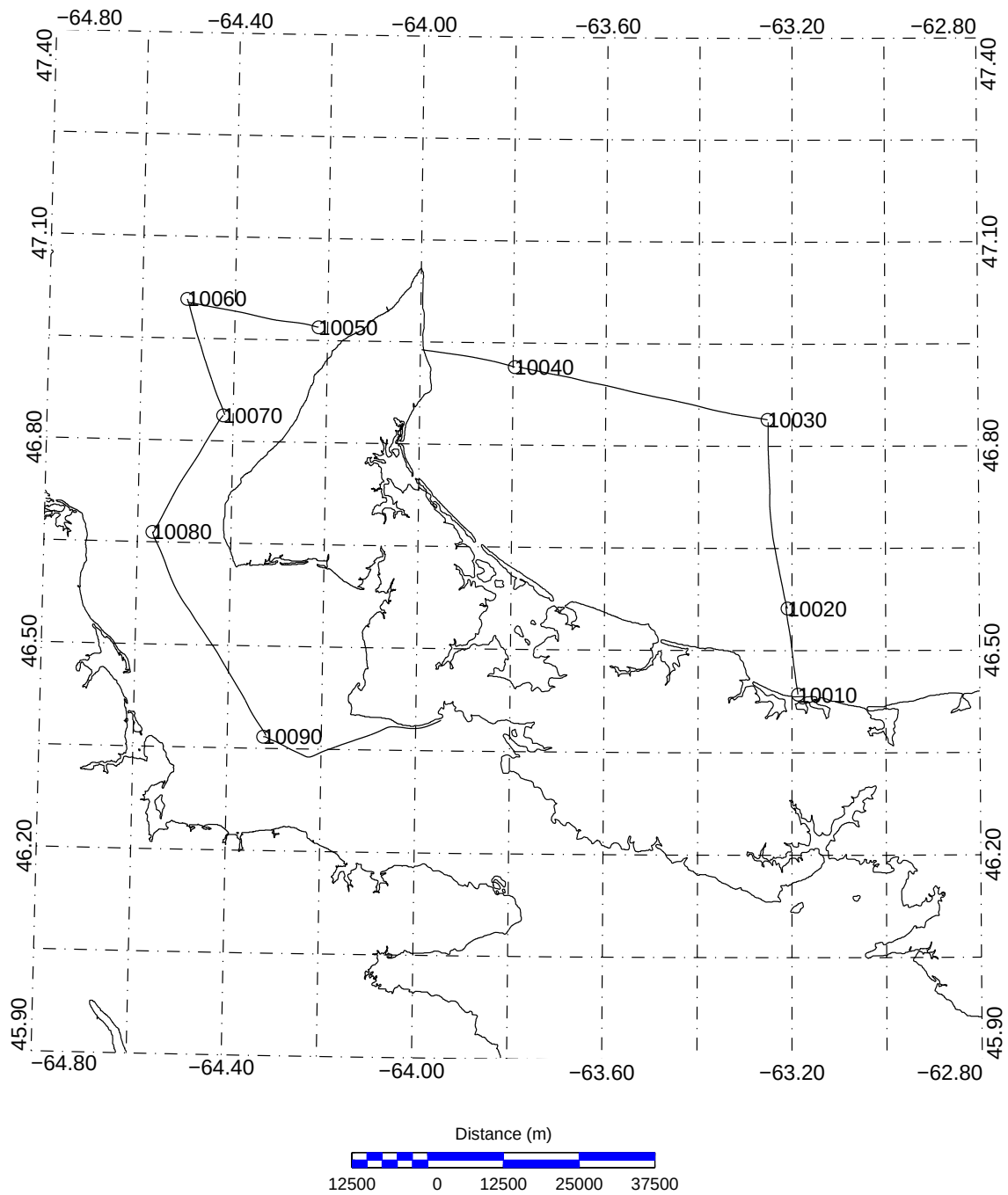


FEBRUARY 23, 1998 FLIGHT 20
Lambert Conic Proj., Center Long.: -64.20, Lat1 49.00, Lat2 77.00
Map Scale 1:800000



C-14

FEBRUARY 24, 1998 FLIGHT 22
Lambert Conic Proj., Center Long.: -63.20, Lat1 49.00, Lat2 77.00
Map Scale 1:1000000

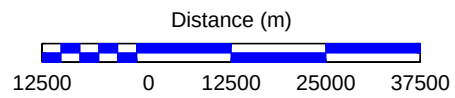
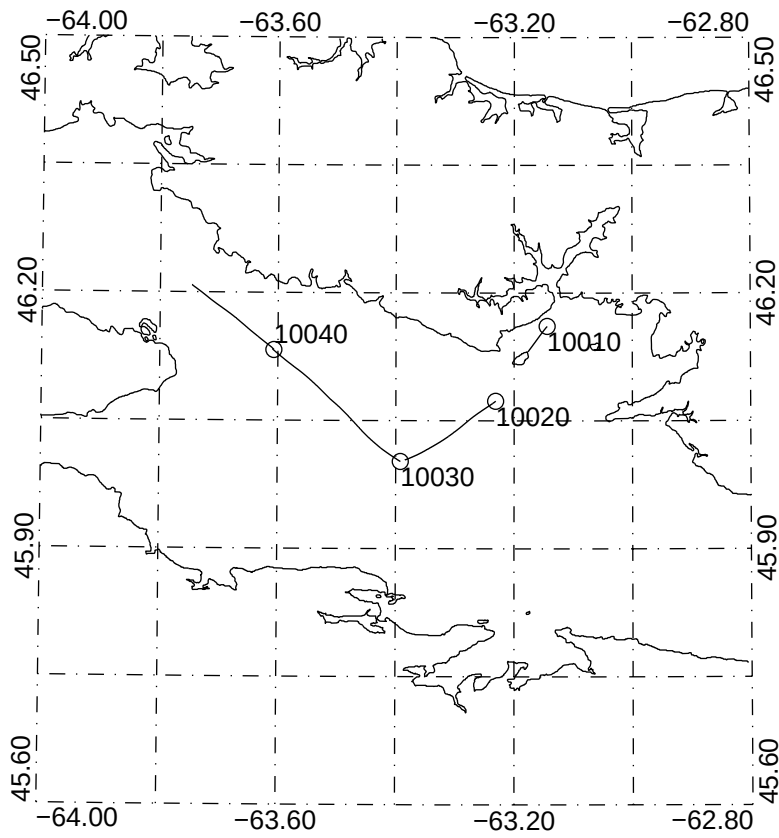


C-15

MARCH 16, 1998 FLIGHT 47

Lambert Conic Proj., Center Long.: -63.16, Lat1 49.00, Lat2 77.00

Map Scale 1:1000000

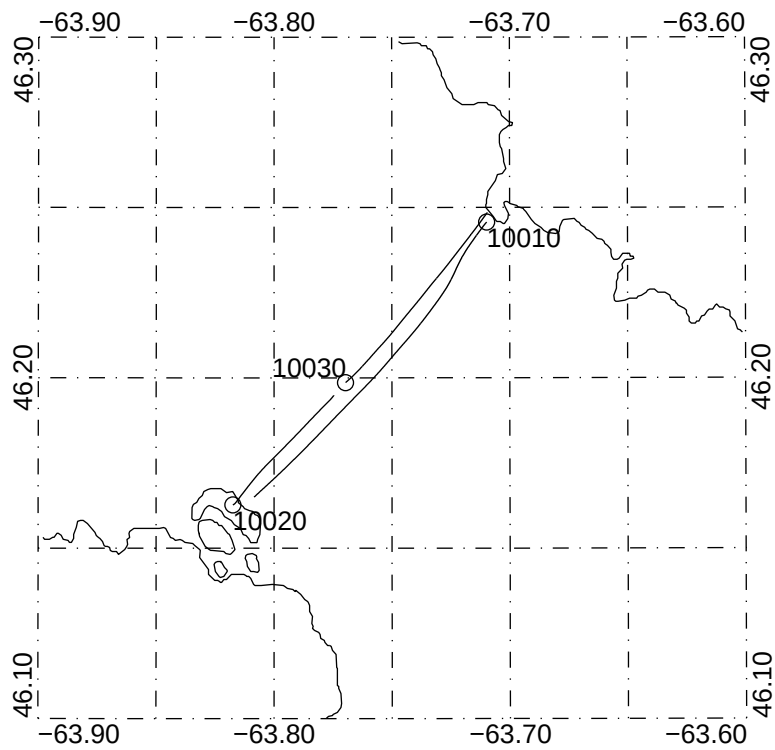


C-16

MARCH 16, 1998 FLIGHT 48

Lambert Conic Proj., Center Long.: -63.80, Lat1 49.00, Lat2 77.00

Map Scale 1:250000

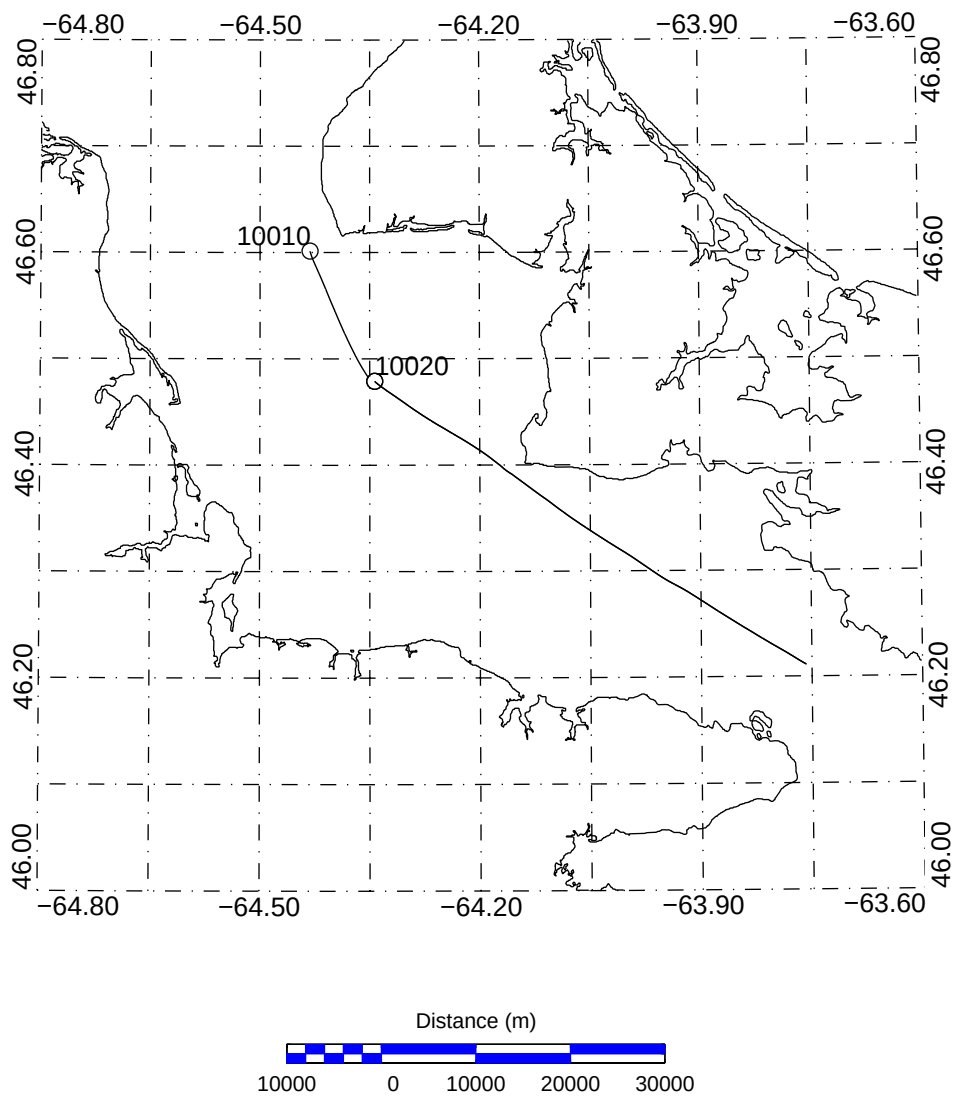


C-17

MARCH 16, 1998 FLIGHT 51

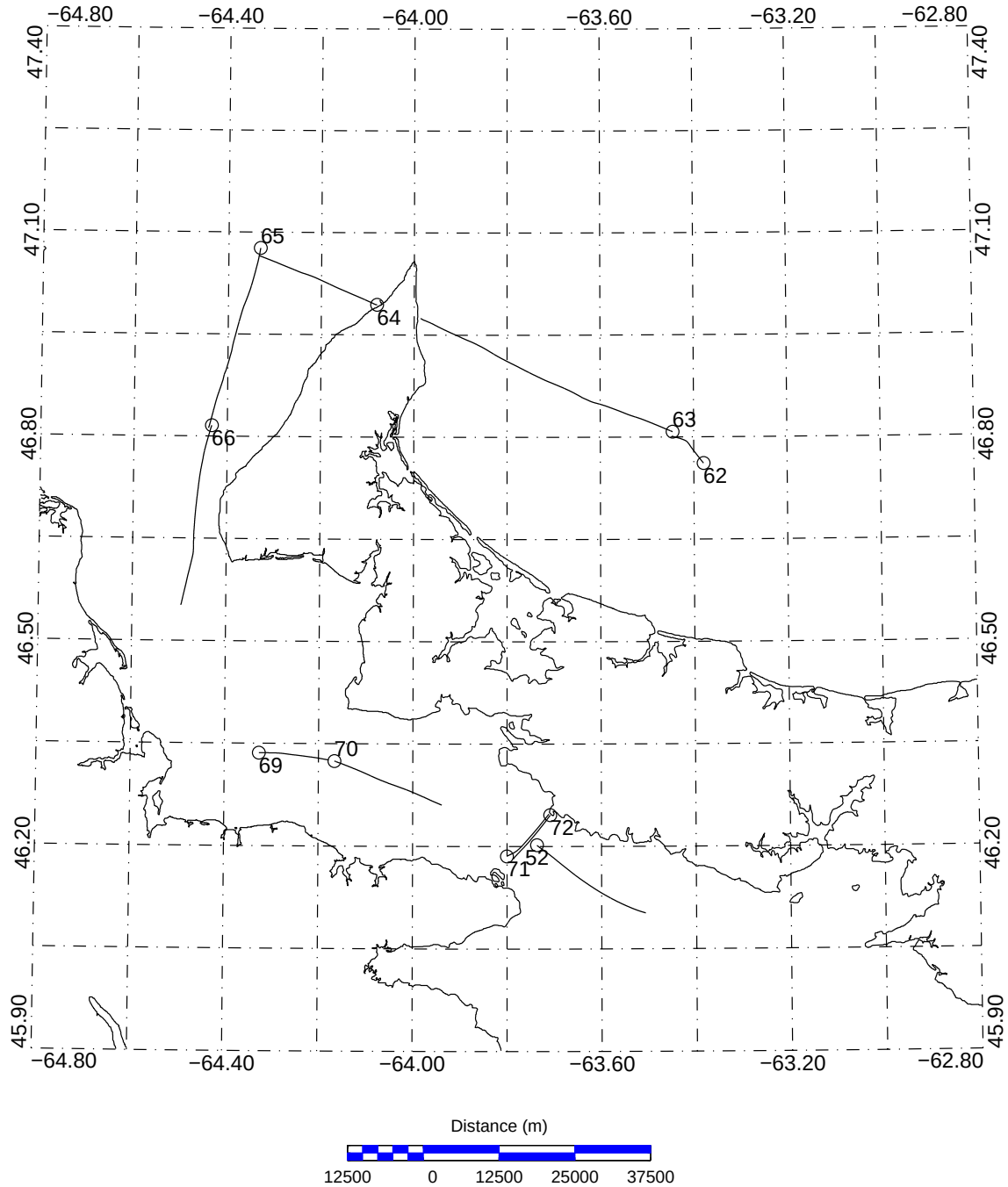
Lambert Conic Proj., Center Long.: -64.39, Lat1 49.00, Lat2 77.00

Map Scale 1:800000



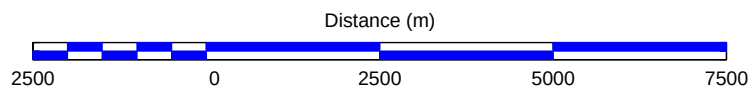
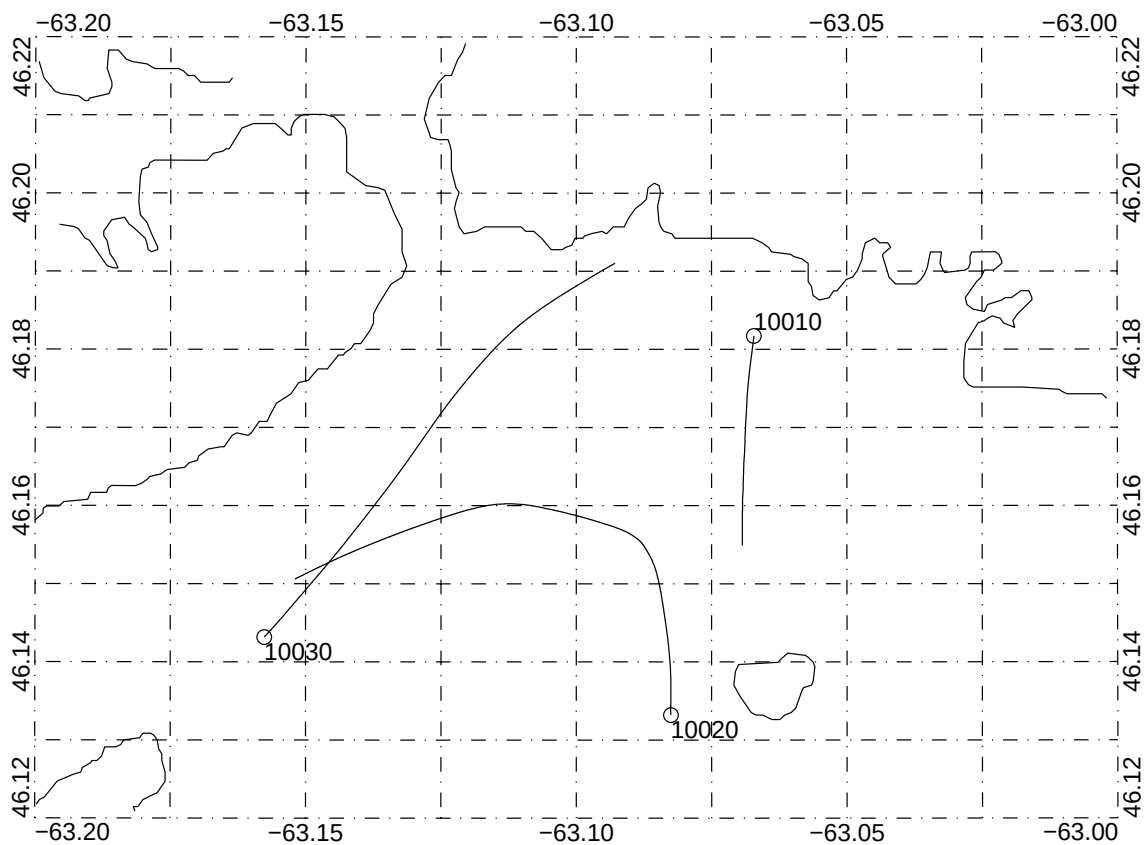
C-18

MARCH 16-17, 1998 SINGLE LINE FLIGHTS
Lambert Conic Proj., Center Long.: -63.80, Lat1 49.00, Lat2 77.00
Map Scale 1:1000000



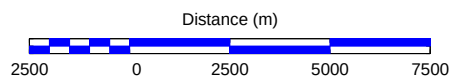
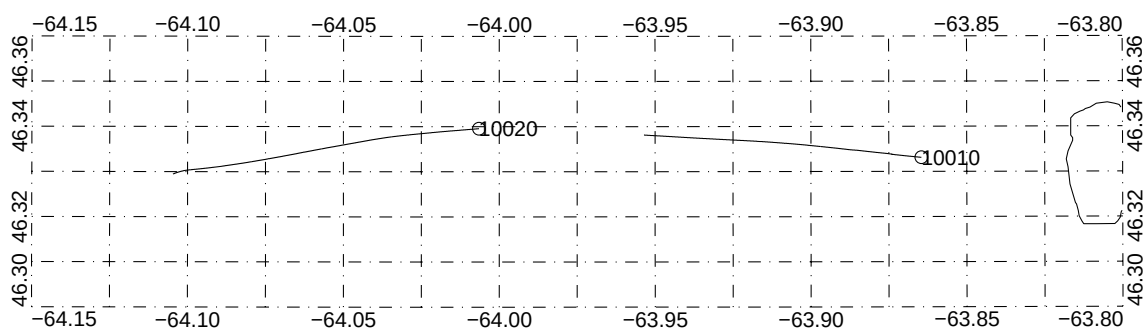
C-19

MARCH 18, 1998 FLIGHT 74
Lambert Conic Proj., Center Long.: -63.10, Lat1 49.00, Lat2 77.00
Map Scale 1:100000



C-20

MARCH 18, 1998 FLIGHT 75
Lambert Conic Proj., Center Long.: -64.00, Lat1 49.00, Lat2 77.00
Map Scale 1:150000

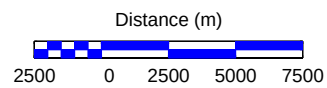
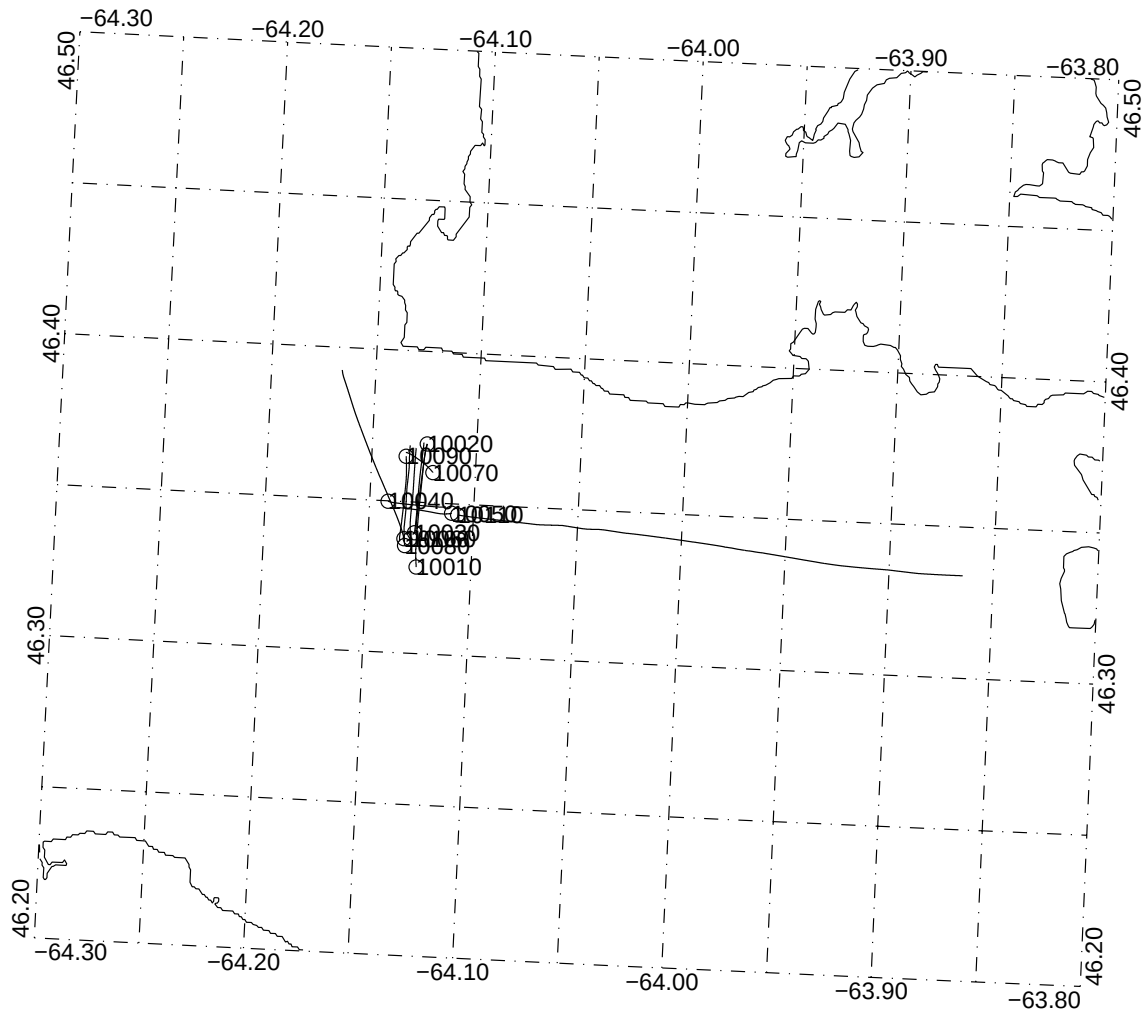


C-21

MARCH 18, 1998 FLIGHT 76

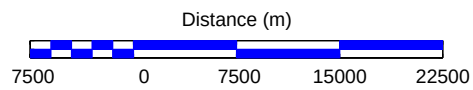
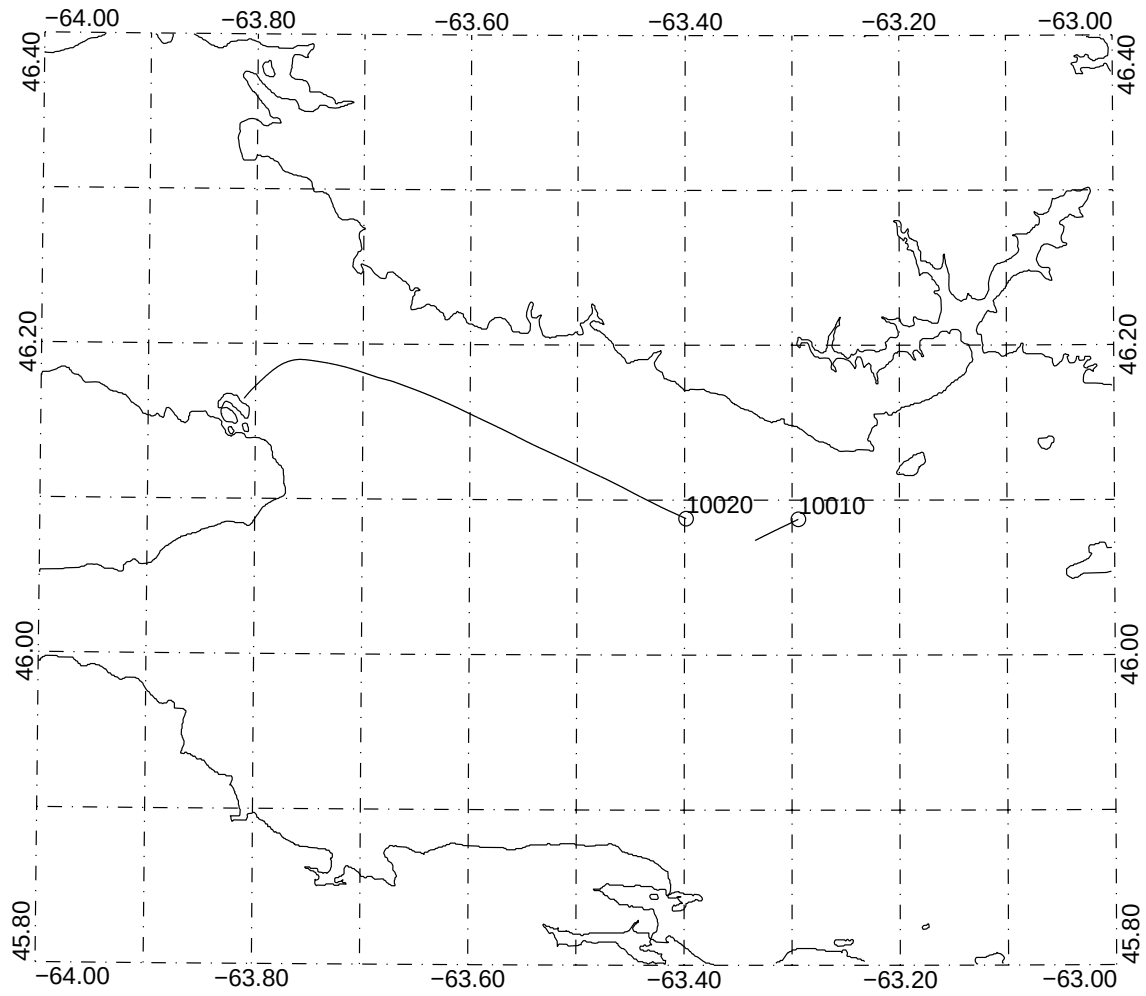
Lambert Conic Proj., Center Long.: -61.10, Lat1 49.00, Lat2 77.00

Map Scale 1:250000



C-22

MARCH 19, 1998 FLIGHT 77
Lambert Conic Proj., Center Long.: -63.31, Lat1 49.00, Lat2 77.00
Map Scale 1:500000

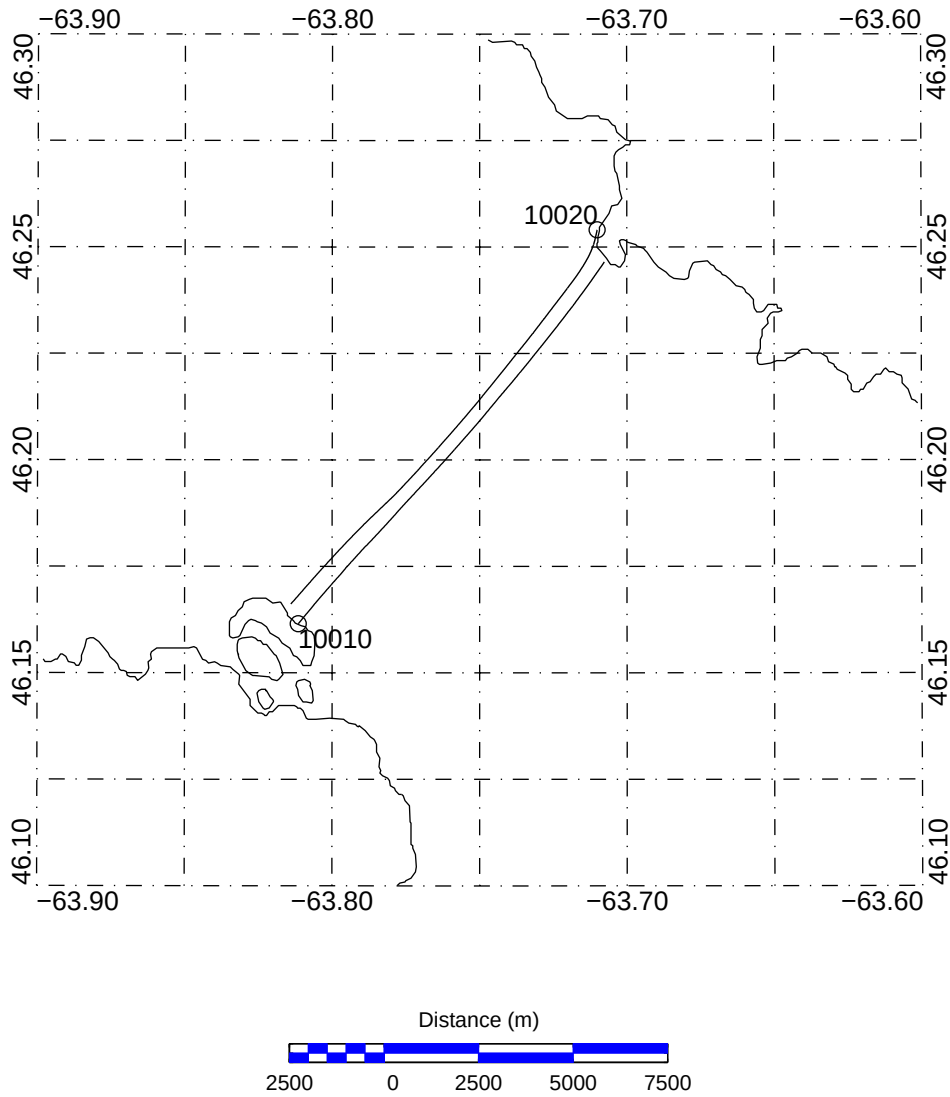


C-23

MARCH 19, 1998 FLIGHT 78

Lambert Conic Proj., Center Long.: -63.75, Lat1 49.00, Lat2 77.00

Map Scale 1:200000

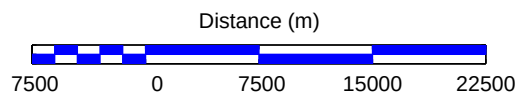
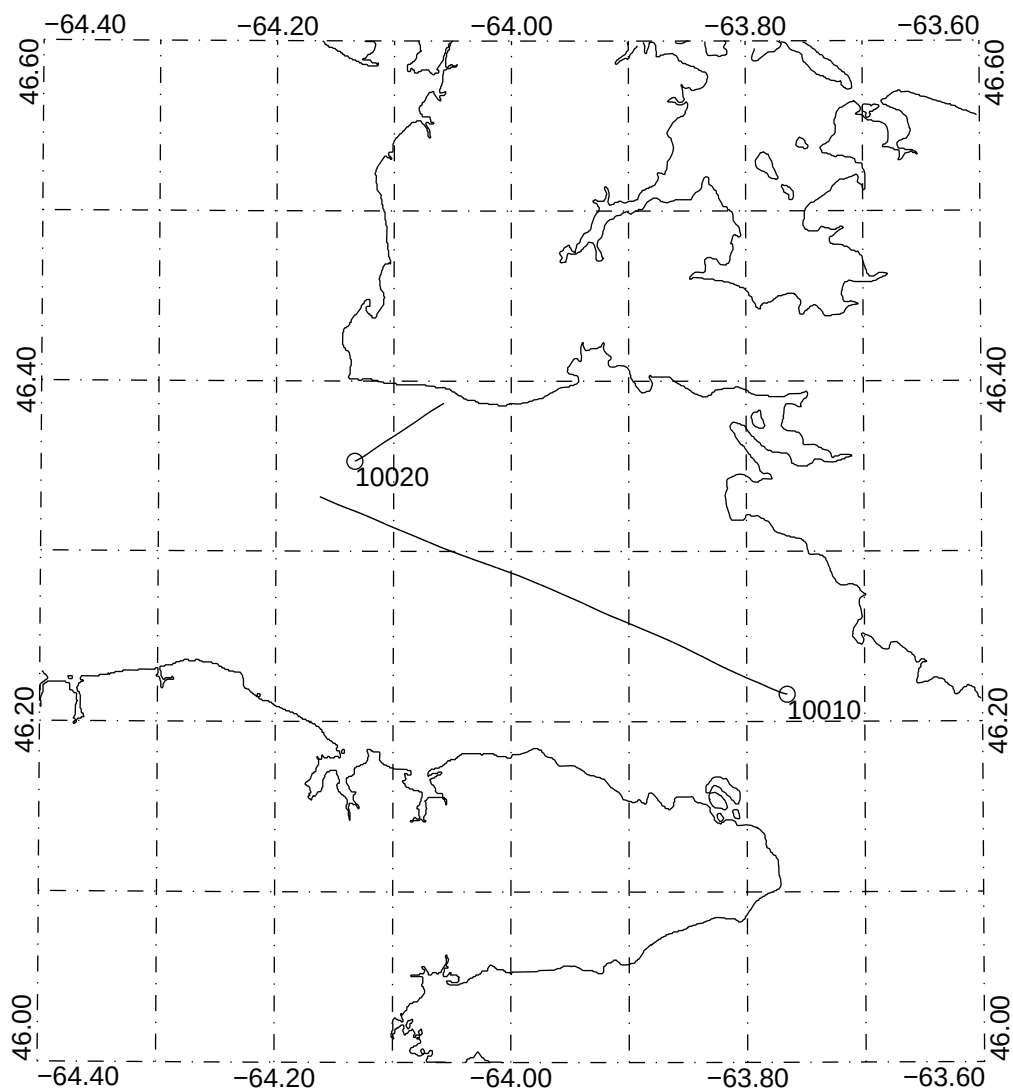


C-24

MARCH 19, 1998 FLIGHT 79

Lambert Conic Proj., Center Long.: -63.96, Lat1 49.00, Lat2 77.00

Map Scale 1:500000

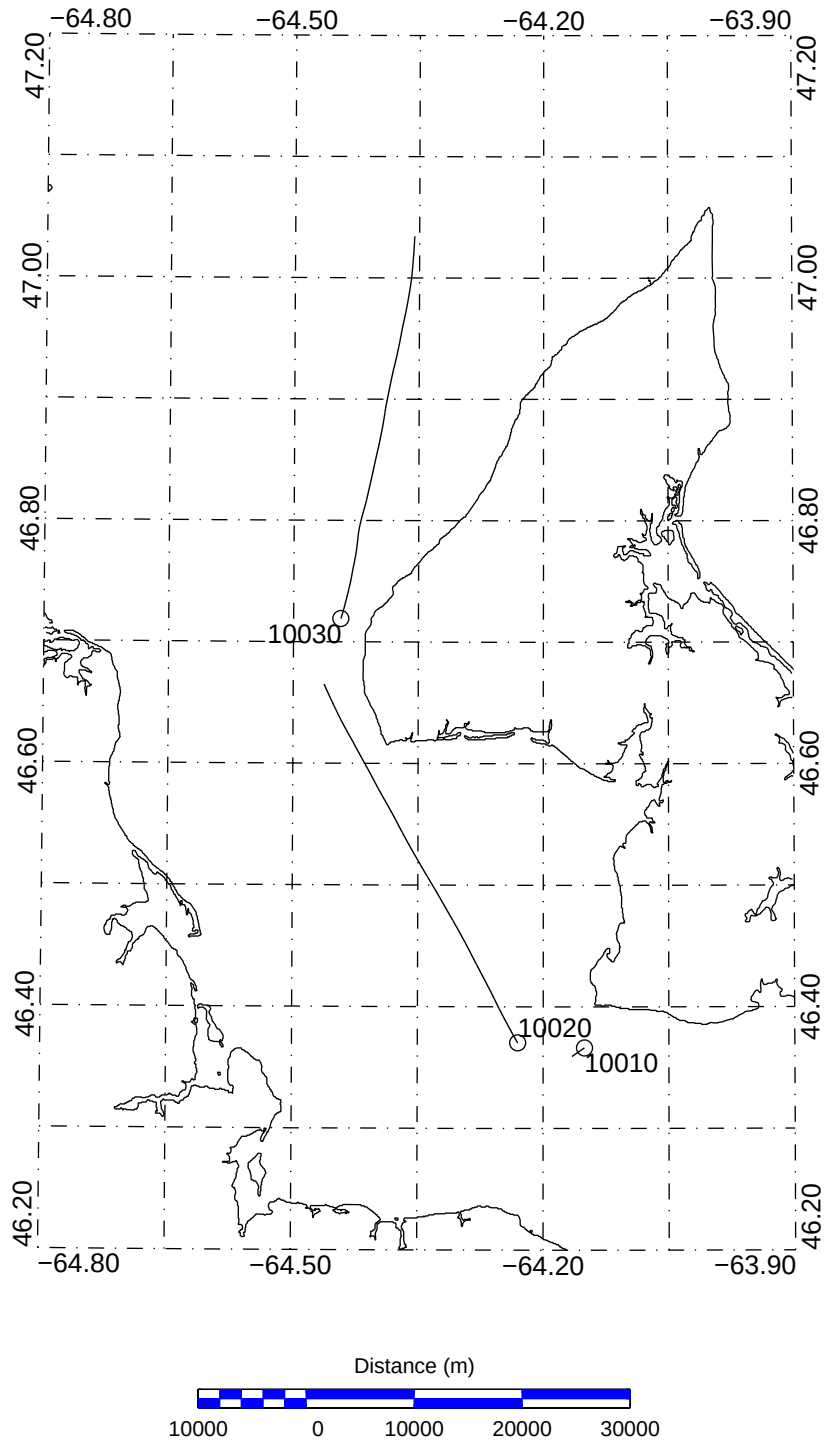


C-25

MARCH 19, 1998 FLIGHT 80

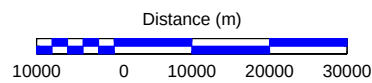
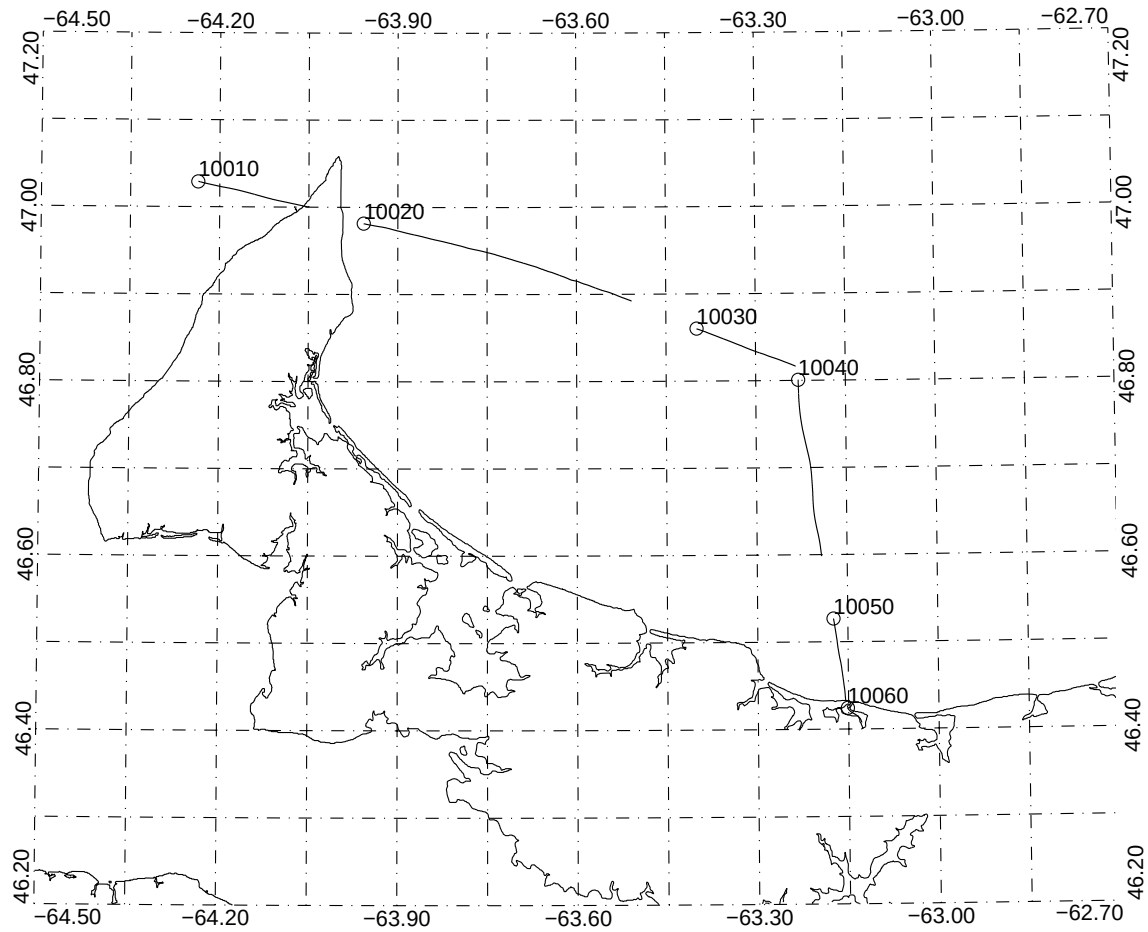
Lambert Conic Proj., Center Long.: -64.16, Lat1 49.00, Lat2 77.00

Map Scale 1:700000



C-26

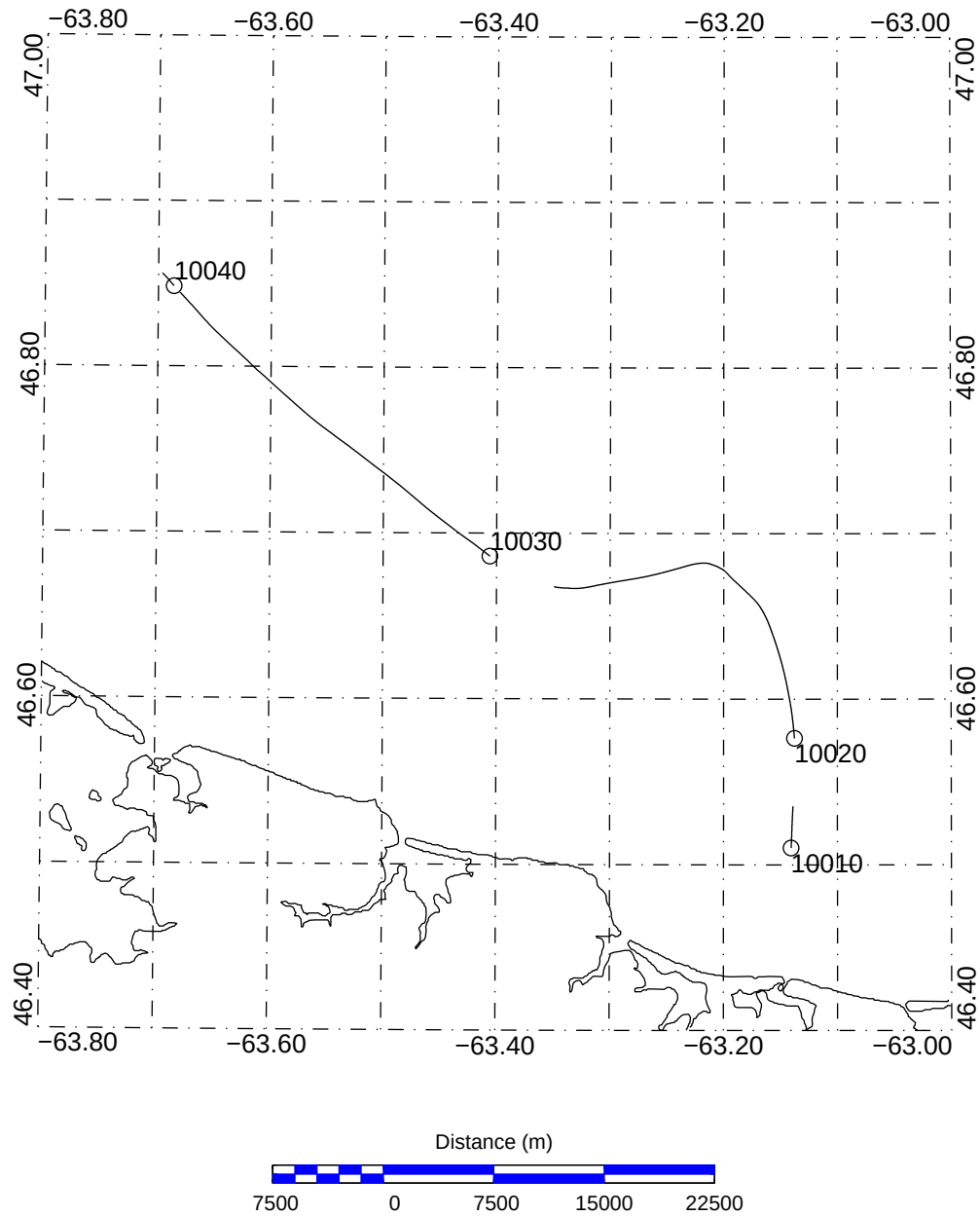
MARCH 19, 1998 FLIGHT 81
Lambert Conic Proj., Center Long.: -63.80, Lat1 49.00, Lat2 77.00
Map Scale 1:800000



MARCH 24, 1998 FLIGHT 82

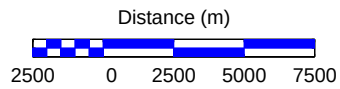
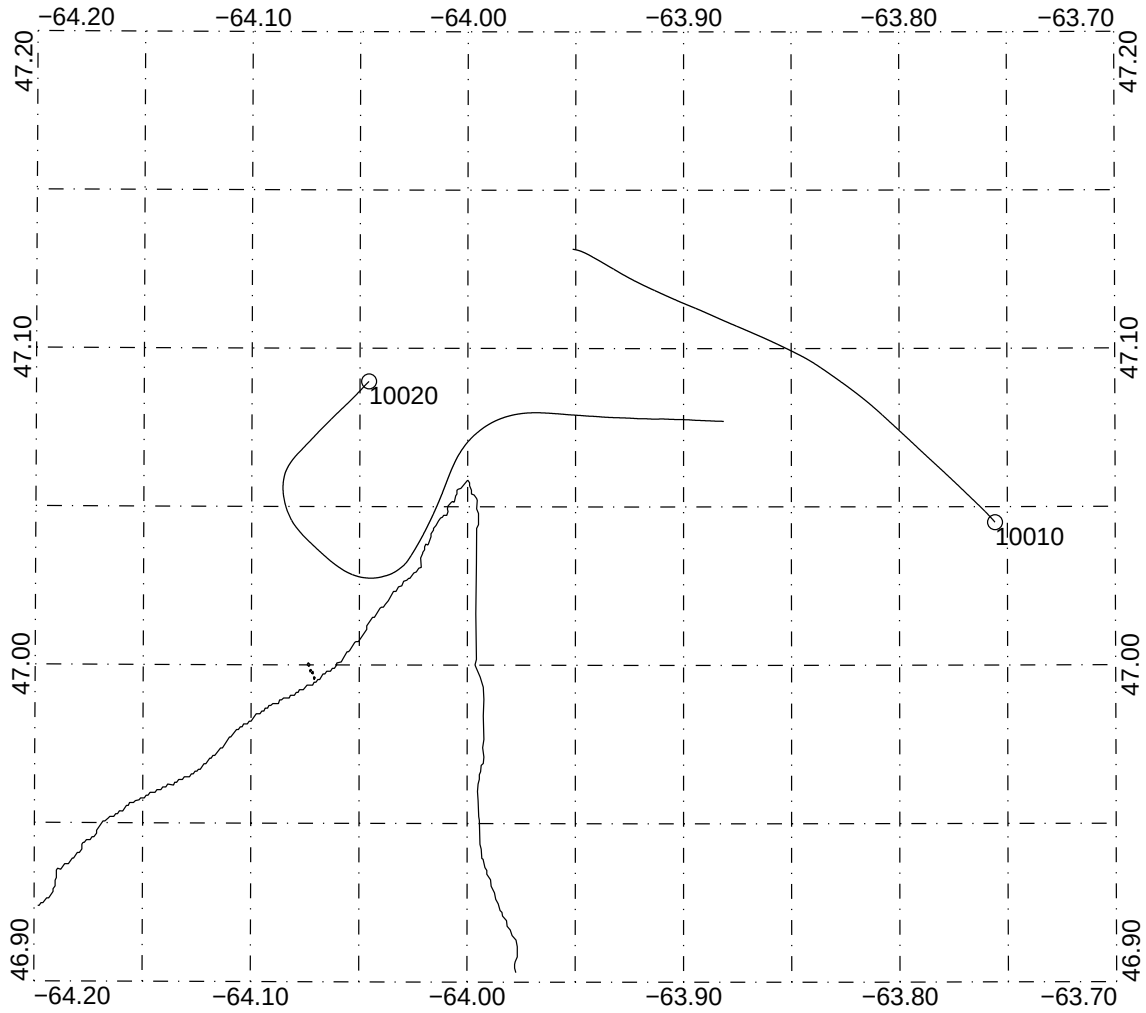
Lambert Conic Proj., Center Long.: -63.14, Lat1 49.00, Lat2 77.00

Map Scale 1:500000



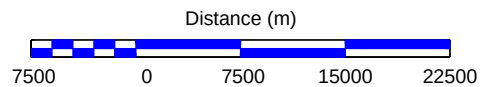
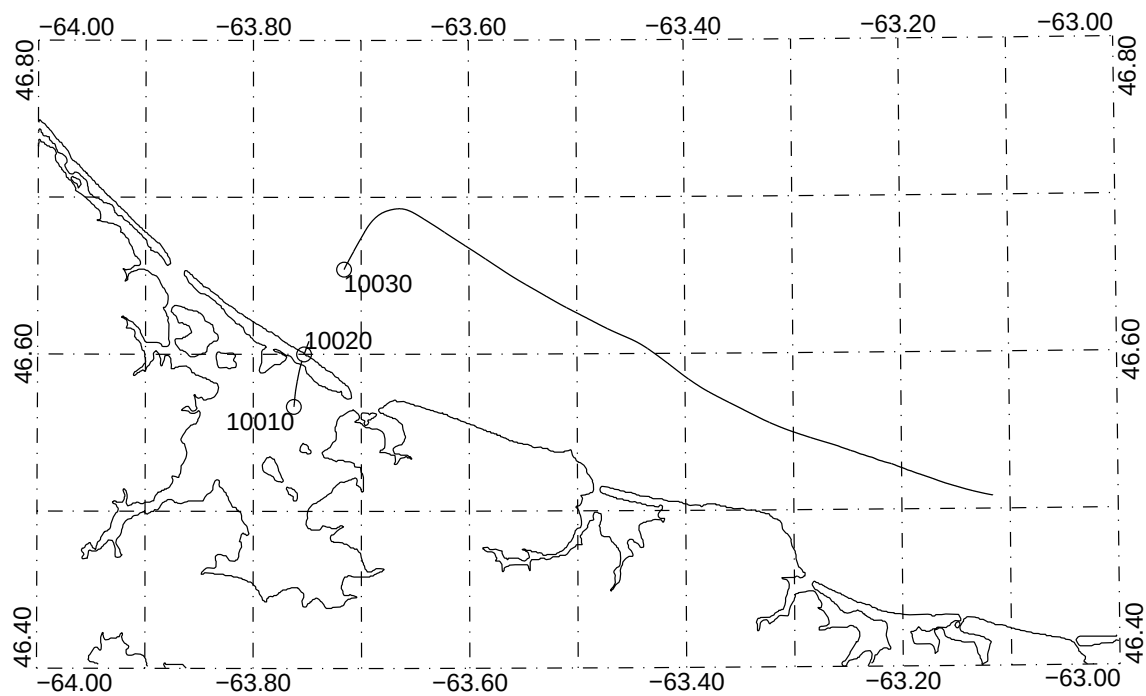
C-28

MARCH 24, 1998 FLIGHT 83
Lambert Conic Proj., Center Long.: -63.90, Lat1 49.00, Lat2 77.00
Map Scale 1:250000



C-29

MARCH 24, 1998 FLIGHT 85
Lambert Conic Proj., Center Long.: -63.76, Lat1 49.00, Lat2 77.00
Map Scale 1:500000

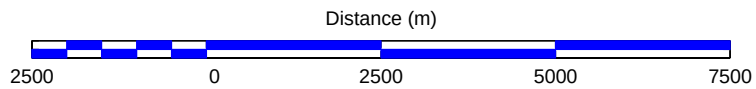
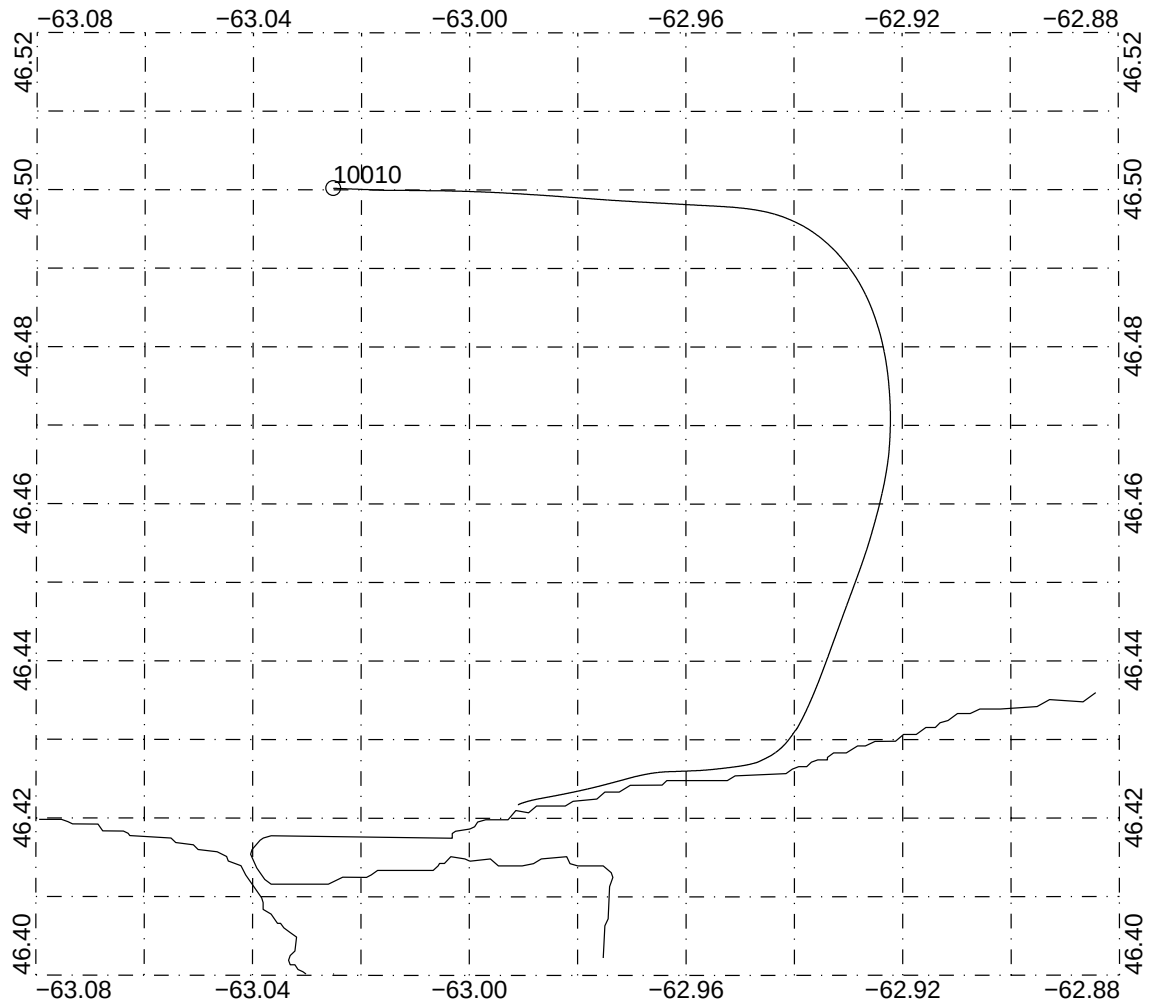


C-30

MARCH 24, 1998 FLIGHT 86

Lambert Conic Proj., Center Long.: -62.97, Lat1 49.00, Lat2 77.00

Map Scale 1:100000



Appendix D: Profile Maps

This appendix presents snow plus ice thickness profile maps generated from the airborne EIS dataset. Although the legends on these maps identify a nominal scale for each map, they have been resized to fit into this document and so are no longer to scale. Distances may be estimated using the scale bar or the latitude/longitude grid.

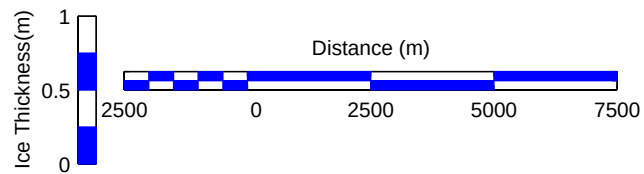
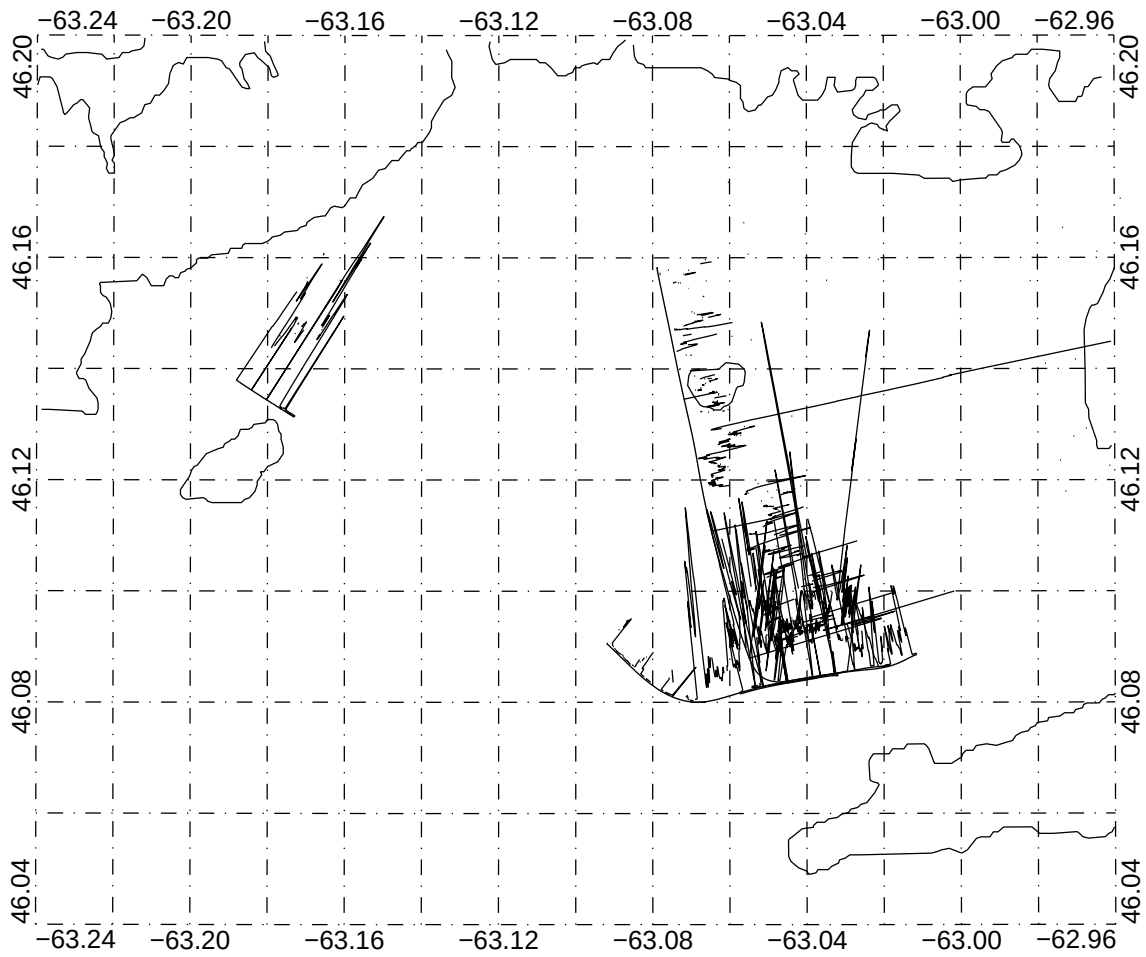
FLT files 052 and 062-072 have been combined into a single map.

D-2

FEBRUARY 21, 1998 FLIGHT 4

Lambert Conic Proj., Center Long.: -63.10, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/0.5 m, Map Scale 1:150000

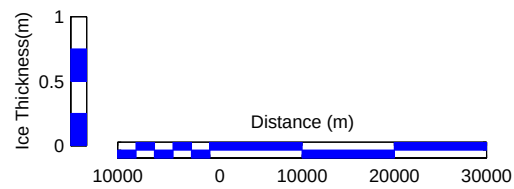
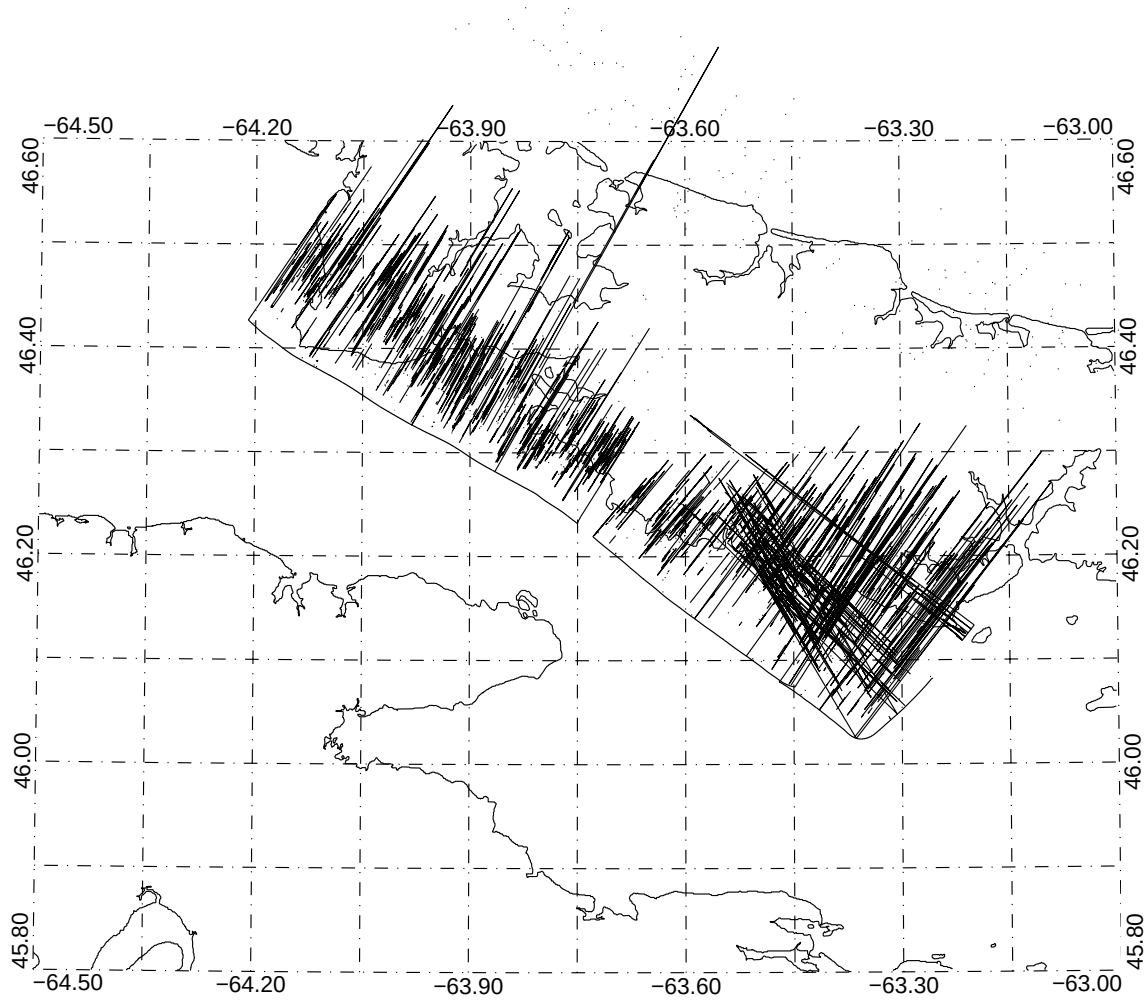


D-3

FEBRUARY 21, 1998 FLIGHT 5

Lambert Conic Proj., Center Long.: -63.70, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/0.5 m, Map Scale 1:700000

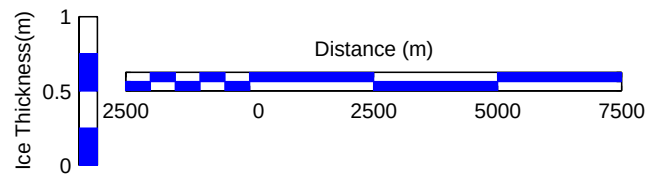
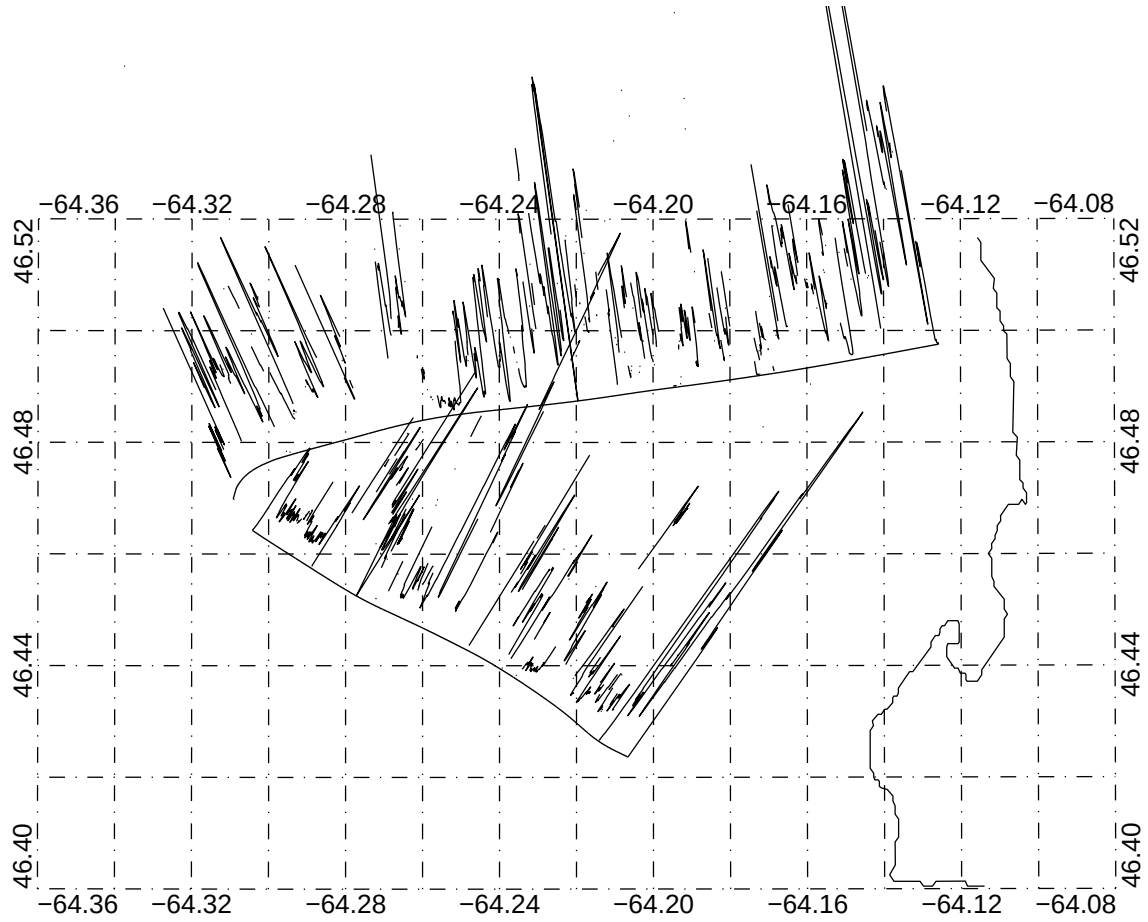


D-4

FEBRUARY 21, 1998 FLIGHT 7

Lambert Conic Proj., Center Long.: -64.26, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/0.5 m, Map Scale 1:150000

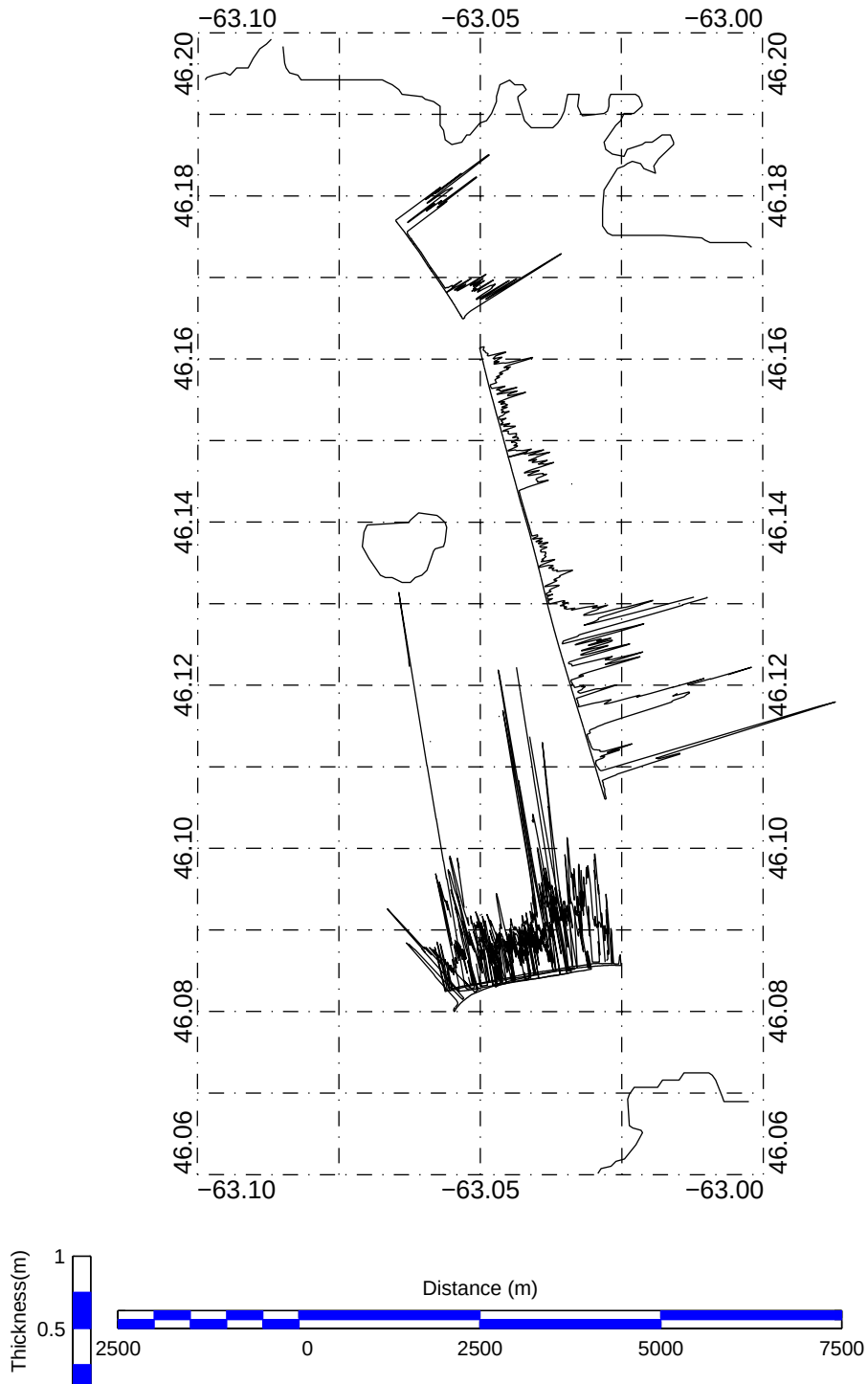


D-5

FEBRUARY 22, 1998 FLIGHT 10

Lambert Conic Proj., Center Long.: -63.05, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/0.5 m, Map Scale 1:100000

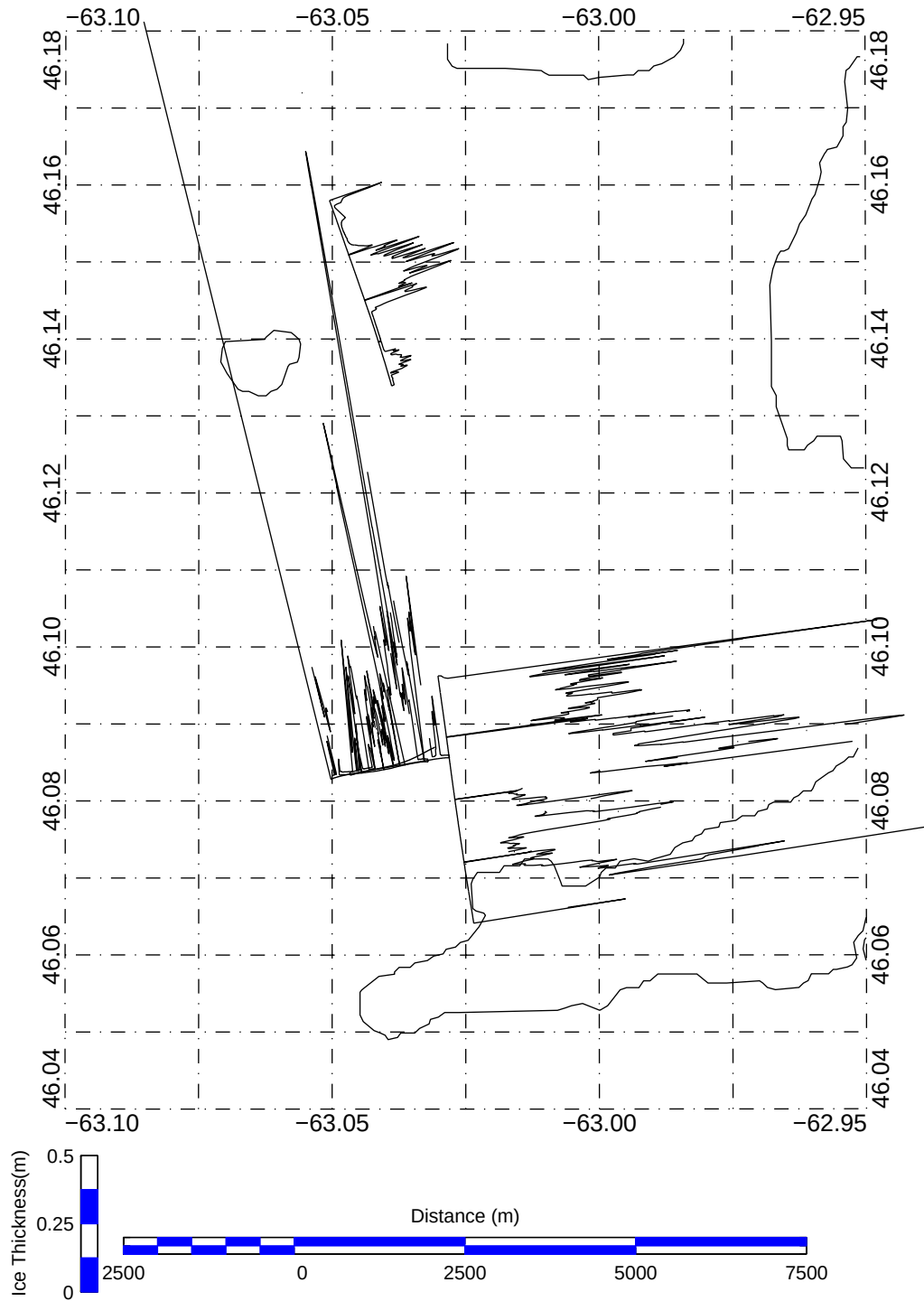


D-6

FEBRUARY 22, 1998 FLIGHT 11

Lambert Conic Proj., Center Long.: -63.04, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/0.25 m, Map Scale 1:100000

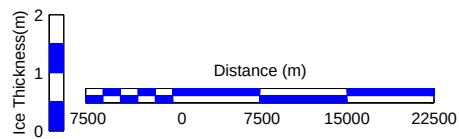
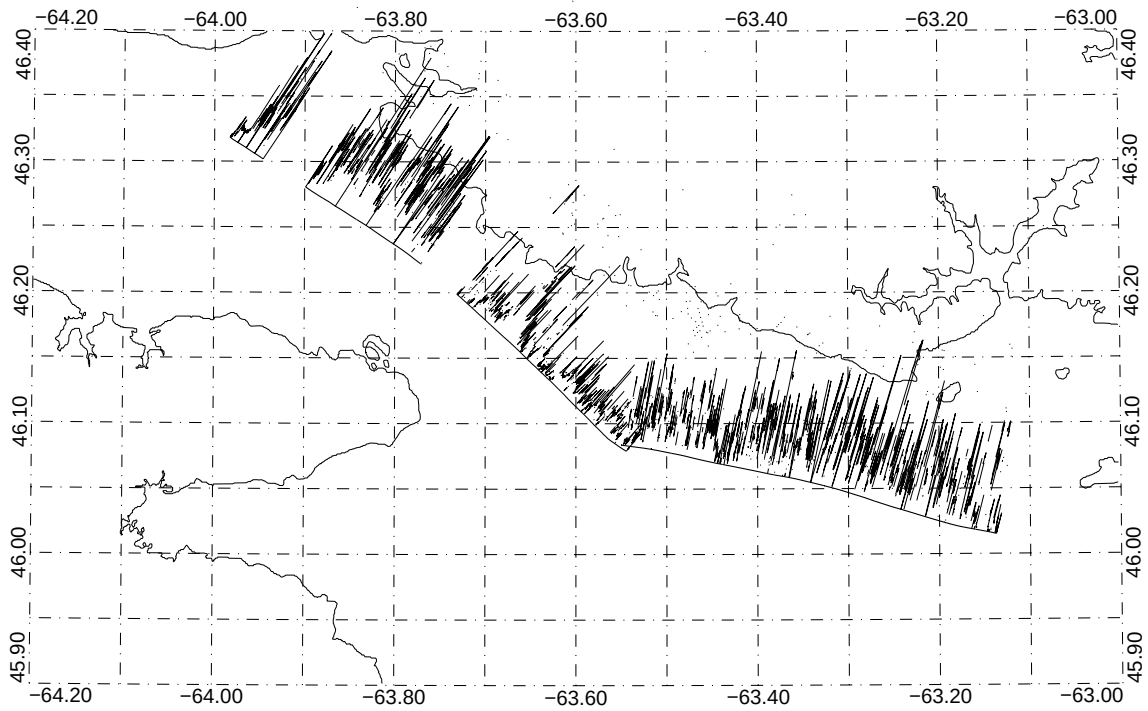


D-7

FEBRUARY 22, 1998 FLIGHT 12

Lambert Conic Proj., Center Long.: -63.60, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/1 m, Map Scale 1:500000

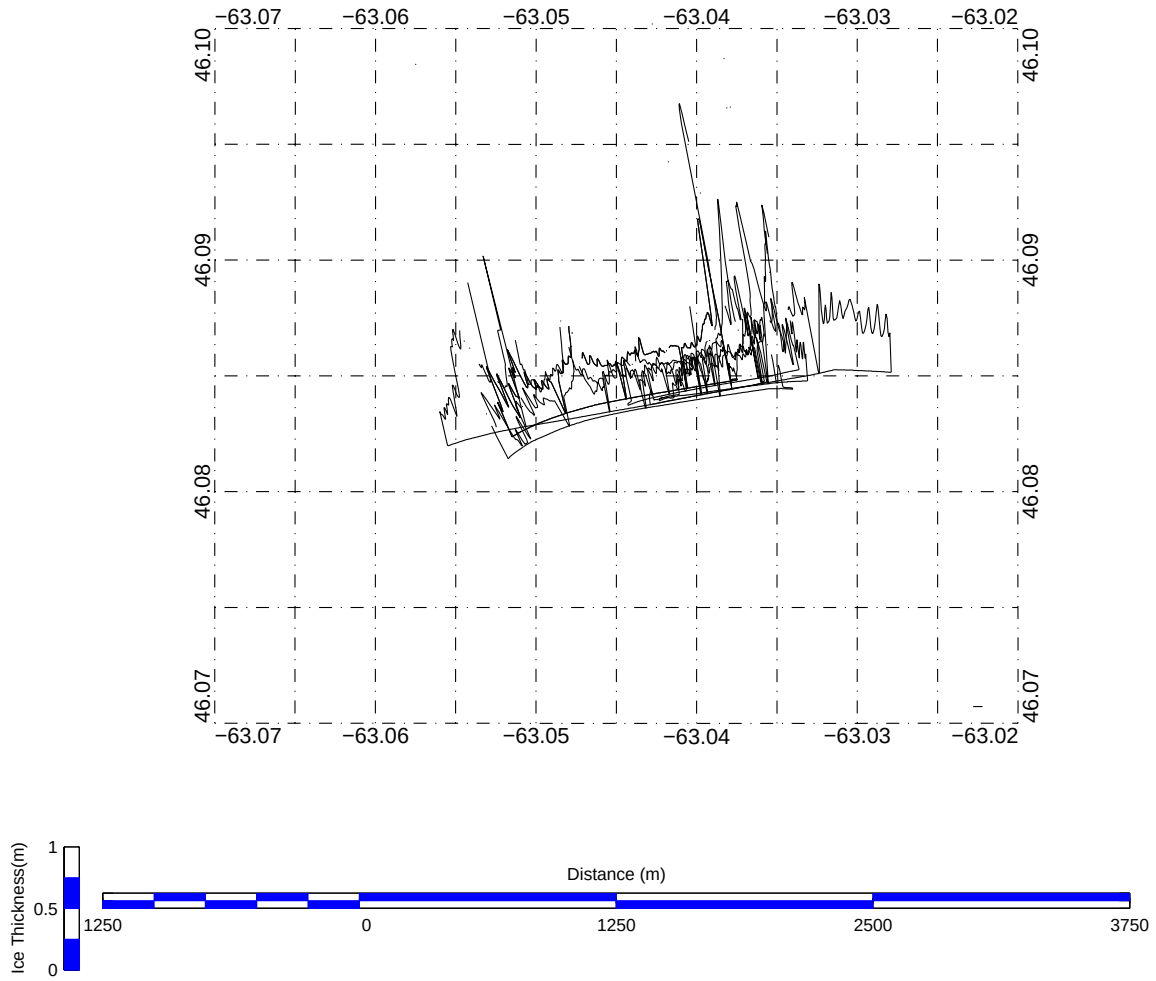


D-8

FEBRUARY 22, 1998 FLIGHT 15

Lambert Conic Proj., Center Long.: -63.04, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/0.5 m, Map Scale 1:30000

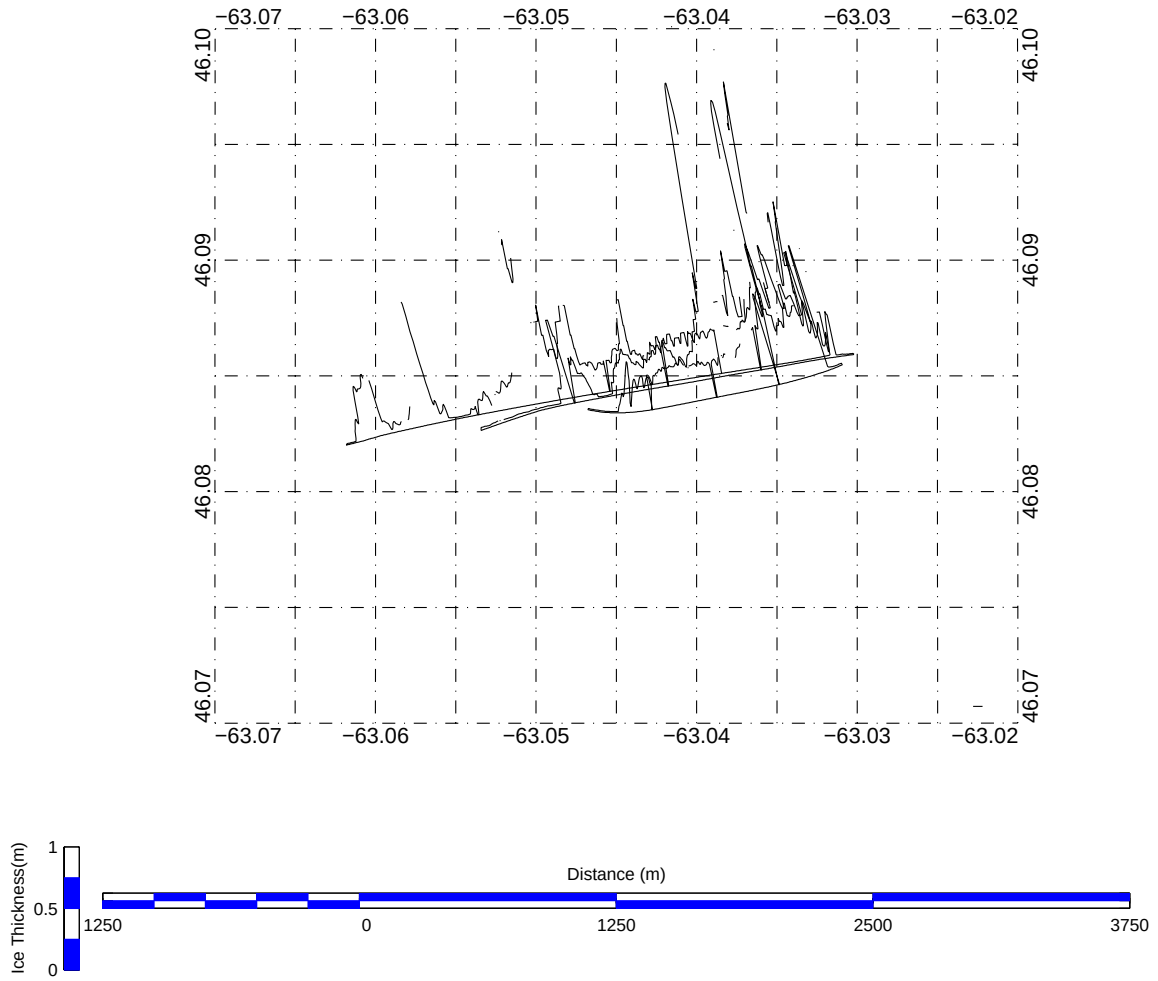


D-9

FEBRUARY 23, 1998 FLIGHT 16

Lambert Conic Proj., Center Long.: -63.05, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/0.5 m, Map Scale 1:30000

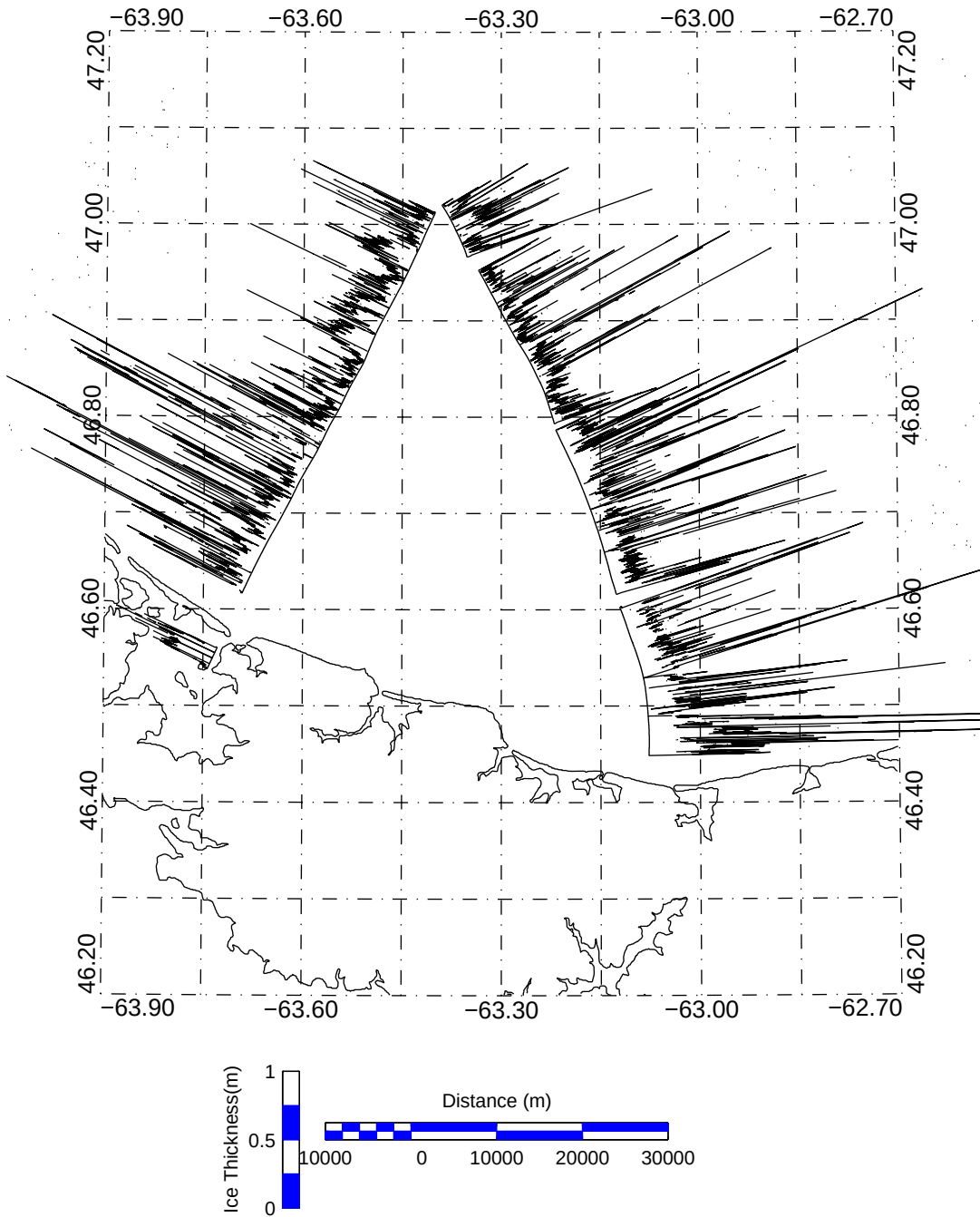


D-10

FEBRUARY 23, 1998 FLIGHT 17

Lambert Conic Proj., Center Long.: -63.30, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/0.5 m, Map Scale 1:800000

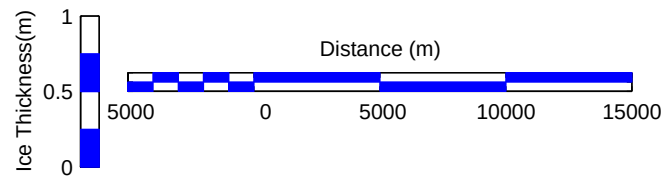
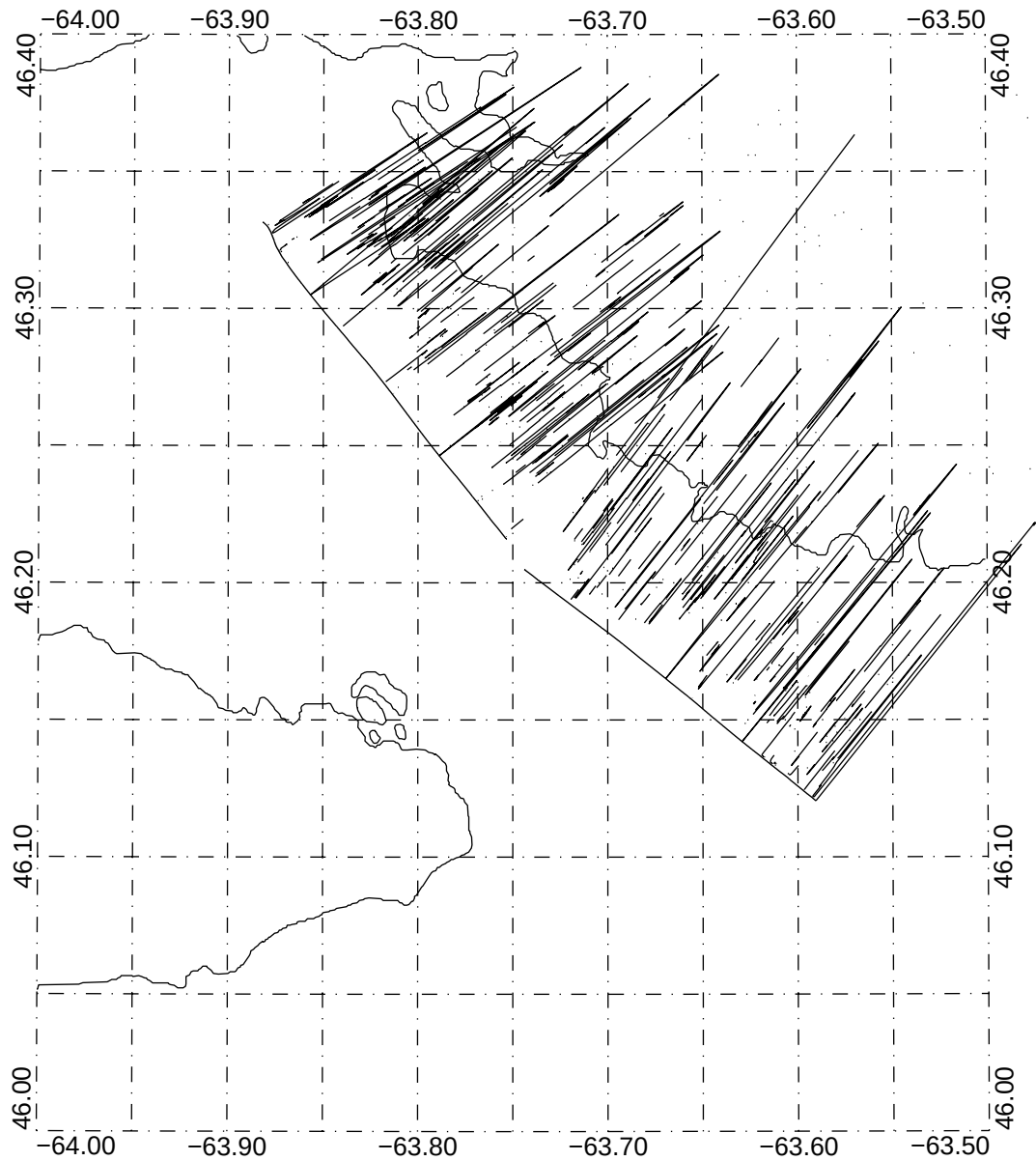


D-11

FEBRUARY 23, 1998 FLIGHT 18

Lambert Conic Proj., Center Long.: -63.75, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/0.5 m, Map Scale 1:300000

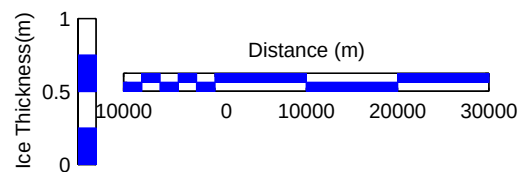
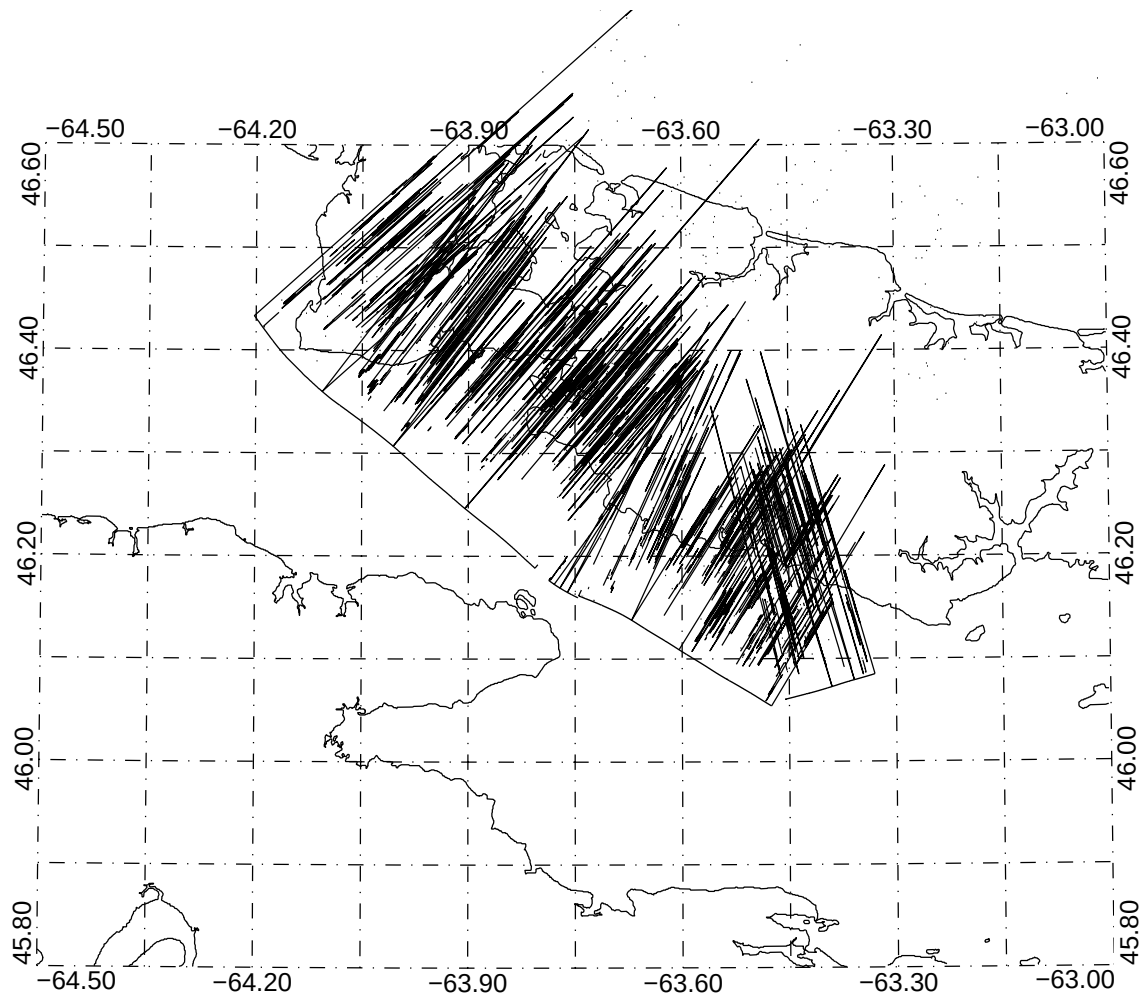


D-12

FEBRUARY 23, 1998 FLIGHT 19

Lambert Conic Proj., Center Long.: -63.80, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/0.5 m, Map Scale 1:800000

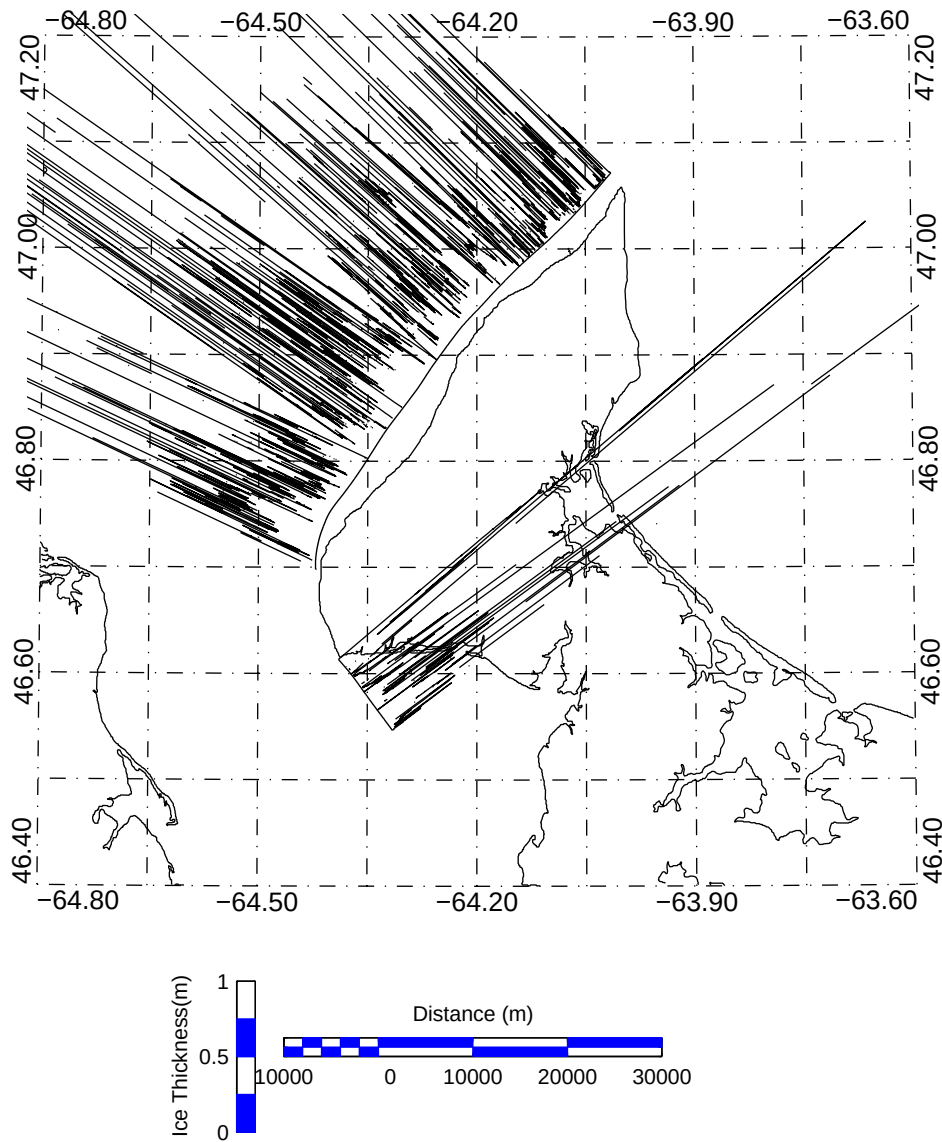


D-13

FEBRUARY 23, 1998 FLIGHT 20

Lambert Conic Proj., Center Long.: -64.20, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/0.5 m, Map Scale 1:800000

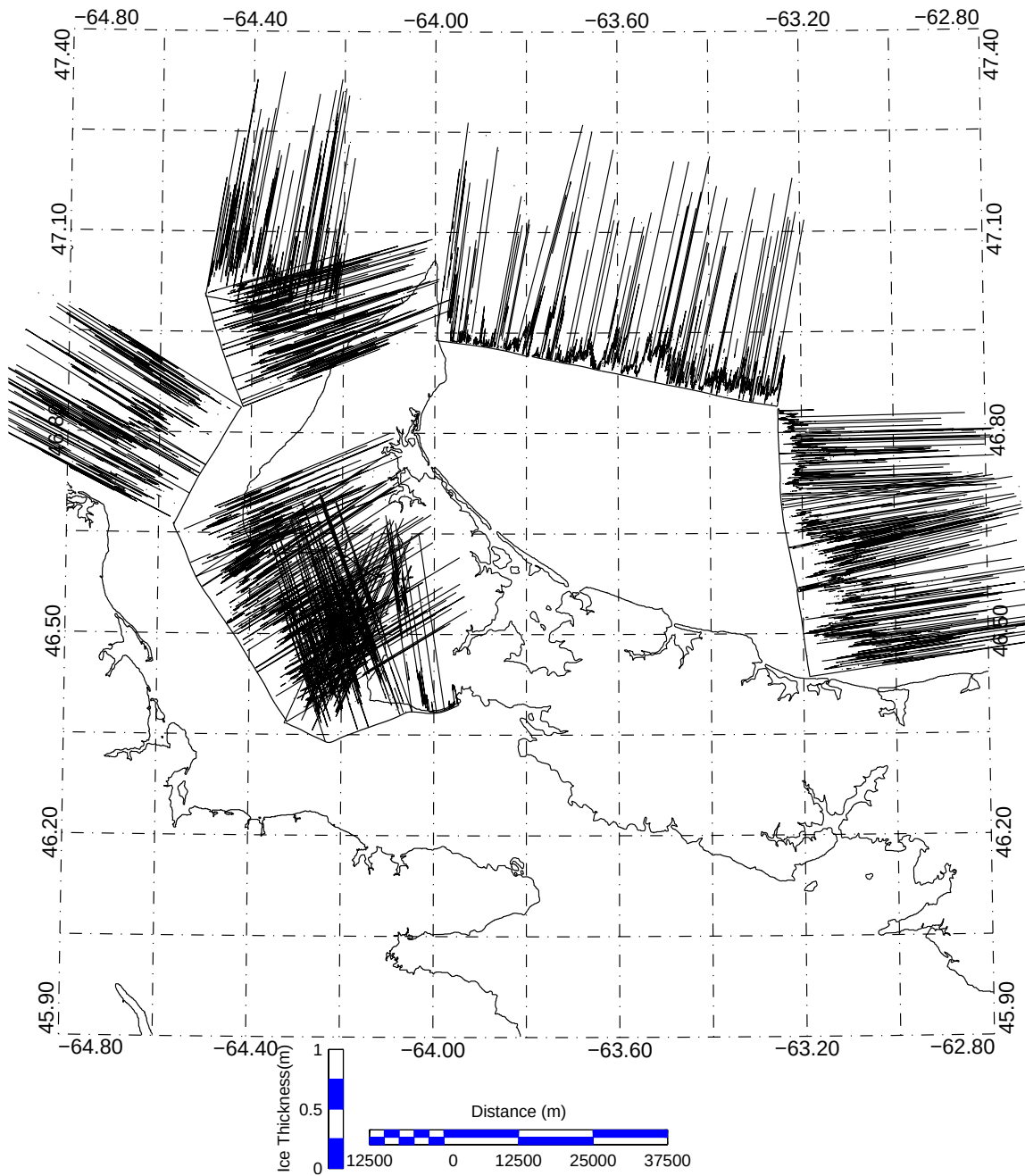


D-14

FEBRUARY 24, 1998 FLIGHT 22

Lambert Conic Proj., Center Long.: -63.80, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/0.5 m, Map Scale 1:1000000

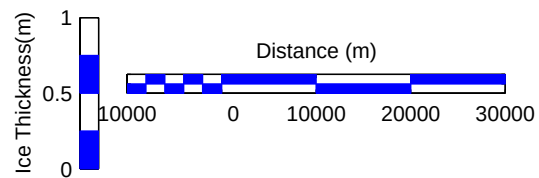
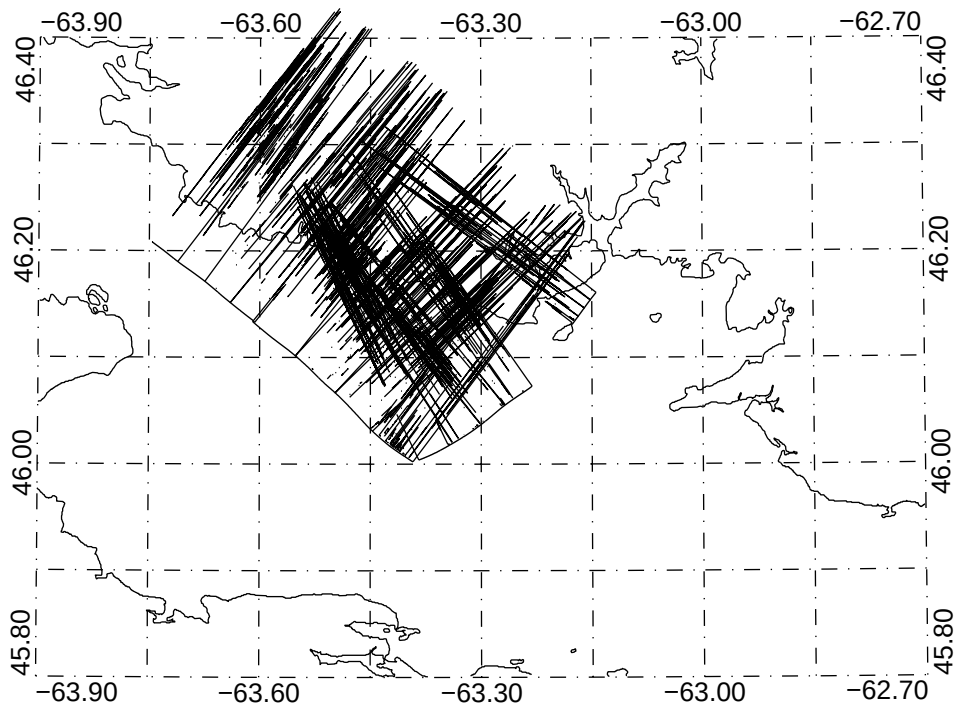


D-15

MARCH 16, 1998 FLIGHT 47

Lambert Conic Proj., Center Long.: -63.40, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/0.5 m, Map Scale 1:800000

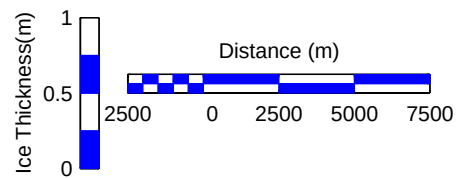
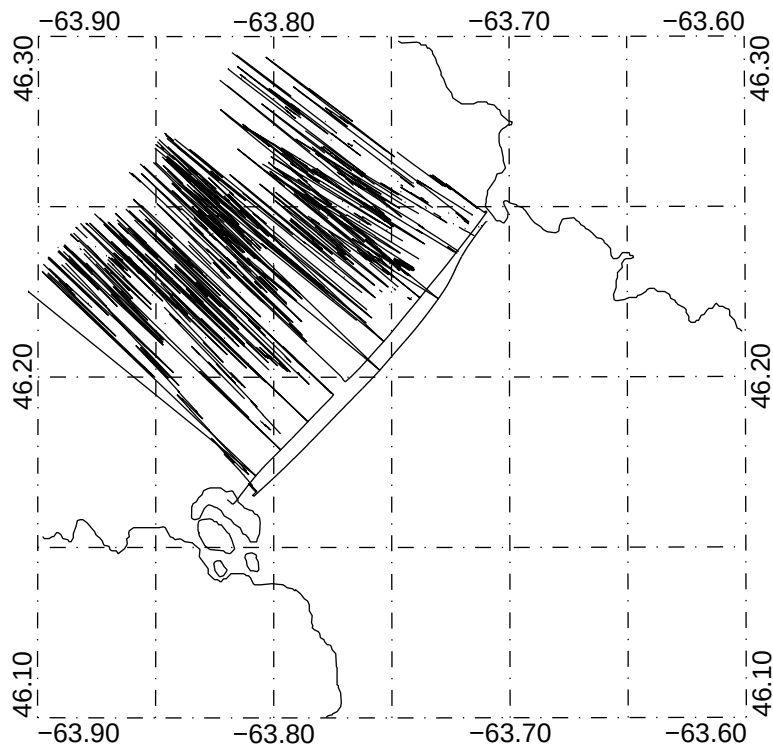


D-16

MARCH 16, 1998 FLIGHT 48

Lambert Conic Proj., Center Long.: -63.80, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/0.5 m, Map Scale 1:250000

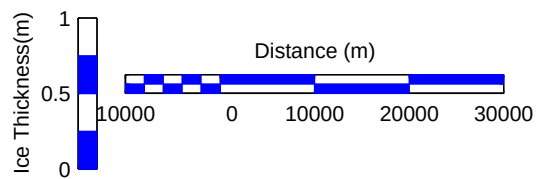
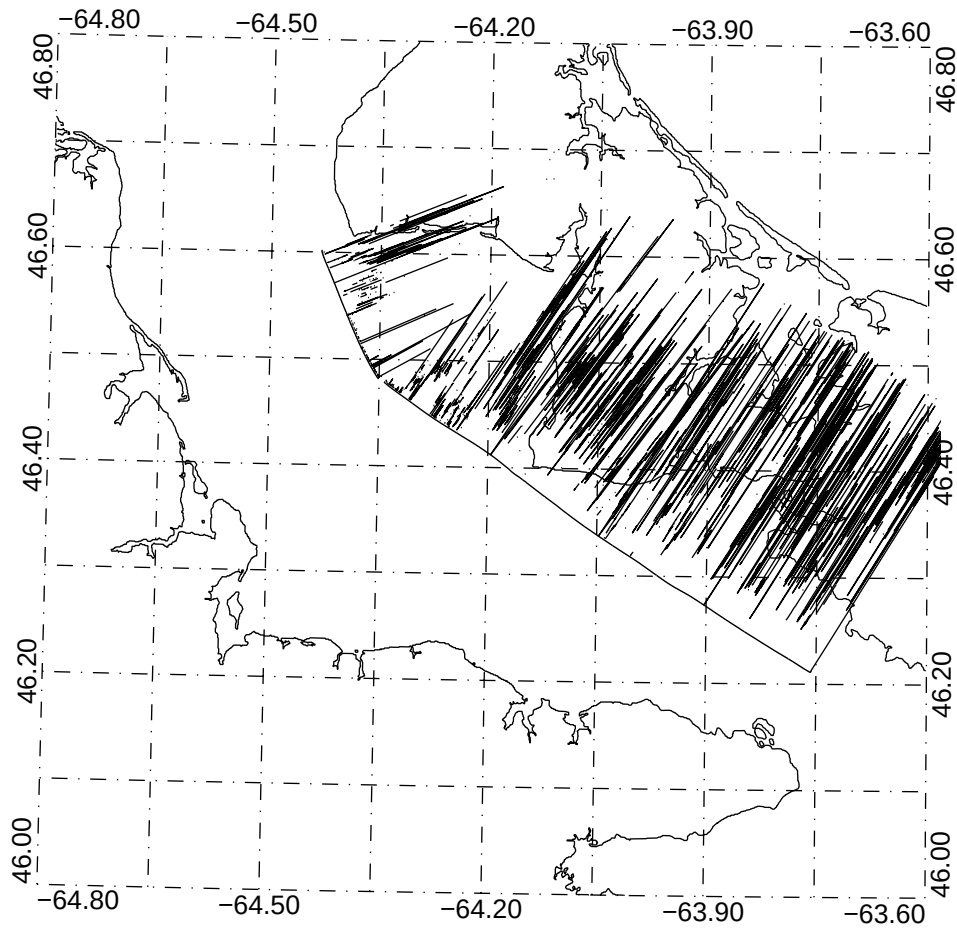


D-17

MARCH 16, 1998 FLIGHT 51

Lambert Conic Proj., Center Long.: -63.20, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/0.5 m, Map Scale 1:800000

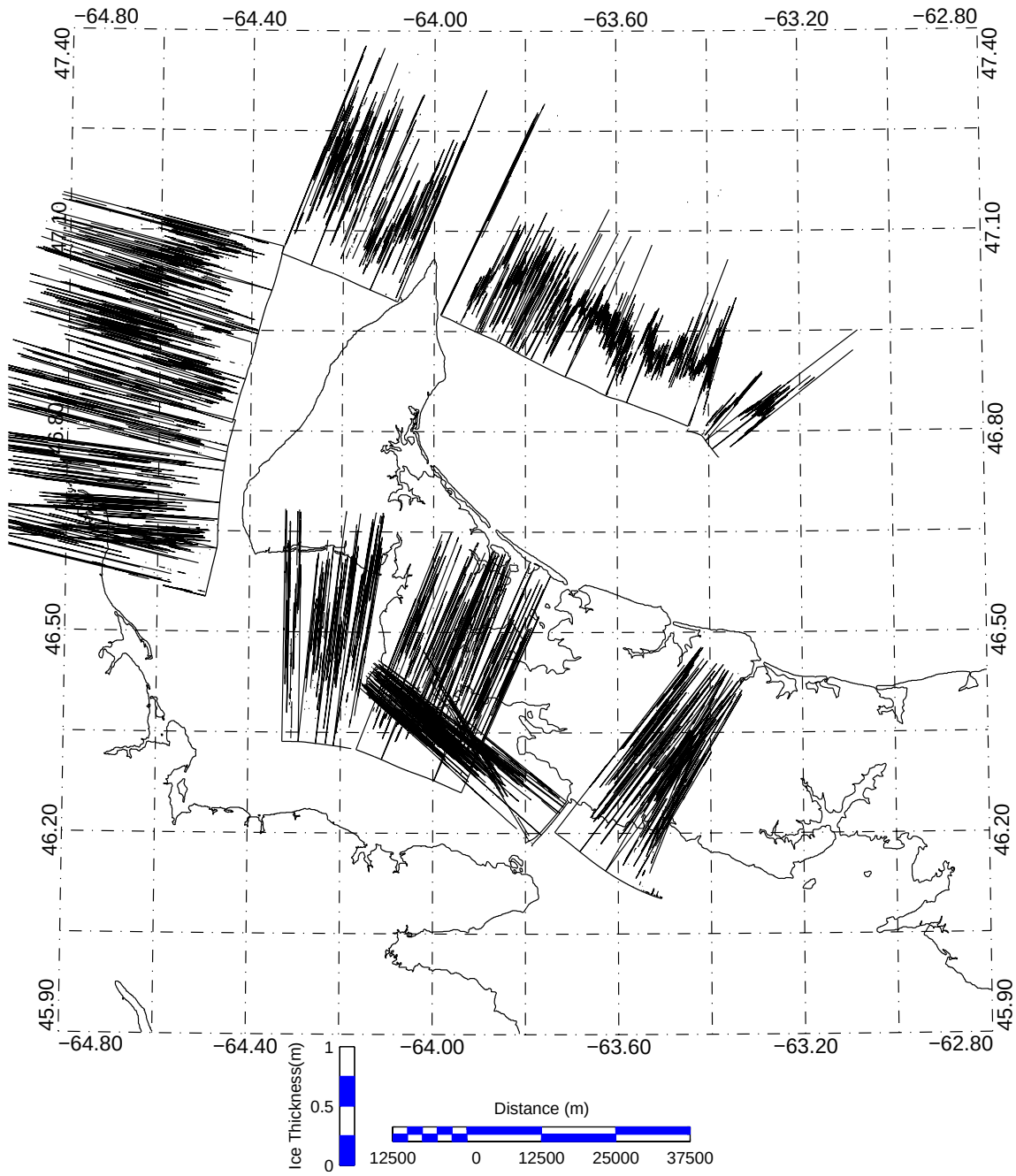


D-18

MARCH 16-17, 1998 SINGLE LINE FLIGHTS

Lambert Conic Proj., Center Long.: -63.80, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/0.5 m, Map Scale 1:1000000

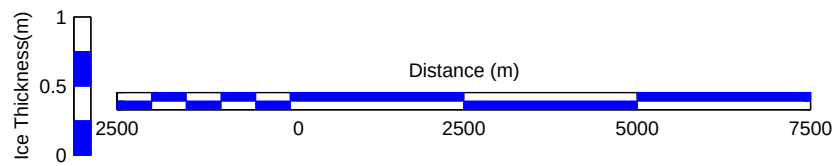
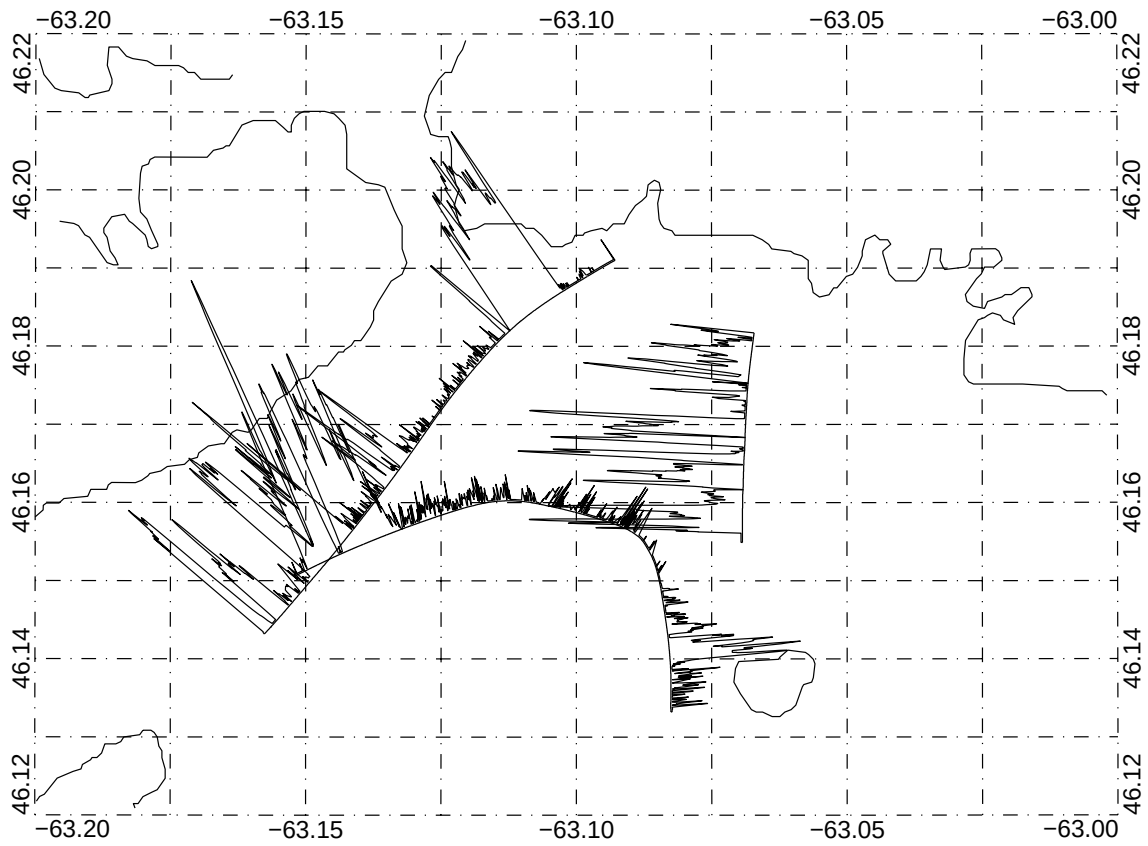


D-19

MARCH 18, 1998 FLIGHT 74

Lambert Conic Proj., Center Long.: -63.10, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/0.5 m, Map Scale 1:100000

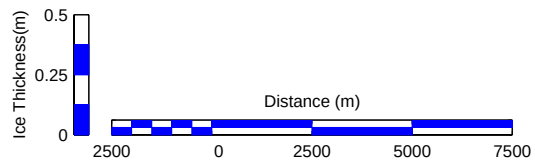
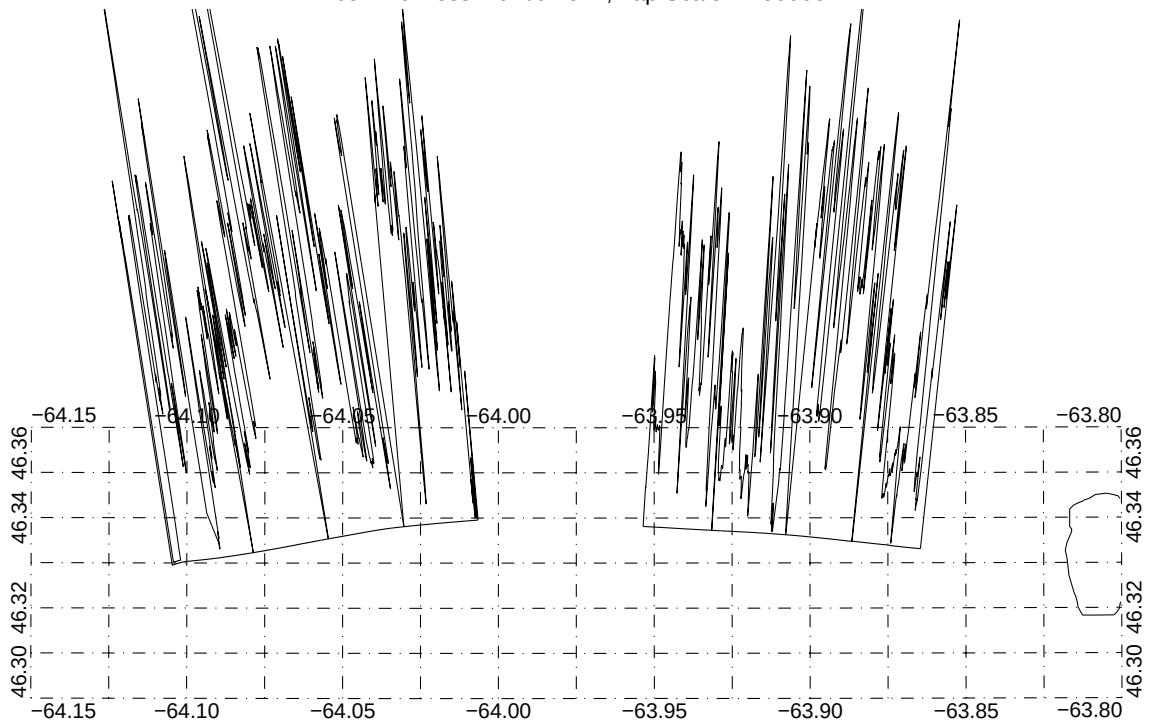


D-20

MARCH 18, 1998 FLIGHT 75

Lambert Conic Proj., Center Long.: -64.00, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/0.25 m, Map Scale 1:150000

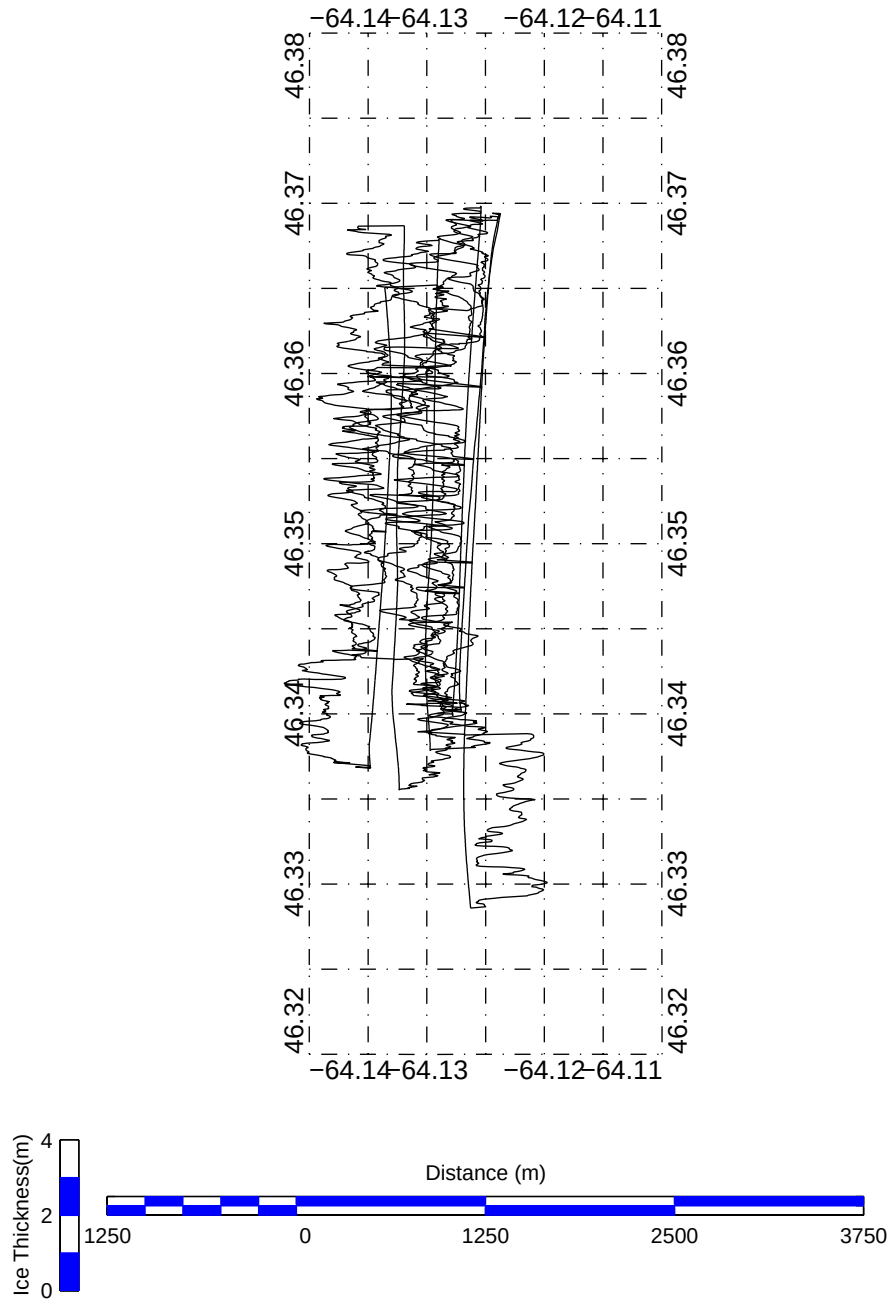


D-21

MARCH 18, 1998 FLIGHT 76

Lambert Conic Proj., Center Long.: -64.13, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/2 m, Map Scale 1:50000

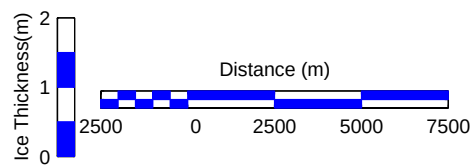
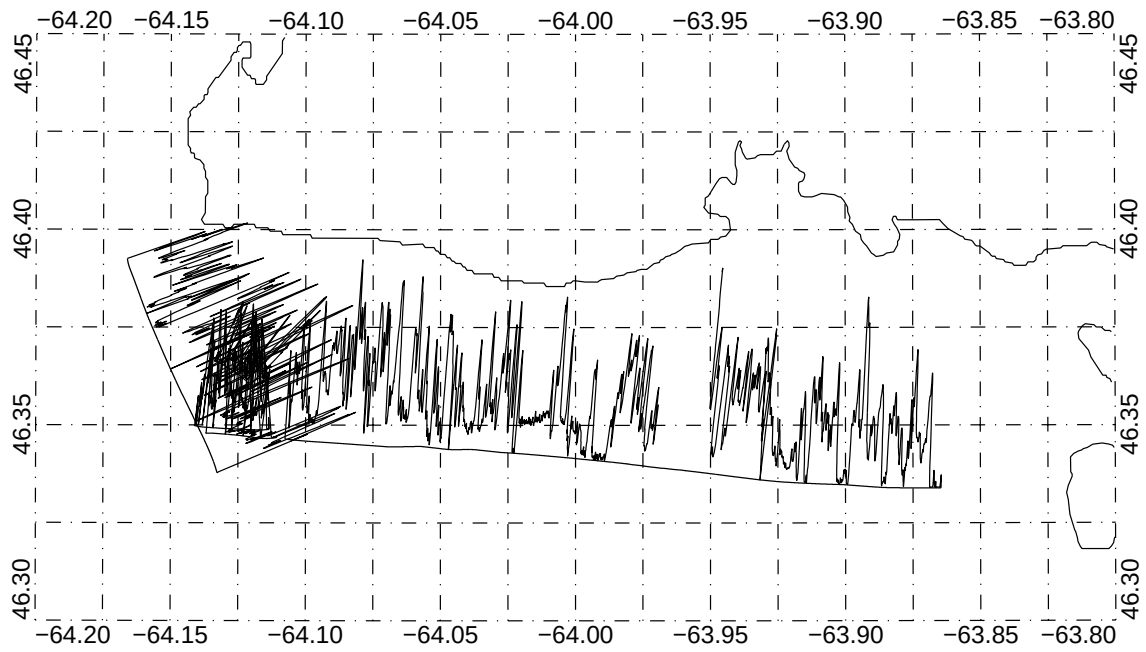


D-22

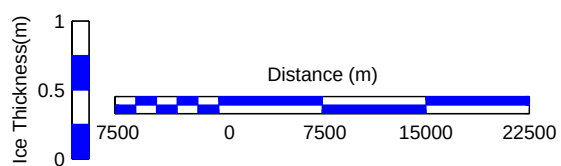
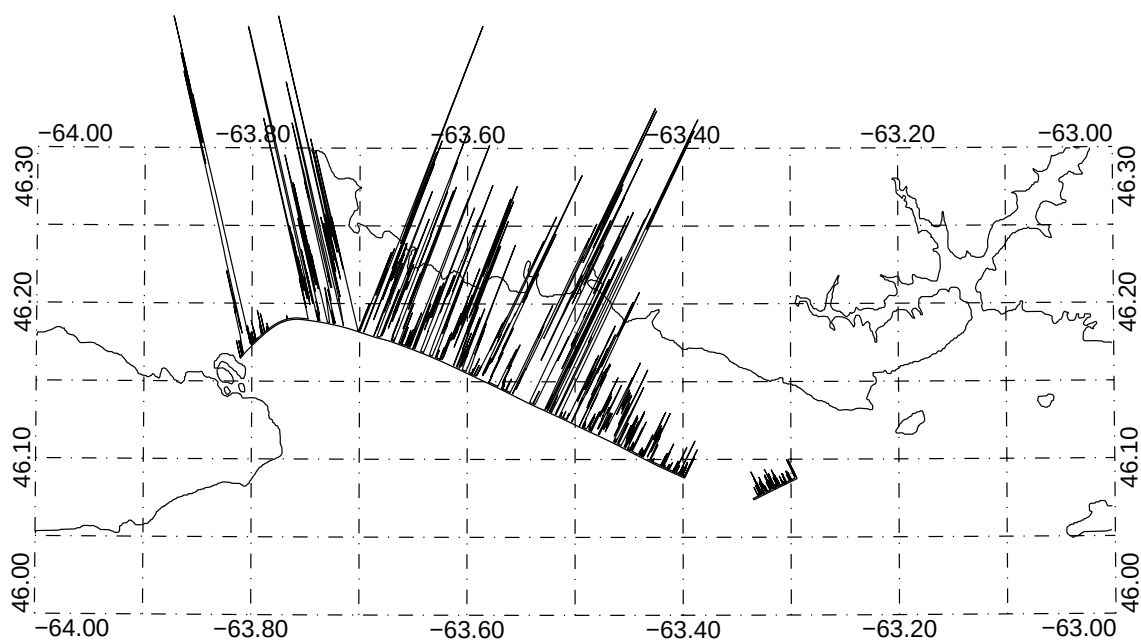
MARCH 18, 1998 FLIGHT 76

Lambert Conic Proj., Center Long.: -64.00, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/1 m, Map Scale 1:200000



MARCH 19, 1998 FLIGHT 77
Lambert Conic Proj., Center Long.: -63.50, Lat1 49.00, Lat2 77.00
Ice Thickness 1 cm/0.5 m, Map Scale 1:500000

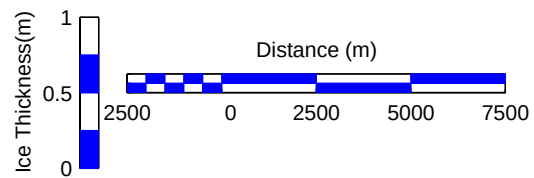
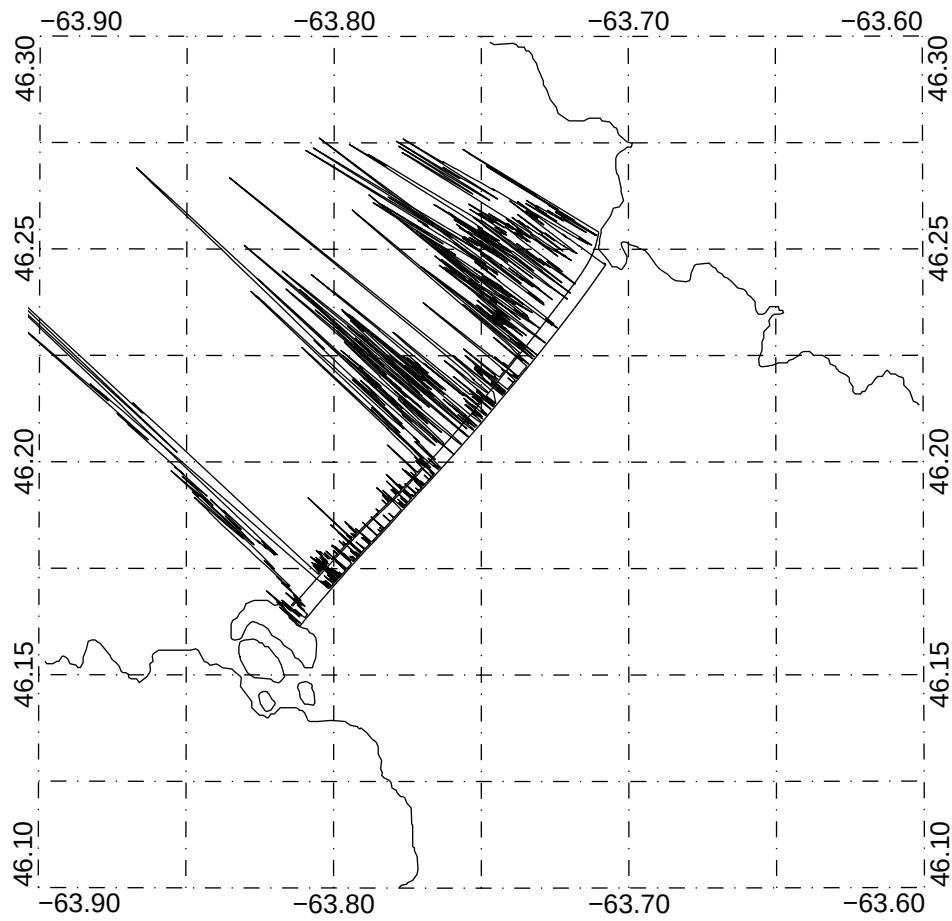


D-24

MARCH 19, 1998 FLIGHT 78

Lambert Conic Proj., Center Long.: -63.75, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/0.5 m, Map Scale 1:200000

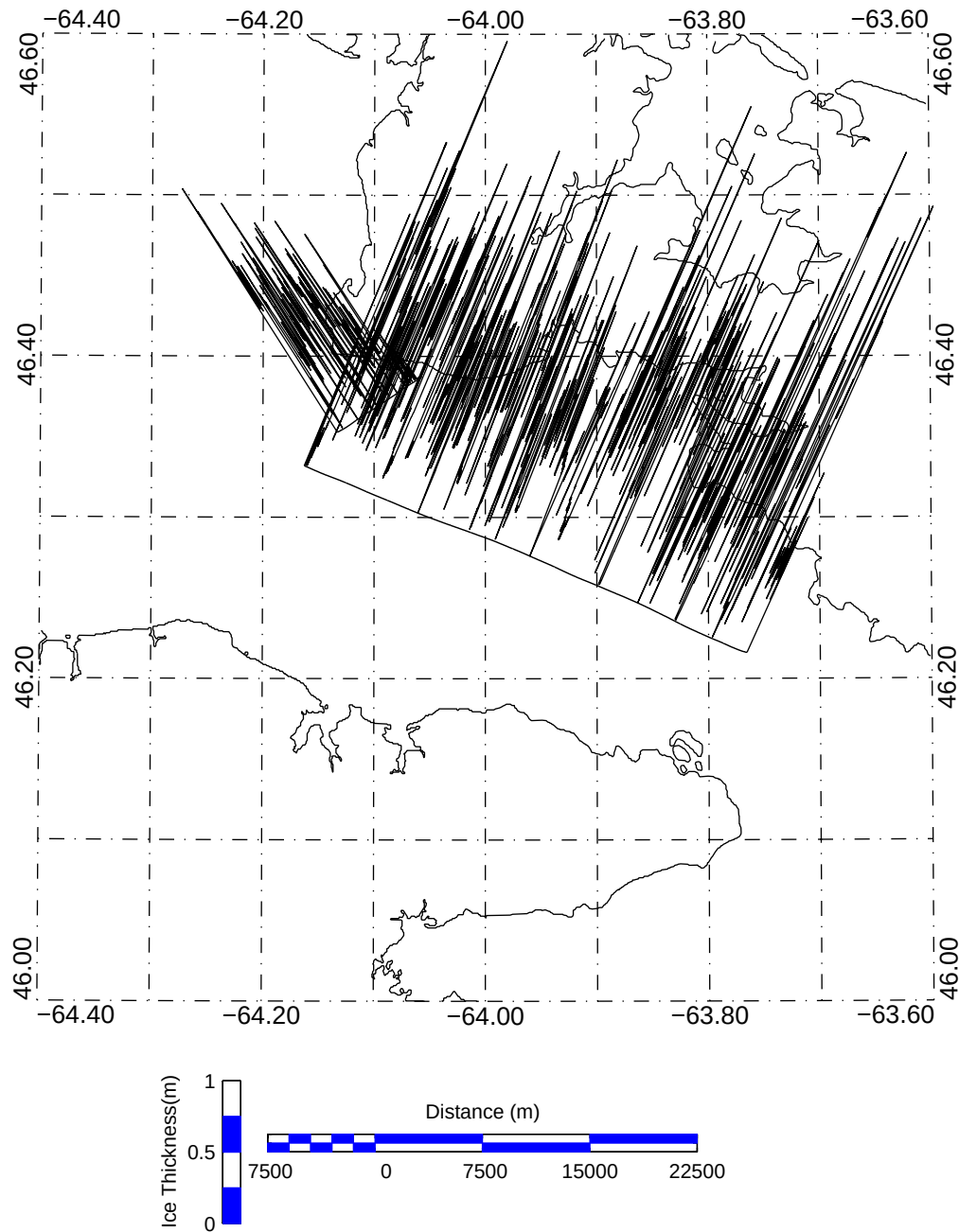


D-25

MARCH 19, 1998 FLIGHT 79

Lambert Conic Proj., Center Long.: -64.00, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/0.5 m, Map Scale 1:500000

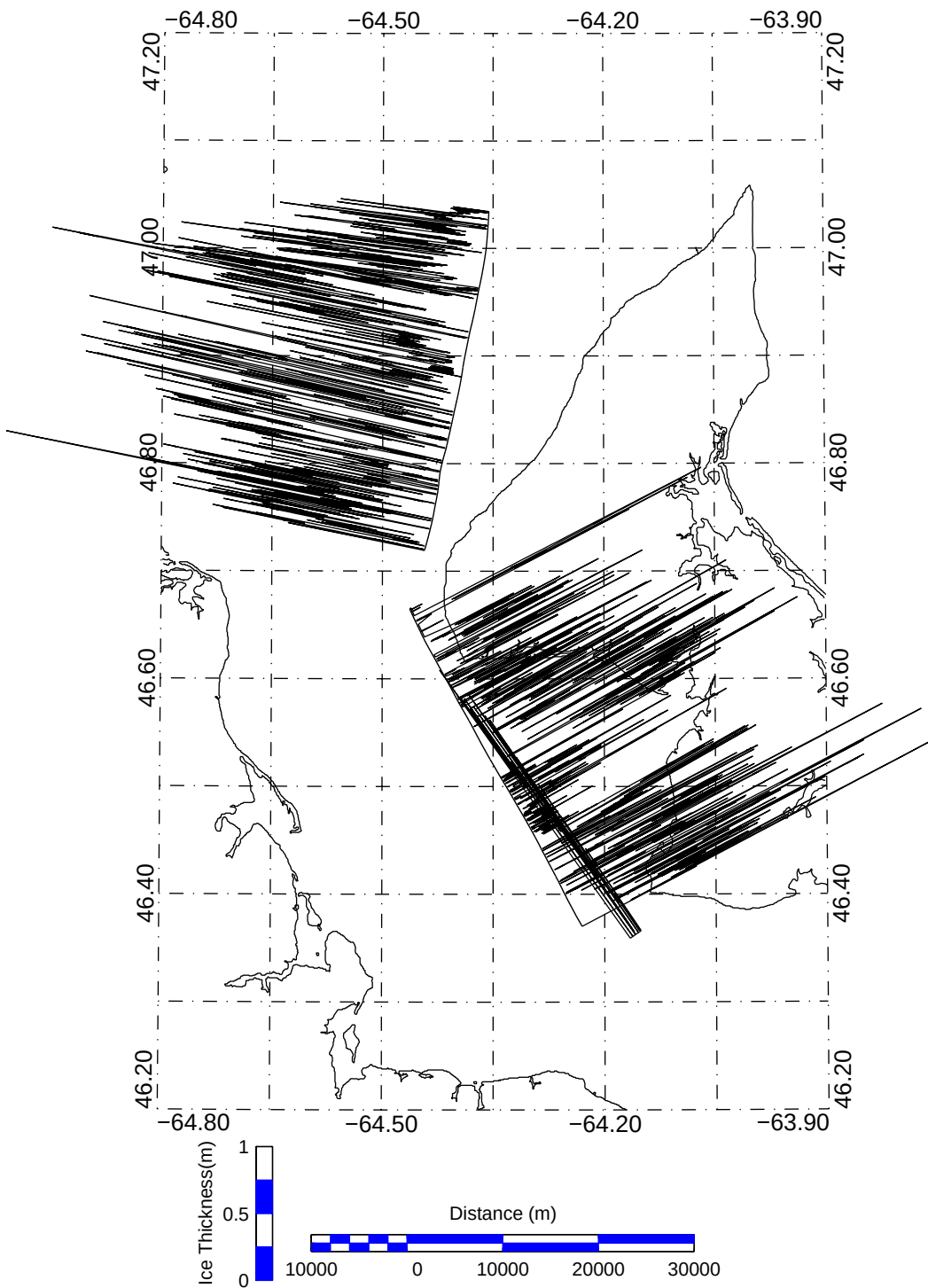


D-26

MARCH 19, 1998 FLIGHT 80

Lambert Conic Proj., Center Long.: -64.35, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/0.5 m, Map Scale 1:700000

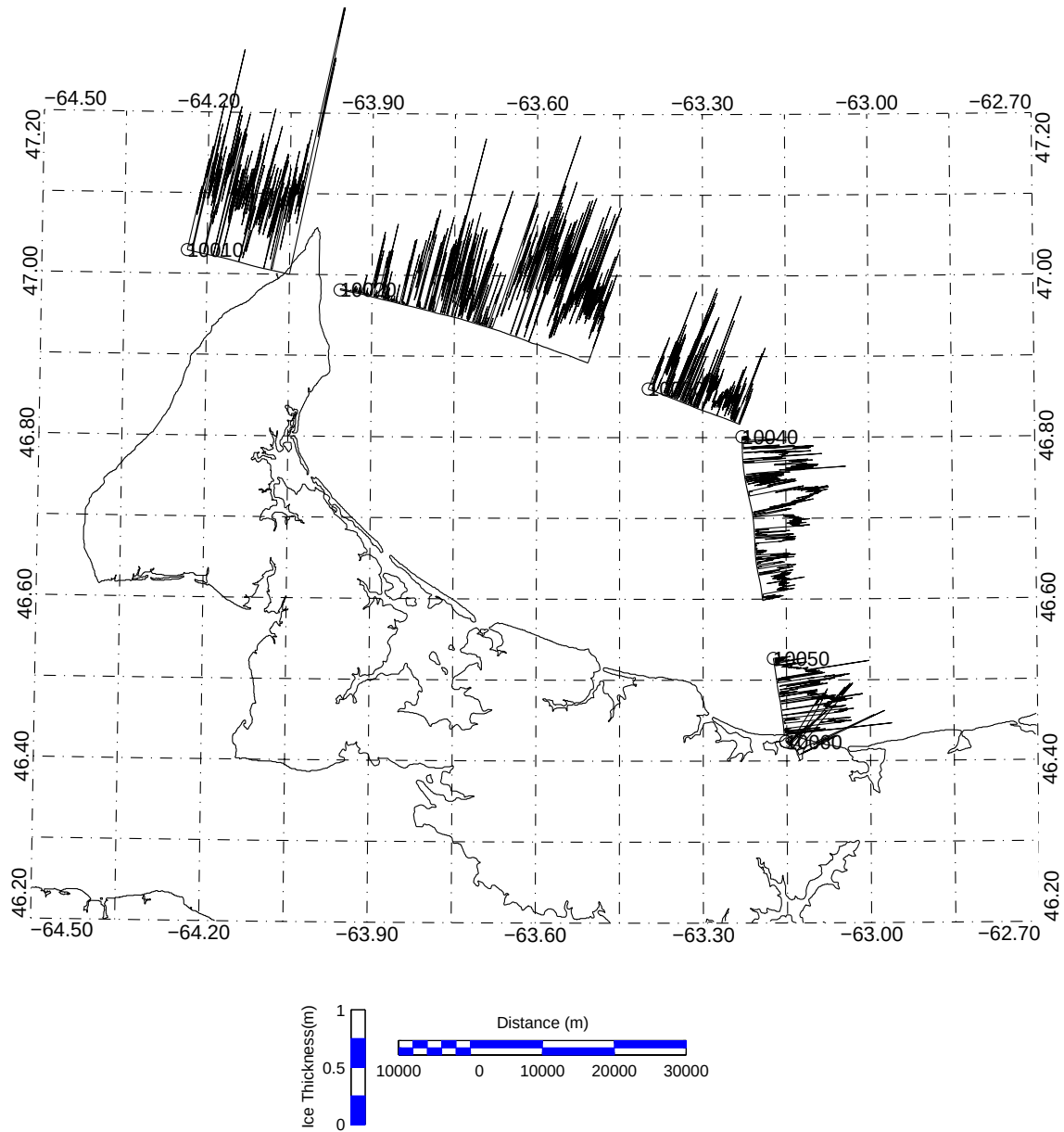


D-27

MARCH 19, 1998 FLIGHT 81

Lambert Conic Proj., Center Long.: -63.40, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/0.5 m, Map Scale 1:800000

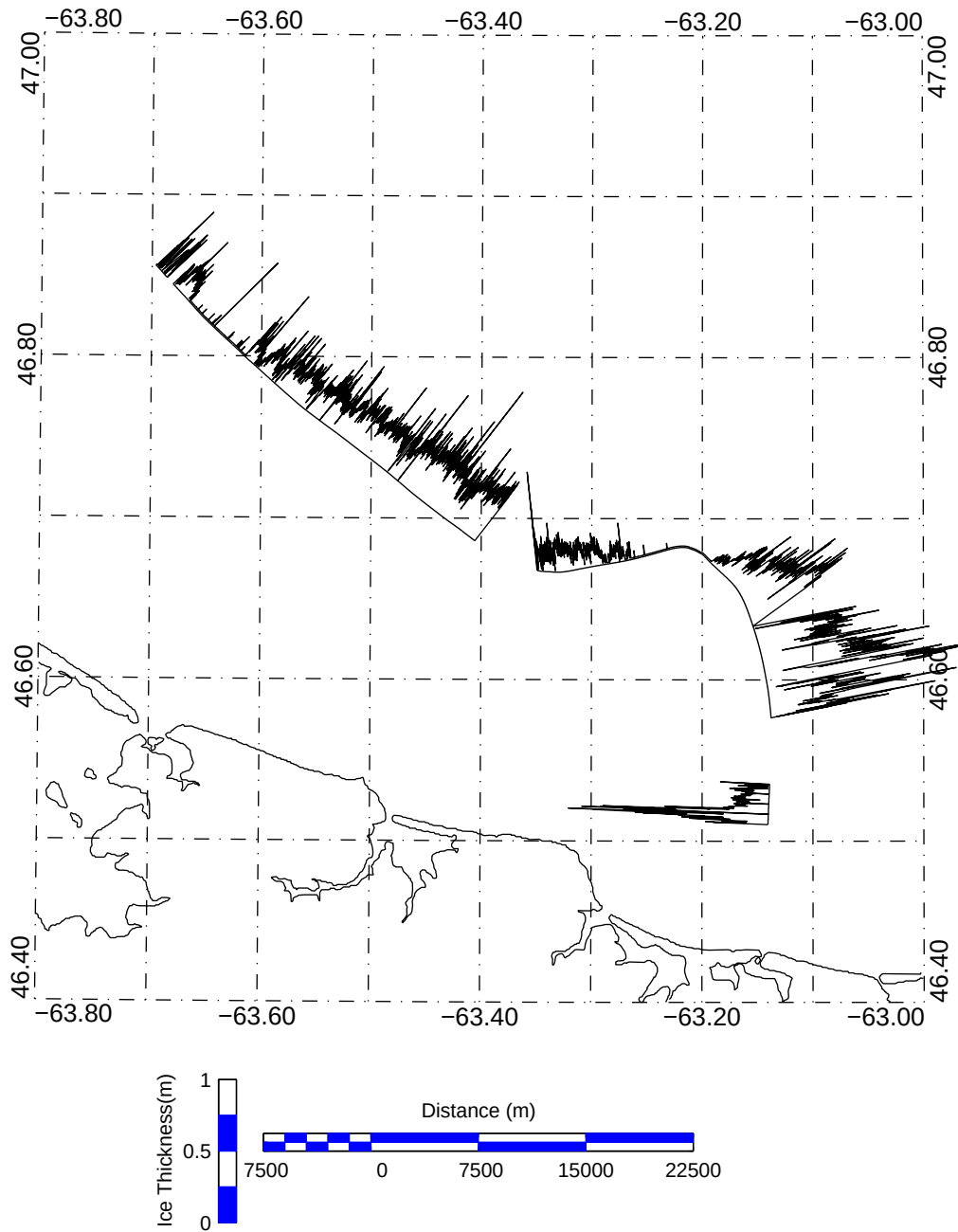


D-28

MARCH 24, 1998 FLIGHT 82

Lambert Conic Proj., Center Long.: -63.14, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/0.5 m, Map Scale 1:500000

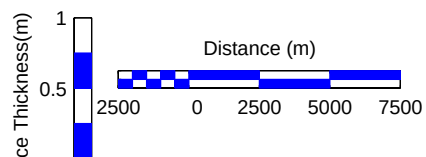
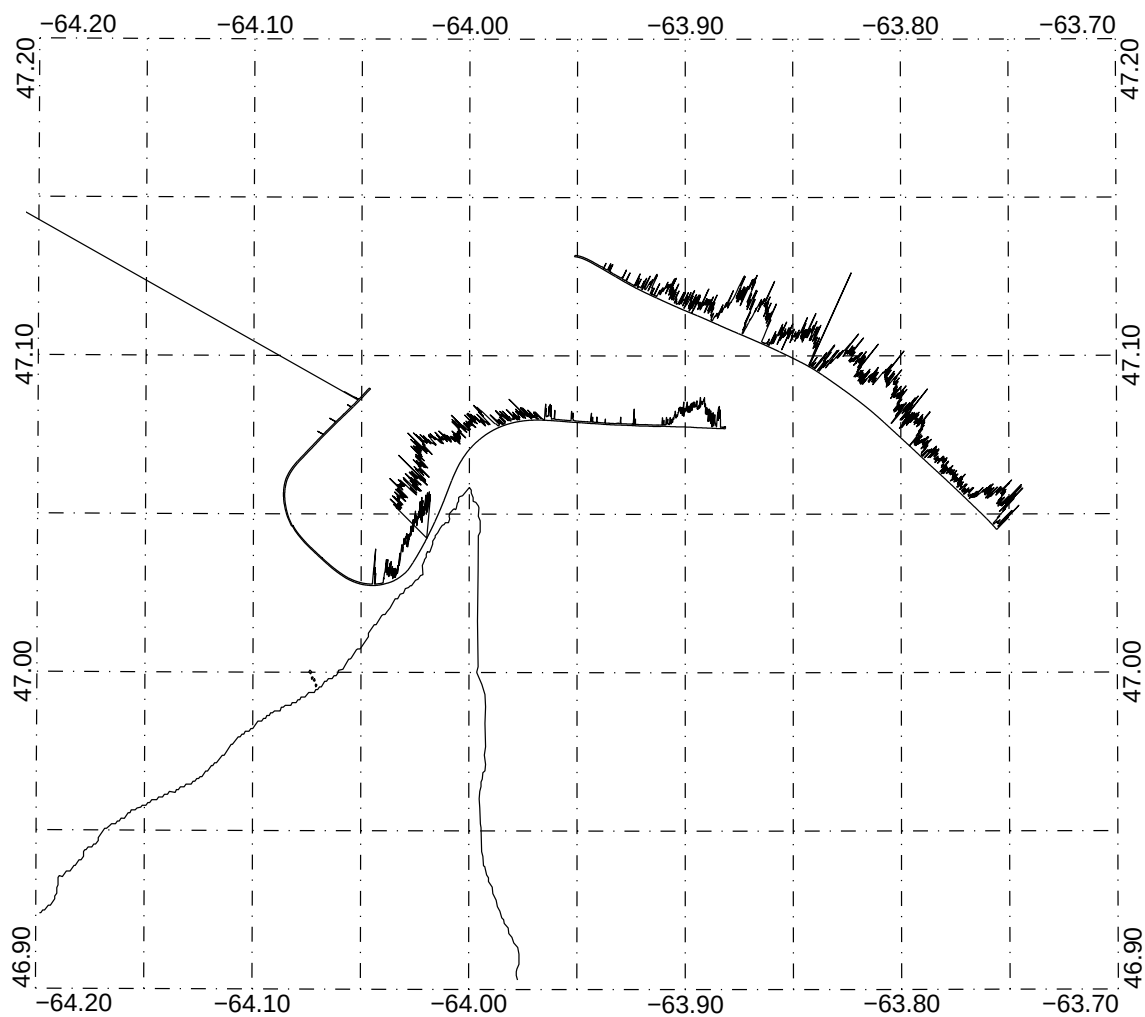


D-29

MARCH 24, 1998 FLIGHT 83

Lambert Conic Proj., Center Long.: -63.90, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/0.5 m, Map Scale 1:250000

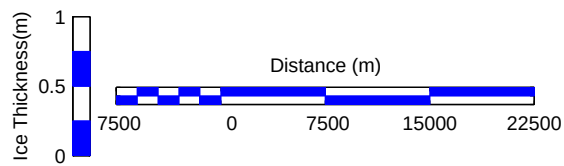
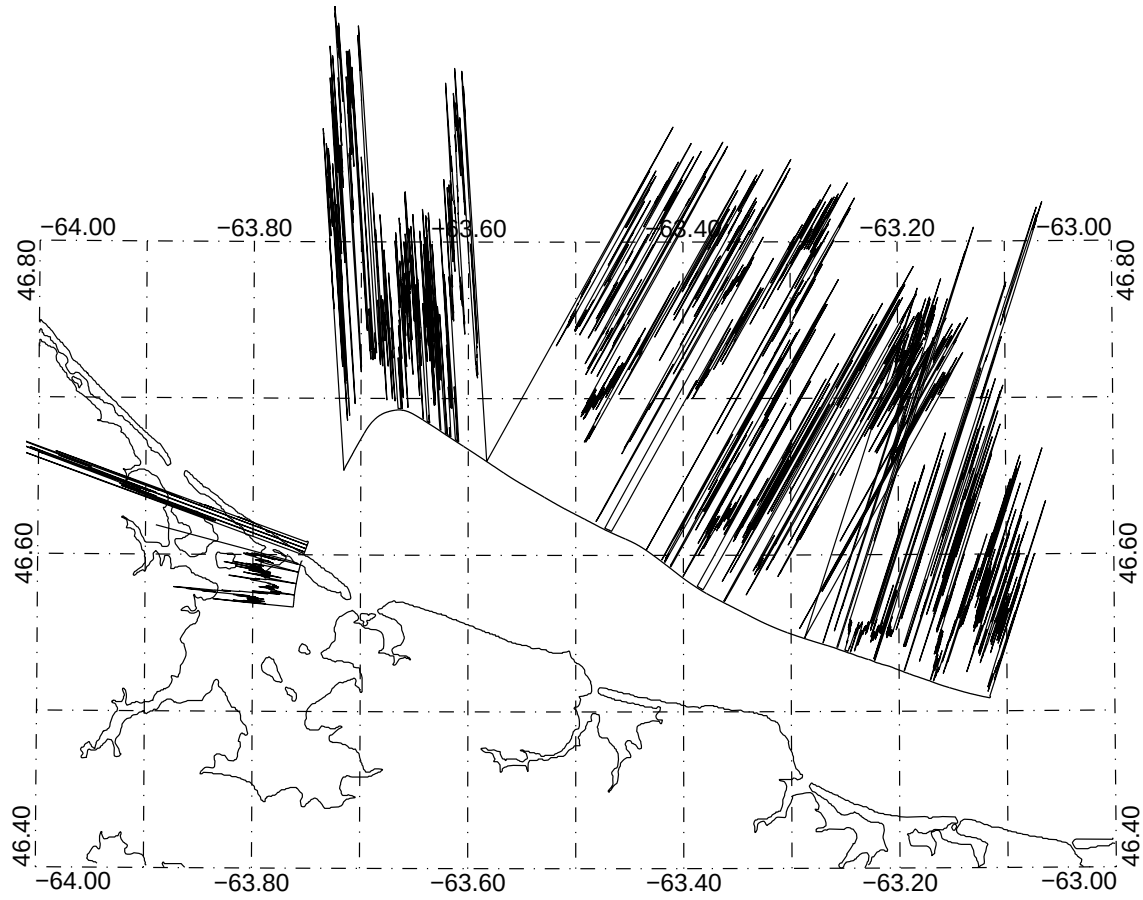


D-30

MARCH 24, 1998 FLIGHT 85

Lambert Conic Proj., Center Long.: -63.50, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/0.5 m, Map Scale 1:500000



D-31

MARCH 24, 1998 FLIGHT 86

Lambert Conic Proj., Center Long.: -62.97, Lat1 49.00, Lat2 77.00

Ice Thickness 1 cm/0.5 m, Map Scale 1:100000

