



Environment and  
Climate Change Canada

Environnement et  
Changement climatique Canada

# Annual Arctic Ice Atlas

Winter 2015-2016

By



Canadian Ice Service  
Le service canadien des glaces

## Foreword

The 2015-2016 Annual Arctic Ice Atlas is part of a continuing series, prepared each year by the Canadian Ice Service since 1990. This collection of atlases documents Canadian Arctic winter sea ice conditions to provide a comparison from year to year. In this year's atlas, graphical depictions of the winter ice conditions primarily based on Synthetic Aperture Radar (SAR) data are presented.

The SAR data used in the compilation of the image mosaics in this year's atlas came from the RADARSAT-2 satellite. The data was captured by the Prince Albert (Saskatchewan) and Gatineau (Quebec) receiving stations, between January 29th and February 1st, 2016.

In this edition of the atlas, the Arctic is divided up into five main regions and three larger-scale snapshot regions. All of the regions have a SAR image mosaic, but three of the main regions (the Eastern Arctic, the Western Arctic, and Hudson Bay) also include an analysis of the data. The ice analyses were created by Environment and Climate Change Canada's Canadian Ice Service (CIS) personnel, who used additional supporting information (including meteorological summaries, ice thickness reports and NOAA AVHRR imagery) in their preparation. An explanation of the nomenclature on the analysis charts can be found on the Sea Ice Symbols page. A more detailed explanation of the terminologies used is available in the Revised Ninth Edition of MANICE (Manual of Standard Procedures for Observing and Reporting Ice Conditions), prepared by the Canadian Ice Service of Environment and Climate Change Canada.

The production of this year's atlas involves an automated algorithm developed by CIS staff which was utilized to: apply radiometric enhancements to the input images; stitch the overlapping images into a seamless mosaic; and then colour-balance the final output. The mosaicked images now display "dual-polarization" imagery consisting of horizontal transmit / horizontal receive ("HH") as well as horizontal transmit / vertical receive ("HV"). Generally speaking, and for discussion purposes here, varying polarizations in SAR data are akin to the spectral bands in an optical image (e.g. LANDSAT).

In order to display the dual-polarized imagery, the mosaicked imagery is presented in colour. The output consists primarily of yellow and purple hues by assigning the following polarization combinations to the RGB colour spectrum: Red = HH, Green = HH, and Blue = HV. During the winter months the horizontal transmit / vertical receive (HV) tends to highlight areas of second-year / multi-year ice as well as areas of roughness which appear as areas of blue to purple in the mosaic.

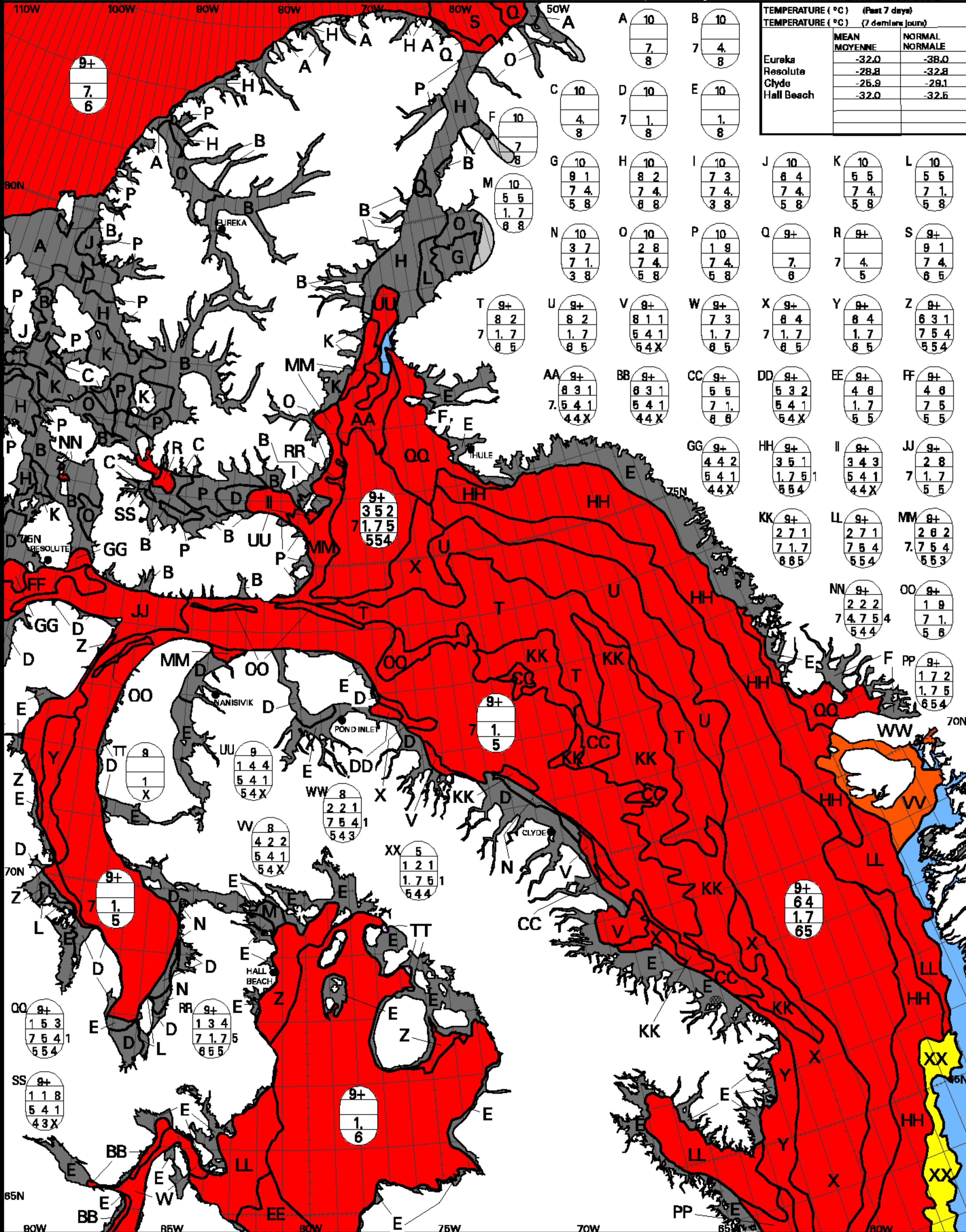
For most regions, the SAR image mosaic is a composite of satellite images captured over several days. In some instances older or newer data was used to substitute for small areas of missing data. The period over which the data was

acquired is noted on each page. For all areas, the SAR data were captured at a resolution of 50 metres / pixel, the data were analyzed at approximately 100 metres / pixel and the published image mosaics were resampled to approximately 500 metres / pixel.

All the RADARSAT-2 images contained in this atlas were processed by and are the property of the MacDonal, Dettwiler, and Associates Ltd. (MDA), and are copyright © MDA 2015 - All Rights Reserved. RADARSAT is an official mark of the Canadian Space Agency. All data acquired for this atlas has been archived by the Canada Centre for Mapping and Earth Observation (CCMEO). This atlas has been published with the permission of MDA.

The successful completion of this project was made possible with the able assistance of many people. The following contributions should be noted:

- Project Manager: Steve McCourt (CIS)
- RADARSAT SAR data acquisition: MDA, Céline Fabi and Ryan Griffin (CIS)
- Mosaic production: Correy Schaad (CIS)
- Mosaic algorithm: Yi Luo (CIS)
- Image analysis: Benoit Montpetit / Stéphanie Tremblay-Therrien, Bradley Drummond, Jason Ross (CIS)



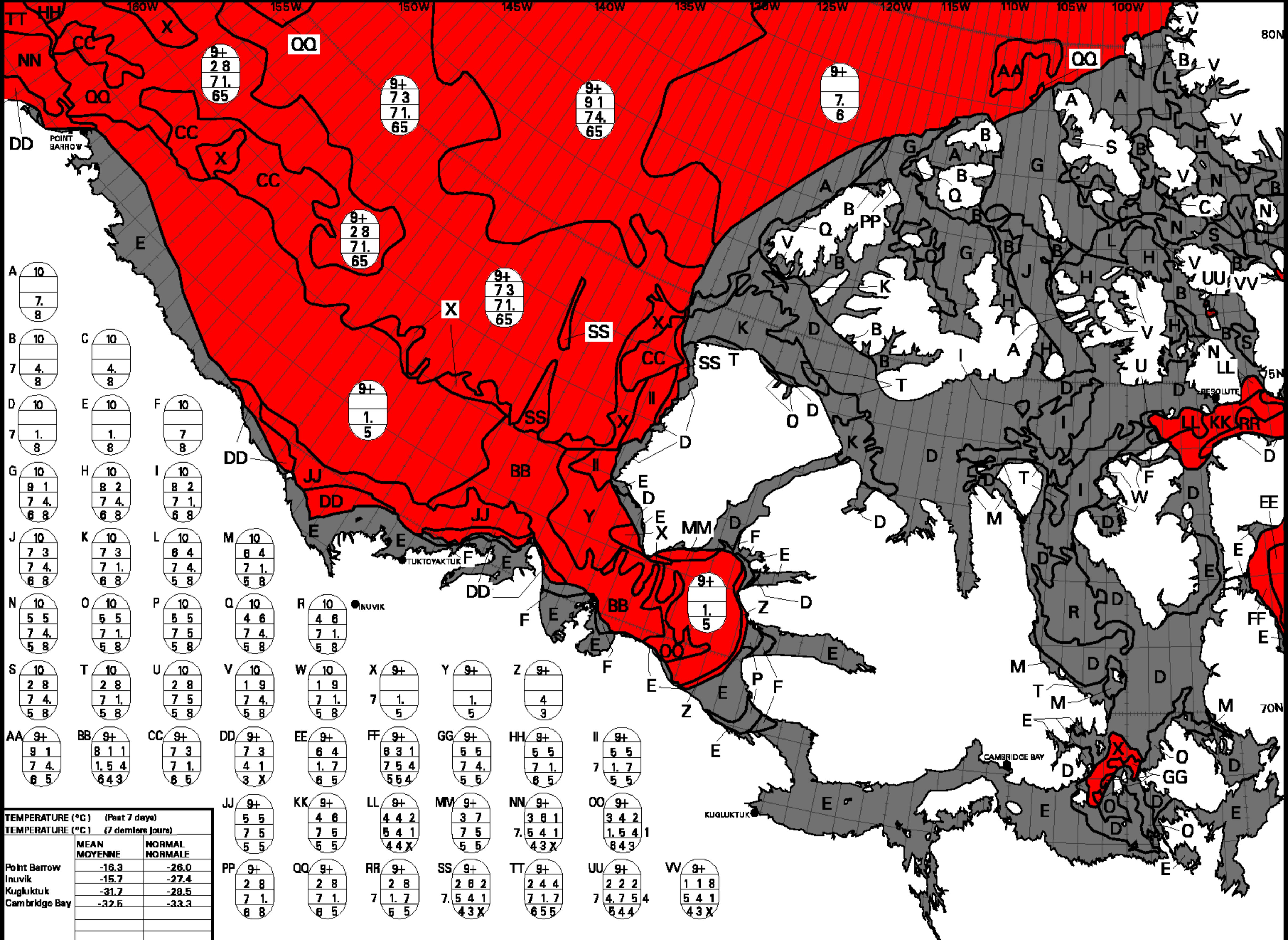
TEMPERATURE (°C) (Past 7 days)		
TEMPERATURE (°C) (7 derniers jours)		
	MEAN MOYENNE	NORMAL NORMALE
Eureka	-32.0	-38.0
Resolute	-28.8	-32.8
Clyde	-25.9	-29.1
Hall Beach	-32.0	-32.6

Location	Temperature (°C) (Past 7 days)	Temperature (°C) (7 derniers jours)
A	10 7 8	10 7 8
B	10 7 8	10 7 8
C	10 4 8	10 4 8
D	10 7 1 8	10 7 1 8
E	10 7 4 8	10 7 4 8
F	10 7 8	10 7 8
G	10 9 7 5 8	10 8 7 6 8
H	10 8 7 8	10 8 7 8
I	10 7 7 3 8	10 7 7 3 8
J	10 6 7 5 8	10 6 7 5 8
K	10 5 7 5 8	10 5 7 5 8
L	10 5 7 5 8	10 5 7 5 8
M	10 5 1 7 8	10 5 1 7 8
N	10 3 7 7 3 8	10 3 7 7 3 8
O	10 2 7 5 8	10 2 7 5 8
P	10 1 7 5 8	10 1 7 5 8
Q	9+ 7 8	9+ 7 8
R	9+ 7 5	9+ 7 5
S	9+ 9 7 6 5	9+ 9 7 6 5
T	9+ 8 7 6 5	9+ 8 7 6 5
U	9+ 8 1 5 4 8	9+ 8 1 5 4 8
V	9+ 8 5 4 X	9+ 8 5 4 X
W	9+ 7 1 8	9+ 7 1 8
X	9+ 6 7 6 5	9+ 6 7 6 5
Y	9+ 8 1 6 5	9+ 8 1 6 5
Z	9+ 6 7 5 4 5	9+ 6 7 5 4 5
AA	9+ 6 7 4 4 X	9+ 6 7 4 4 X
BB	9+ 6 5 4 4 X	9+ 6 5 4 4 X
CC	9+ 5 7 6 8	9+ 5 7 6 8
DD	9+ 5 5 4 4 X	9+ 5 5 4 4 X
EE	9+ 4 5 1 5 5	9+ 4 5 1 5 5
FF	9+ 4 7 5 5	9+ 4 7 5 5
GG	9+ 4 5 4 4 X	9+ 4 5 4 4 X
HH	9+ 3 5 1 5 4	9+ 3 5 1 5 4
II	9+ 3 4 3 4 4 X	9+ 3 4 3 4 4 X
JJ	9+ 2 7 1 7 5	9+ 2 7 1 7 5
KK	9+ 2 7 1 6 5	9+ 2 7 1 6 5
LL	9+ 2 7 1 5 4	9+ 2 7 1 5 4
MM	9+ 2 7 1 5 4	9+ 2 7 1 5 4
NN	9+ 2 2 2 4 4	9+ 2 2 2 4 4
OO	9+ 1 7 1 5 8	9+ 1 7 1 5 8
PP	9+ 1 7 2 1 5 4	9+ 1 7 2 1 5 4
QQ	9+ 1 7 5 6 5	9+ 1 7 5 6 5
RR	9+ 1 3 4 7 1 7 5	9+ 1 3 4 7 1 7 5
SS	9+ 1 1 8 5 4 1 4 3 X	9+ 1 1 8 5 4 1 4 3 X
TT	9+ 1 1 5 6	9+ 1 1 5 6
UU	9+ 1 4 4 5 4 1 5 4 X	9+ 1 4 4 5 4 1 5 4 X
VV	9+ 4 2 2 5 4 1 5 4 X	9+ 4 2 2 5 4 1 5 4 X
WW	9+ 2 2 1 7 5 4 1 5 4 3	9+ 2 2 1 7 5 4 1 5 4 3
XX	9+ 1 2 1 1 7 5 1 5 4 4	9+ 1 2 1 1 7 5 1 5 4 4
YY	9+ 1 5 3 7 5 4 1 5 5 4	9+ 1 5 3 7 5 4 1 5 5 4
ZZ	9+ 1 3 4 7 1 7 5 6 5 5	9+ 1 3 4 7 1 7 5 6 5 5

WMO Colour Code - Concentration

Code de couleurs de l'OMM - Concentration

Ice Free Libre de glace	1-3/10	7-8/10	New Ice Nouvelle glace	Fast Ice Banquise à ôtre
< 1/10	4-6/10	9-10/10	Nilas/Grey Ice Nilas/glace grise	Ice Shelf Plateau de glace
			Undefined Indéterminé	



A	10	7	8	B	10	4	8	C	10	4	8	D	10	1	8	E	10	1	8	F	10	7	8	G	10	9	1	7	4	6	8	H	10	8	2	7	4	6	8	I	10	8	2	7	1	6	8	J	10	7	3	7	4	6	8	K	10	7	3	7	1	6	8	L	10	6	4	7	4	5	8	M	10	6	4	7	1	5	8	N	10	5	5	7	4	5	8	O	10	5	5	7	1	5	8	P	10	5	5	7	5	5	8	Q	10	4	6	7	4	5	8	R	10	4	6	7	1	5	8	S	10	2	8	7	4	5	8	T	10	2	8	7	1	5	8	U	10	2	8	7	5	5	8	V	10	1	9	7	4	5	8	W	10	1	9	7	1	5	8	X	9+	7	1	5	Y	9+	1	5	Z	9+	4	3	AA	9+	9	1	7	4	6	5	BB	9+	8	1	1	1	5	4	6	4	3	CC	9+	7	3	7	1	6	5	DD	9+	7	3	4	1	3	X	EE	9+	6	4	1	7	8	5	FF	9+	6	3	1	7	5	4	5	5	4	GG	9+	5	5	7	4	5	5	HH	9+	5	5	7	1	6	5	II	9+	5	5	7	1	7	5	5	JJ	9+	5	5	3	X	KK	9+	4	6	4	4	2	LL	9+	4	4	2	5	4	1	4	4	X	MM	9+	3	7	7	5	5	NN	9+	3	6	1	7	5	4	1	4	3	X	OO	9+	3	4	2	1	5	4	1	6	4	3	PP	9+	2	8	2	2	2	2	2	2	2	QQ	9+	2	8	7	1	7	1	7	4	7	5	4	RR	9+	2	8	7	1	7	5	4	1	5	4	4	SS	9+	2	8	2	2	2	2	2	2	2	2	2	TT	9+	2	4	4	7	1	7	6	5	5	UU	9+	2	2	2	2	2	2	2	2	2	2	2	VV	9+	1	1	8	5	4	1	4	3	X	WW	9+	1	1	8	5	4	1	4	3	X
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TEMPERATURE (°C) (Past 7 days)		
TEMPERATURE (°C) (7 derniers jours)		
	MEAN MOYENNE	NORMAL NORMALE
Point Barrow	-16.3	-26.0
Inuvik	-15.7	-27.4
Kugluktuk	-31.7	-29.5
Cambridge Bay	-32.6	-33.3

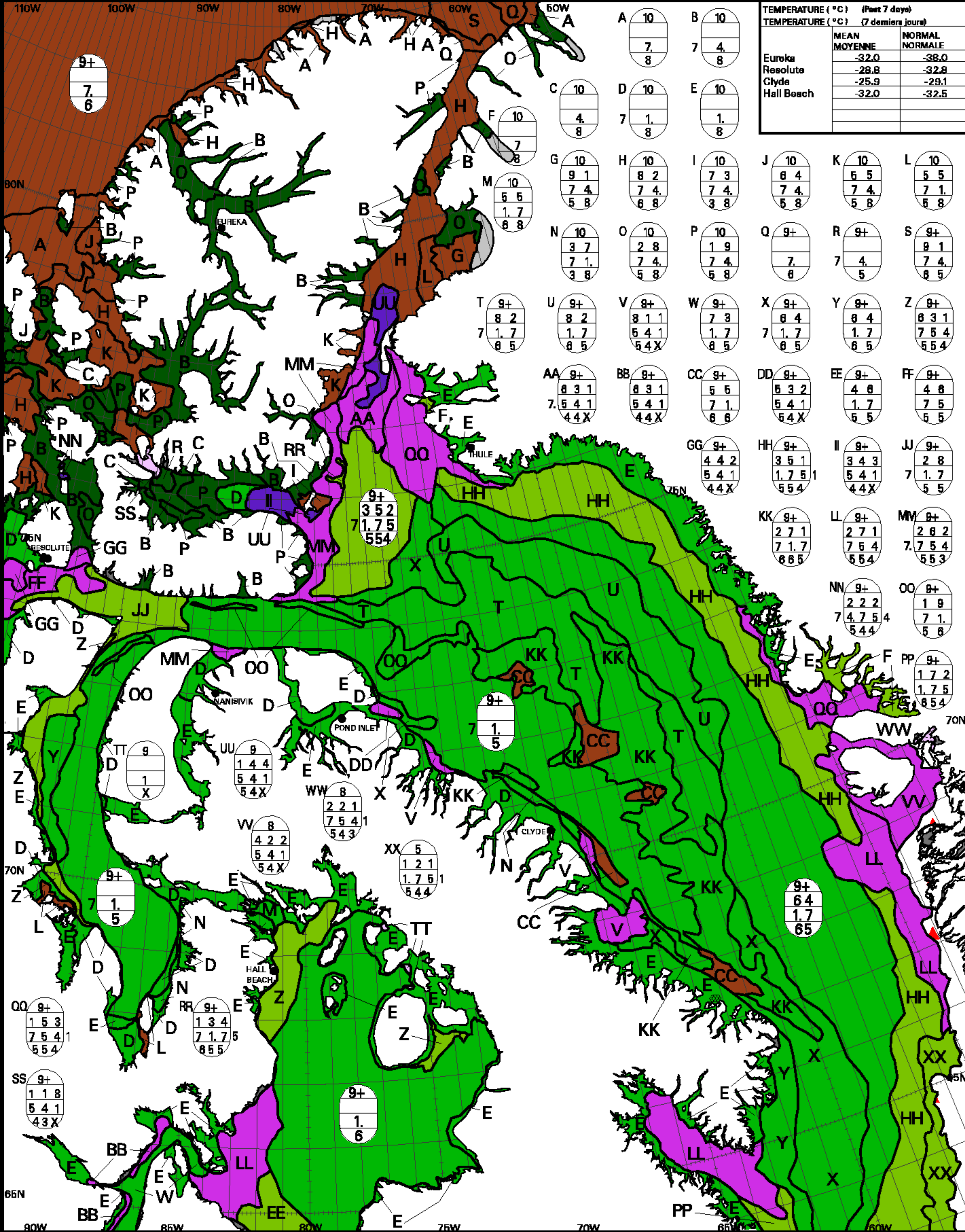
WMO Colour Code - Concentration

	Ice Free Libre de glace		1-3/10		7-8/10
	< 1/10		4-6/10		9-10/10

Code de couleurs de l'OMM - Concentration

	New Ice Nouvelle glace		Fast Ice Banquise côtière
	Nilas/Grey Ice Nilas/glace grise		Ice Shelf Plateau de glace
	Undefined Indéterminée		

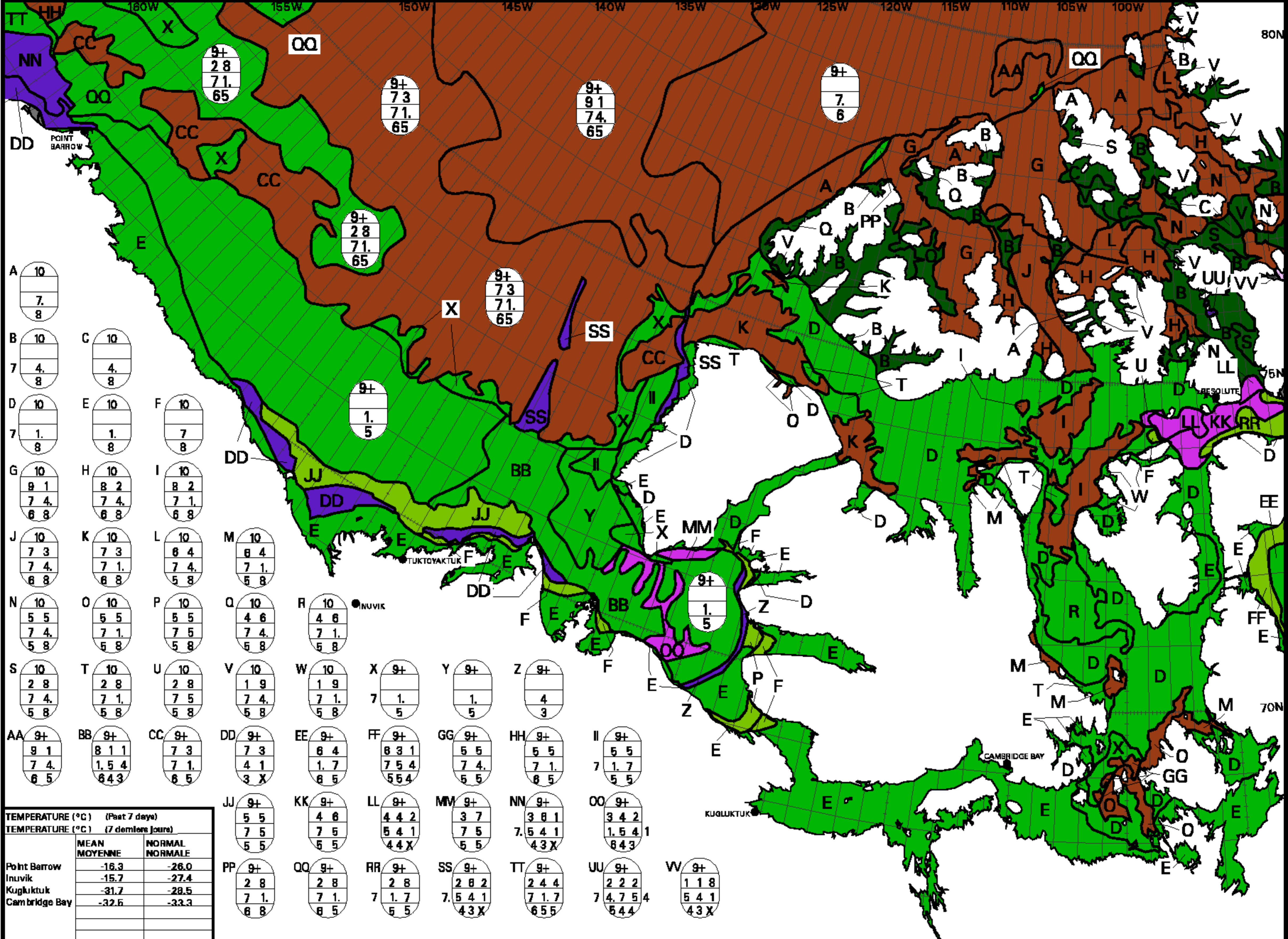




TEMPERATURE (°C) (Past 7 days)	
TEMPERATURE (°C) (7 derniers jours)	
MEAN MOYENNE	NORMAL NORMALE
Eureka	-32.0 / -38.0
Resolute	-28.8 / -32.8
Clyde	-25.9 / -29.1
Hall Beach	-32.0 / -32.5

A	10	B	10
C	10	D	10
E	10	F	10
G	10	H	10
I	10	J	10
K	10	L	10
M	10	N	10
O	10	P	10
Q	9+	R	9+
S	9+	T	9+
U	9+	V	9+
W	9+	X	9+
Y	9+	Z	9+
AA	9+	BB	9+
CC	9+	DD	9+
EE	9+	FF	9+
GG	9+	HH	9+
II	9+	JJ	9+
KK	9+	LL	9+
MM	9+	NN	9+
OO	9+	PP	9+
QQ	9+	RR	9+
SS	9+	TT	9
UU	9	VV	9
WW	8	XX	5
YY	9+	ZZ	9+

WMO Colour Code - Stage of Development			Code de couleurs de l'OMM - Stade de formation						
	Ice Free Libre de glace		New Nouvelle		Thin First-year Mince de première année		Old ice Vieille glace		Undefined Fast Ice Indéfini Banquise c. étère
	Open Water Eau Libre		Grey Grise		Medium First-year Moyenne de première année		Second-year Deuxième année		Ice Shelf Plateau de glace
	Iceberg		First-year Première année		Thick First-year Épaisse de première année		Multi-year Plusieurs années		Undefined Indéterminée



A	10	7	8	B	10	4	8	C	10	4	8	D	10	1	8	E	10	1	8	F	10	7	8	G	10	9	1	7	4	6	8	H	10	8	2	7	4	6	8	I	10	8	2	7	1	6	8	J	10	7	3	7	4	6	8	K	10	7	3	7	1	6	8	L	10	6	4	7	4	5	8	M	10	6	4	7	1	5	8	N	10	5	5	7	4	5	8	O	10	5	5	7	1	5	8	P	10	5	5	7	5	5	8	Q	10	4	6	7	4	5	8	R	10	4	6	7	1	5	8	S	10	2	8	7	4	5	8	T	10	2	8	7	1	5	8	U	10	2	8	7	5	5	8	V	10	1	9	7	4	5	8	W	10	1	9	7	1	5	8	X	9+	7	1	5	Y	9+	1	5	Z	9+	4	3	AA	9+	9	1	7	4	6	5	BB	9+	8	1	1	1	5	4	6	4	3	CC	9+	7	3	7	1	6	5	DD	9+	7	3	4	1	3	X	EE	9+	6	4	1	7	8	5	FF	9+	8	3	1	7	5	4	5	5	4	GG	9+	5	5	7	4	5	5	HH	8+	5	5	7	1	6	5	II	9+	5	5	7	1	7	5	5	JJ	9+	5	5	7	5	5	5	KK	9+	4	6	7	5	5	5	LL	9+	4	4	2	5	4	1	4	4	X	MM	9+	3	7	7	5	5	5	NN	9+	3	8	1	7	5	4	1	4	3	X	OO	9+	3	4	2	1	5	4	1	8	4	3	PP	9+	2	2	2	7	4	7	5	4	4	QQ	9+	2	8	7	1	7	1	7	6	5	5	RR	9+	2	8	7	1	7	5	4	1	4	3	X	SS	9+	2	8	2	5	4	1	4	3	X	TT	9+	2	4	4	7	1	7	6	5	5	UU	9+	2	2	2	4	7	5	4	4	VV	9+	1	1	8	5	4	1	4	3	X
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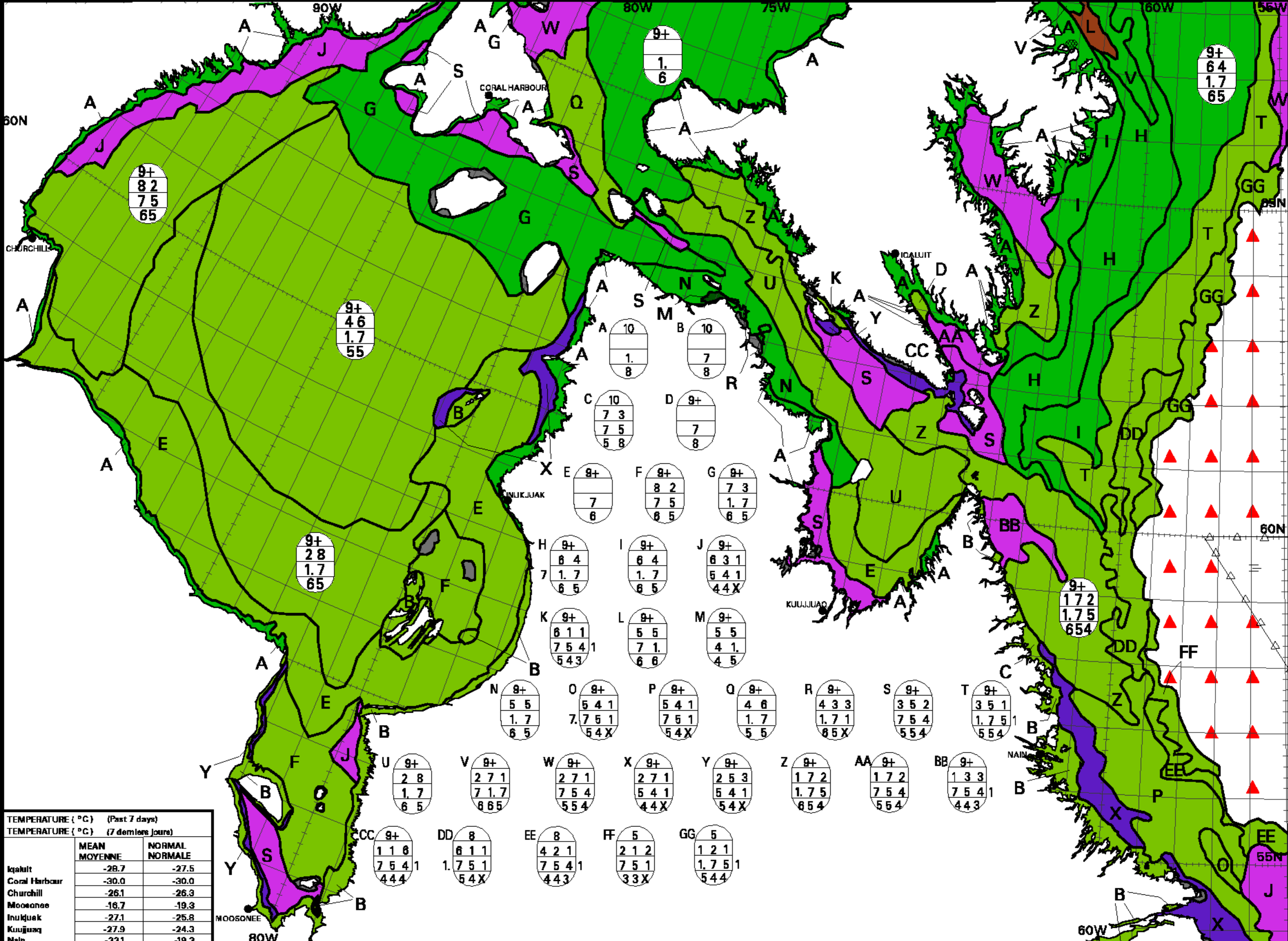
TEMPERATURE (°C) (Past 7 days)	MEAN	NORMAL
TEMPERATURE (°C) (7 derniers jours)	MOYENNE	NORMALE
Point Barrow	-16.3	-26.0
Inuvik	-15.7	-27.4
Kugluktuk	-31.7	-28.5
Cambridge Bay	-32.6	-33.3

WMO Colour Code - Stage of Development

Code de couleurs de l'OMM - Stade de formation

Ice Free Libre de glace	Open Water Eau Libre	Icebergs	New Nouvelle	Grey Grise	Grey-white Blanchâtre	First-year Première année	Thin First-year Mince de première année	Medium First-year Moyenne de première année	Thick First-year Épaisse de première année	Old ice Vieille glace	Second-year Deuxième année	Multi-year Plusieurs années	Undefined Fast Ice Indéfini Banquise côtière	Ice Shelf Plateau de glace	Undefined Indéterminée
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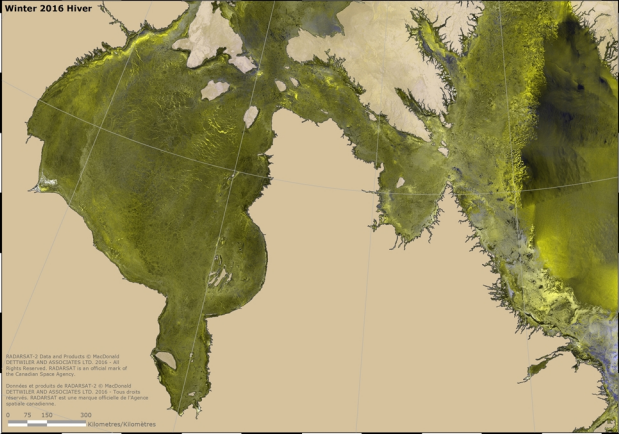
	TEMPERATURE ( °C ) (Past 7 days)	
	TEMPERATURE ( °C ) (7 derniers jours)	
	MEAN MOYENNE	NORMAL NORMALE
Iqaluit	-28.7	-27.5
Coral Harbour	-30.0	-30.0
Churchill	-26.1	-26.3
Moosonee	-16.7	-19.3
Inukjuak	-27.1	-25.8
Kuujuaq	-27.9	-24.3
Nain	-22.1	-19.3

WMO Colour Code - Stage of Development

Code de couleurs de l'OMM - Stade de formation

Ice Free Libre de glace	New Nouvelle	Grey-white Blanchâtre	Thin First-year Mince de première année	Old Ice Vieille glace	Undefined Fast Ice Indéfini Banquise c. brisée
Open Water Eau Libre	Grey Grise	First-year Première année	Medium First-year Moyenne de première année	Second-year Deuxième année	Multi-year Plusieurs années
Iceberg			Thick First-year Épaisse de première année		Undefined Indéterminée

100°W 90°W 80°W 70°W 60°W 50°W



Hudson Bay - Baie d'Hudson

01/29/2016 - 02/01/2016

Canada

80°W 70°W 60°W 50°W 40°W 30°W

Winter 2016 Hiver

0 50 100 200

Kilometres/Kilomètres

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spatiale canadienne.

80°N

75°N

70°N

80°N

75°N

70°N

90°W

80°W

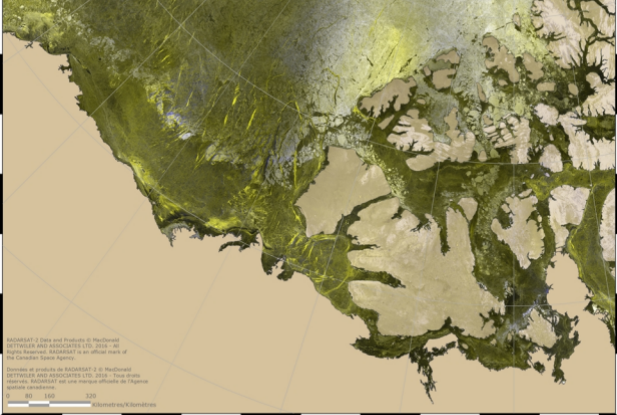
70°W

Eastern Arctic - Arctique de l'Est

01/29/2016 - 02/01/2016

Canada

Winter 2016 Hiver



Western Arctic - Arctique de l'Ouest

01/29/2016 - 02/01/2016

70°W

60°W

50°W

40°W

Winter 2016 Hiver

0 25 50 100

Kilometres/Kilomètres

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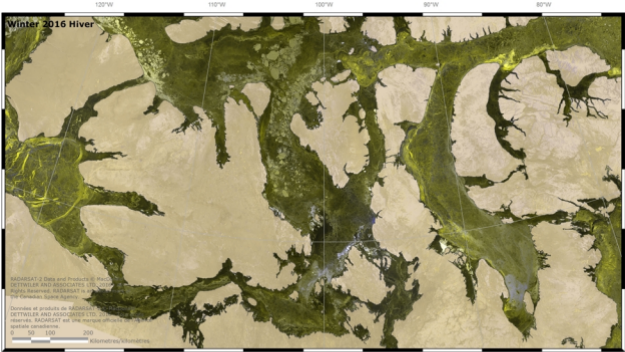
80°N

70°N

## Nares Strait - Détroit de Nares



01/29/2016 - 02/01/2016



**Canadian Northwest Passage - Passage du Nord-Ouest Canadien**



01/29/2016 - 02/01/2016

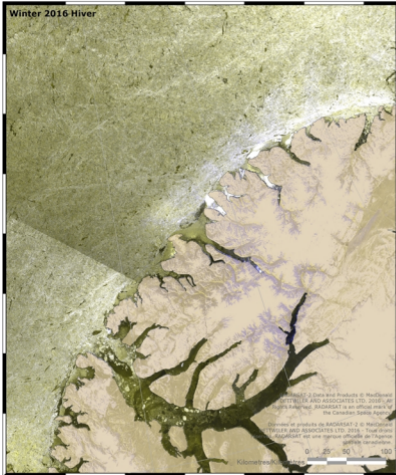
90°W

80°W

70°W

60°W

Winter 2016 Hiver



90°W

80°W

## Canadian Ice Shelves Plateaux des glaces canadiens



80°N

01/29/2016 - 02/01/2016

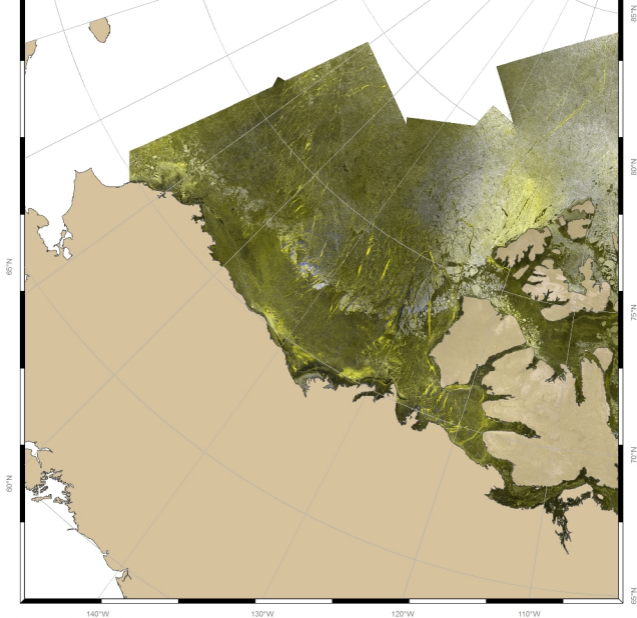
Canada

Winter 2016 Hiver

0 100 200 400  
Kilometres/Kilomètres

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140°W 130°W 120°W 110°W  
**Met Area 17**

01/29/2016 - 02/01/2016



150°E 10°E

# Winter 2016 Hiver

Kilomètres/Kilomètres 0 100 200 400

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80°N  
80°N  
75°N  
70°N

70°N  
65°N  
60°N

100°W 90°W 80°W 70°W

**Met Area 18**

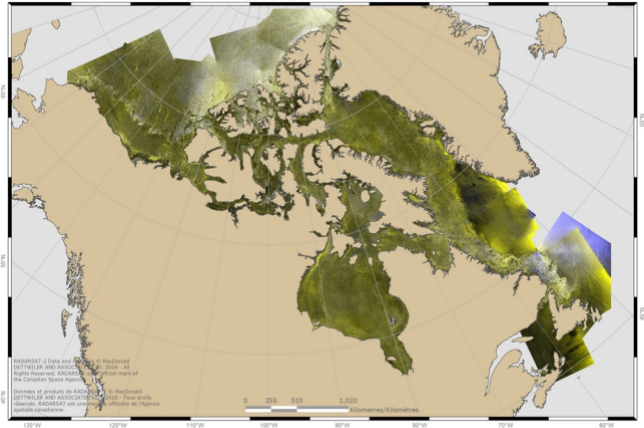
01/29/2016 - 02/01/2016

Canada



# Canadian Arctic Mosaic - Mosaïque de l'arctique Canadien

180°W 170°W 160°W 140°W 120°W 80°W 70°W 50°W 40°W 30°W 20°W 10°W



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0 255 510 1,020  
Kilomètres/Kilomètres

01/29/2016 - 02/01/2016

Winter 2016 Hiver

