Document Control

Document Version	Author(s)	Date	Comments
1.0	Claire Herbert	20 Feb 2019	Initial draft
1.1	Claire Herbert	24 Sept 2010	Revised deployment and site tables
1.2	Claire Herbert	10 Oct 2019	Modified relationship tables. Added Cite as.
1.3	Claire Herbert	22 Jan 2020	Modified data fields
1.4	Claire Herbert	30 Jan 2020	Modified processing description

Deployment Information

Campaign Name	Platform Type	Start Date	End Date	Deployment	Coordinated (Dataset) Platform Deployment
2017 Churchill River and Mobile Ice Survey	Helicopter	2017-02-01	2017-02-15	BaySys Winter 2017	
2018 Hudson Bay Amundsen	Helicopter	2018-05-31	2018-07-01	Amundsen Leg 1, 2018	

Site Information

All stations/sites are type ice floe. Site IDs are only available for 2018 Hudson Bay Amundsen Ice Beacons, and not the 2017 Churchill River and Mobile Ice Survey.

Ice Beacons in this Series

Table 1. Identifiers and Deployment Information of Ice Beacons

Dataset Name	IMEI*	Deployment	Site ID	Starting Coordinates Measured by Beacon	Deployment Date	End Date
1.csv	601230	BaySys Winter 2017		59.02523, -93.35263	2017-02-08	2017-02-22
2.csv	509530	BaySys Winter 2017		59.07119, -93.06435	2017-02-09	2017-04-24
3.csv	209070	BaySys Winter 2017		59.28362, -92.68871	2017-02-10	2017-03-08
4.csv	608210	BaySys Winter 2017		58.86944, -93.25067	2017-02-08	2017-02-21
5.csv	501220	BaySys Winter 2017		59.07685, -93.1979	2017-02-09	2017-03-07
6.csv	207990	BaySys Winter 2017		59.01509, -93.16666	2017-02-09	2017-02-21
7.csv	506510	BaySys Winter 2017		58.91716, -93.38368	2017-02-08	2017-05-12
8.csv	003430	BaySys Winter 2017		59.31783, -93.09488	2017-02-12	2017-06-16
9.csv	505510	BaySys Winter 2017		59.0579, -93.03508	2017-02-12	2017-03-08
10.csv	204080	BaySys Winter 2017		59.17439, -93.20157	2017-02-12	2017-03-04
11.csv	609220	BaySys Winter 2017		59.20603, -92.84424	2017-02-10	2017-03-21
12.csv	301440	BaySys Winter 2017		59.21443, -92.69659	2017-02-10	2017-03-08
14.csv	207980	BaySys Winter 2017		59.31762, -93.09439	2017-02-12	2017-06-28
15.csv	306190	BaySys Winter 2017		59.07847, -92.10976	2017-02-07	2017-02-22
16.csv	608220	BaySys Winter 2017		58.97341, -93.38482	2017-02-08	2017-03-08
CT.csv	906880	BaySys Winter 2017		59.32814, -92.90887	2017-02-13	2017-03-27
17.csv	607220	Amundsen Leg 1, 2018	IB17	58.61729, -89.57683	2018-06-18	2018-07-14
19.csv	206980	Amundsen Leg 1, 2018	IB19	57.72522, -88.05737	2018-06-19	2018-07-29

23.csv	503520	Amundsen Leg 1, 2018	IB23	57.12653, -88.35158	2018-06-19	2018-08-01
13.csv	504190	Amundsen Leg 1, 2018	IB13	56.60985, -87.08107	2018-06-20	2018-07-29
21.csv	300430	Amundsen Leg 1, 2018	IB21	54.40994, -85.89129	2018-06-21	2018-07-23
26.csv	908870	Amundsen Leg 1, 2018	IB26	56.10707, -84.56303	2018-06-21	2018-07-27
25.csv	907730	Amundsen Leg 1, 2018	IB25	57.87995, -84.22141	2018-06-22	2018-08-03
18.csv	201080	Amundsen Leg 1, 2018	IB18	58.29801, -87.60599	2018-06-22	2018-07-19
20.csv	300000	Amundsen Leg 1, 2018	IB20	59.26393, -87.99193	2018-06-23	2018-07-27
22.csv	300440	Amundsen Leg 1, 2018	IB22	58.79762, -84.22619	2018-06-23	2018-08-01

*The IMEI each of ice beacon begins with 300134010. This table shows the unique last 6 digits.

Collection and Analysis Procedures

Sample Collection Method Name*	BaySys Winter 2017 Solara Communications Ice Beacon protocol
Method Link	http://lwbin-datahub.ad.umanitoba.ca/dataset/baysys-reports/resource/04c01137-85bd-47c0-b1da-364efe70e4c5
Method Summary	To measure sea ice drift 14 ice beacons built by Solara Communications and David Babb. The beacons are enclosed within a 20" long tube comprised of 6" internal diameter Drain Water Ventilation PVC (DWV-PVC) with a sealed cap at the bottom end and a waterproof screw on cap at the upper end. An internal frame comprised of acrylic rods and PVC sheets houses the batteries and iridium/GPS unit. The beacon is deployed into a 10-12" deep 8" auger hole that anchors the beacon in the ice and keeps the batteries partially insulated from extreme air temperatures.
Analytical Method Name*	BaySys Winter 2017 Ice Beacon Iridium Communications Network protocol
Analytical Method Link	http://lwbin-datahub.ad.umanitoba.ca/dataset/baysys-reports/resource/04c01137-85bd-47c0-b1da-364efe70e4c5
Analytical Method Summary	The ice beacons simply transmit their GPS location every hour to an online data portal, allowing us to track the drift of individual ice floes and the relative drift of ice beacons deployed in pairs or in arrays. Live data can be accessed through the Solara online data portal where the transmission frequency can also be adjusted.
Analytical Laboratory Name	Solara Communications

Sample Collection Method Name*	Amundsen Leg 1 Ice Beacon Solara Communications Ice Beacon protocol
Method Link	http://lwbin-datahub.ad.umanitoba.ca/dataset/baysys-reports/resource/04c01137-85bd-47c0-b1da-364efe70e4c5
Method Summary	To measure sea ice drift 10 ice beacons built by Solara Communications and David Babb were deployed on large ice floes in central and southern Hudson Bay. Ice Beacons are contained within sealed PVC tubes (13 cm diameter x 50 cm length) that house a small processor, GPS and Iridium antennae, and a battery pack. The ice beacons transmit their location until the ice floe breaks up and they sink.
Analytical Method Name*	Amundsen Leg 1 Ice Beacon Iridium Communications Network protocol
Analytical Method Link	http://lwbin-datahub.ad.umanitoba.ca/dataset/baysys-reports/resource/04c01137-85bd-47c0-b1da-364efe70e4c5
Analytical Method Summary	Once the units are activated they transmit their GPS location at user-defined intervals (typically 1 hour) to an online web portal.
Analytical Laboratory Name	Solara Communications

Processing Description

Not applicable.

CanWIN Data Cleaning Notes

The data was cleaned/processed using the script “Process_Ice_beacon_files.py” written by Victory Iyakoregha. The script is accessible at: https://cwincloud.cc.umanitoba.ca/canwin/scripts/-/tree/master/Ice_Beacon

Summary:

- The columns “id”, “serial”, “message”, “hdop”, “pdop”, “speed”, “altitude”, and “heading” were stripped from the raw Amundsen ice beacon files.
- The distance and speed of the ice beacon were calculated using python functions calc_distance() and calc_speed()

Variable Detection Limits

Not applicable.

Instruments

CanWIN Instrument Name*	Ice Drift Beacon
Common Name	Ice Beacon – Solara Communications and David Babb
Activity Collection Type*	**Field Measurement/Observation - Portable Data Logger**
Variables Measured with units in brackets (e.g. Nitrogen (mg/L)*	Latitude (decimal degrees) Longitude (decimal degrees)
Additional Comments	

Instrument/Result Data Parameters*

Define the column headings in your dataset, and supply a human readable name if the header name is a shortform

Header	Description	Units	CanWIN Variable Name	Result Value Type	Result Value Qualifier	Formula or script applied	Statistic Applied
Beacon_ID	The beacon ID consists of the beacon name followed by CEOS, then 300134010, and the IMEI	None	Beacon_ID	Actual	None.	None	None
Latitude	Latitude of the ice beacon	Decimal degrees	latitude_DD	Actual			
Longitude	Longitude of the ice beacon	Decimal degrees	longitude_DD	Actual			
Timestamp	Time from the logger time base. Excel date time stamp.	YYYY/MM/DD HH:MM:SS	UT_ISO8601	Actual			
Battery Voltage	Operating battery voltage of the ice beacon	Volts	battery_voltage	Actual			
Internal Temperature	Internal temperature of the ice beacon	Degrees Celsius	internal_temperature	Actual			
distance_calculated_metres	The total distance travelled by the ice beacon from activation	Metres	distance_m	Calculated		See CanWIN Data Cleaning Notes section for python script.	
speed_calculated_m/s	The average speed of the ice beacon between logs	Metres per second	Speed_m_s	Calculated			

Table 1. Result Value Qualifier

CanWIN Short Code	Definition	User Code
$	Incorrect sample container	
EFAI	Equipment failure, sample lost	
FEF	Field equipment failed	
FEQ	Field Equipment Questionable	
FFB	Failed. Field blank not acceptable	
FFD	Field Duplicate, failed	
FFS	Failed. Field spike not acceptable	

H	Holding time exceeded	
ISP	Improper Sample Preservation	
ITNA	Incubation time not attained	
ITNM	Incubation temperature not maintained	
JCW	Sample Container Damaged, sample lost	
NC	Not Collected	
ND	Not detected	
NR	Sample taken/measured on site but information in this field not collected	
NS	Sample collected but not submitted	
OC	Master Coordinate List Used	
P	Analysis requested and result pending	

Table 2. Statistics applied options

Statistics Applied	Description
30DADMean	Thirty day average daily mean
7DADM	Seven Day Average Daily Maximum
7DADMean	Seven day average daily mean
7DADMin	Seven day average daily minimum
Coefficient of variation	
Daily Geometric Mean	Calculating a geometric mean (a daily period) provides a number that is more representative of the median and helps reduce the effect of a few extreme values.
Daily Maximum	The largest value of a set, each period of a day cycle
Daily Minimum	The smallest value of a set, each period of a day cycle
Hourly Maximum	The largest value of a set, each period of a hour cycle
Hourly Minimum	The smallest value of a set, each period of a hour cycle
MatLab script	Provide MatLab script or link to script
Mean	mean is the sum of all the numbers in the set divided by the amount of numbers in the set
Median	median is the middle point of a number set, in which half the numbers are above the median and half are below.
None	None
R script	Provide R script or link to script
Standard Deviation	This describes the spread of values in the sample