Environment Canada Environnement Canada

# Annual Arctic Ice Atlas

## Winter 2014-2015

By

Canadian Ice Service
Le service canadien des glaces

Canada

# Foreword

The 2015 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 each atlas, ice formation during the freeze-up period is first described. This is then followed by graphical depictions of the winter ice conditions, primarily based on Synthetic Aperture Radar (SAR) data.

The SAR data used in the compilation of the image mosaics in this year's atlas came from the RADARSAT-2 satellite. The data were captured by the Prince Albert (Saskatchewan) and Gatineau (Quebec) receiving stations, between January 30th and February 2nd, 2015.

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 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 Canada.

The production of this year's atlas introduces changes to both the procedure as well as the display of the output. Procedurally, an automated algorithm developed by CIS staff 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. The period over which the data were 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 MacDonald, 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 Kathy Clevers (CIS)
Mosaic production: Nicolas Denis (CIS)
Mosaic algorithm: Yi Luo (CIS)
Image analysis: Pierre Boivin, Ginette Leger, and Daniel Beauchamp (CIS)

REGIONAL ICE ANALYSIS
ANALYSE REGIONALE DE GLACE

Western Arctic
Arctique de l'Ouest

# 02 FEB/FEV 2015

CANADIAN ICE SERVICE | SERVICE CANADIEN DES GLACES

DB

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160W 155W 150W 145W 140W 135W 130W 125W 120W 115W 110W 105W 100W 95W 80N 75N 70N

POINT BARROW

TUKTOYAKTUK

INUVIK

RESOLUTE

CAMBRIDGE BAY

KUGLUKTUK

| TEMPERATURE (°C) (Past 7 days) / TEMPERATURE (°C) (7 derniers jours) | MEAN MOYENNE | NORMAL NORMALE |
|---|---|---|
| Point Barrow | -21.8 | -26.1 |
| Inuvik | -24.9 | -27.4 |
| Kugluktuk | -28.0 | -28.5 |
| Cambridge Bay | -33.9 | -33.3 |

## WMO Colour Code - Concentration / Code de couleurs de l'OMM - Concentration

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

# REGIONAL ICE ANALYSIS
# ANALYSE REGIONALE DE GLACE

**Eastern Arctic**
**Arctique de l'Est**

# 02 FEB/FEV 2015

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ENVIRONNEMENT CANADA

TEMPERATURE ( °C ) (Past 7 days)
TEMPERATURE ( °C ) (7 derniers jours)

| | MEAN MOYENNE | NORMAL NORMALE |
|---|---|---|
| Eureka | -41.1 | -38.0 |
| Resolute | -33.3 | -32.9 |
| Clyde | -31.0 | -29.1 |
| Hall Beach | -30.6 | -32.5 |

110W 100W 90W 80W 70W 60W 50W
80N 75N 70N 65N
EUREKA RESOLUTE THULE NANISIVIK POND INLET CLYDE HALL BEACH

WMO Colour Code - Concentration

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

Code de couleurs de l'OMM - Concentration

- New Ice / Nouvelle glace
- Nilas/Grey Ice / Nilas/glace grise
- Fast Ice / Banquise c ôtière
- Ice Shelf / Plateau de glace
- Undefined / Indéterminé

REGIONAL ICE ANALYSIS
ANALYSE REGIONALE DE GLACE

Hudson Bay
Baie d'Hudson

# 02 FEB/FEV 2015

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GL

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CORAL HARBOUR
CHURCHILL
INUKJUAK
IQALUIT
KUUJJUAQ
NAIN
MOOSONEE

90W 80W 75W 60W 55W 60N 65N

| TEMPERATURE ( °C) (Past 7 days) / TEMPERATURE ( °C) (7 derniers jours) | MEAN MOYENNE | NORMAL NORMALE |
|---|---|---|
| Iqaluit | -25.4 | -27.5 |
| Coral Harbour | -30.8 | -30.0 |
| Churchill | -27.3 | -26.3 |
| Moosonee | -22.0 | -19.3 |
| Inukjuak | -26.6 | -25.8 |
| Kuujjuaq | -27.4 | -24.3 |
| Nain | -20.9 | -19.4 |

WMO Colour Code - Concentration

Code de couleurs de l'OMM - Concentration

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REGIONAL ICE ANALYSIS
ANALYSE REGIONALE DE GLACE

Western Arctic
Arctique de l'Ouest

# 02 FEB/FEV 2015

CANADIAN ICE SERVICE
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DB

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160W 155W 150W 145W 140W 135W 130W 125W 120W 115W 110W 105W 100W 95W 80N 75N 70N

POINT BARROW
TUKTOYAKTUK
NUVIK
RESOLUTE
CAMBRIDGE BAY
KUGLUKTUK

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| Inuvik | -24.9 | -27.4 |
| Kugluktuk | -28.0 | -28.5 |
| Cambridge Bay | -33.9 | -33.3 |

## WMO Colour Code - Stage of Development

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
Epaisse 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

## Code de couleurs de l'OMM - Stade de formation

# REGIONAL ICE ANALYSIS
# ANALYSE REGIONALE DE GLACE

**Eastern Arctic**
**Arctique de l'Est**

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TEMPERATURE ( °C ) (Past 7 days)
TEMPERATURE ( °C ) (7 derniers jours)

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|---|---|---|
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110W 100W 90W 80W 70W 60W 50W 80N 75N 70N 65N 90W 85W 80W 75W 70W

EUREKA · THULE · RESOLUTE · NANISIVIK · POND INLET · CLYDE · HALL BEACH

## WMO Colour Code - Stage of Development

- Ice Free — Libre de glace
- Open Water — Eau Libre
- Icebergs
- New — Nouvelle
- Grey — Grise
- Grey-white — Blanchâtre
- First-year — Première année

## Code de couleurs de l'OMM - Stade de formation

- Thin First-year — Mince de première année
- Medium First-year — Moyenne de première année
- Thick First-year — Epaisse 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

REGIONAL ICE ANALYSIS
ANALYSE REGIONALE DE GLACE

Hudson Bay
Baie d'Hudson

# 02 FEB/FEV 2015

CANADIAN ICE SERVICE | SERVICE CANADIEN DES GLACES

GL

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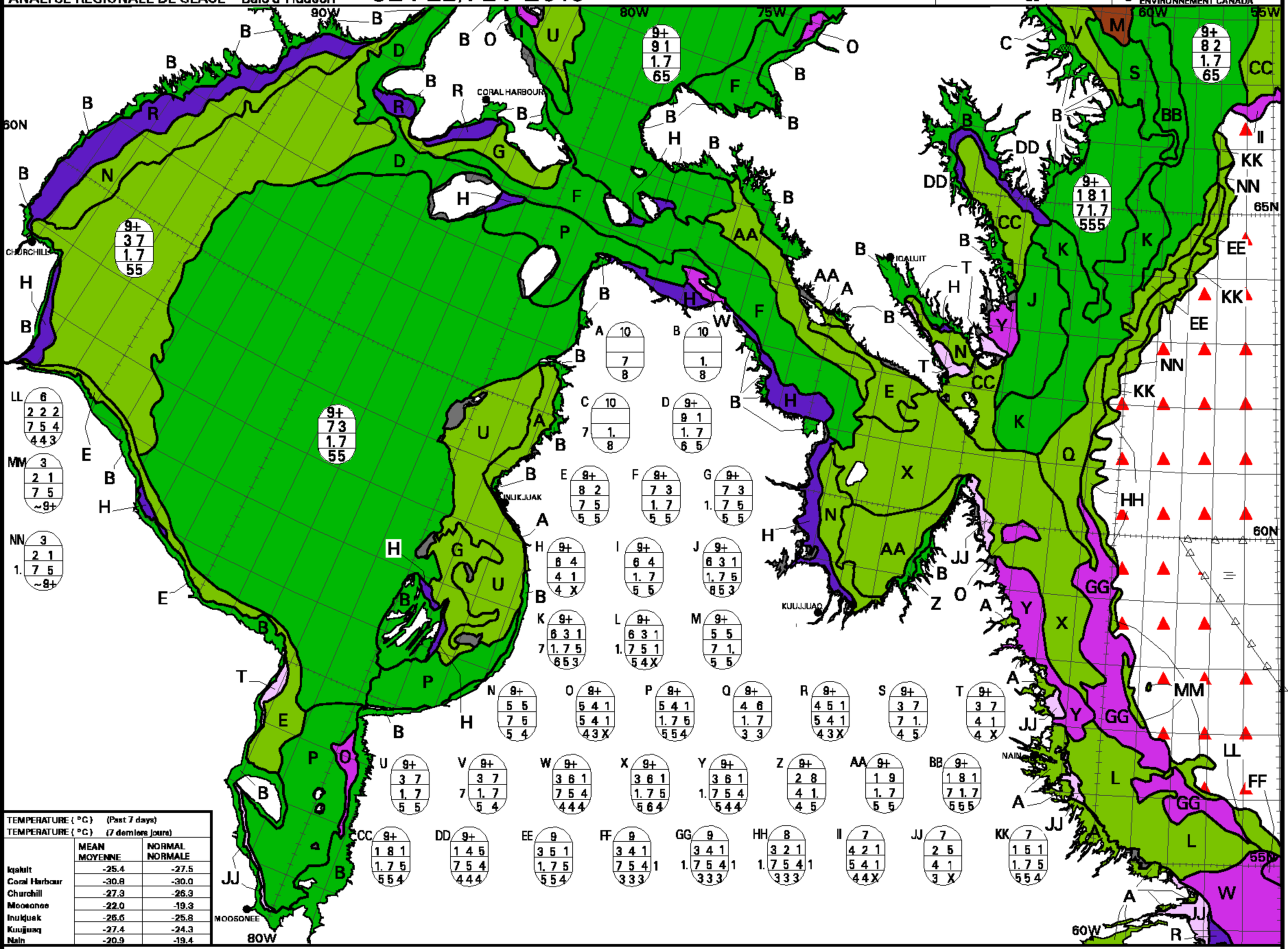


| TEMPERATURE ( °C) (Past 7 days)<br>TEMPERATURE ( °C) (7 derniers jours) | MEAN<br>MOYENNE | NORMAL<br>NORMALE |
|---|---|---|
| Iqaluit | -25.4 | -27.5 |
| Coral Harbour | -30.8 | -30.0 |
| Churchill | -27.3 | -26.3 |
| Moosonee | -22.0 | -19.3 |
| Inukjuak | -26.6 | -25.8 |
| Kuujjuaq | -27.4 | -24.3 |
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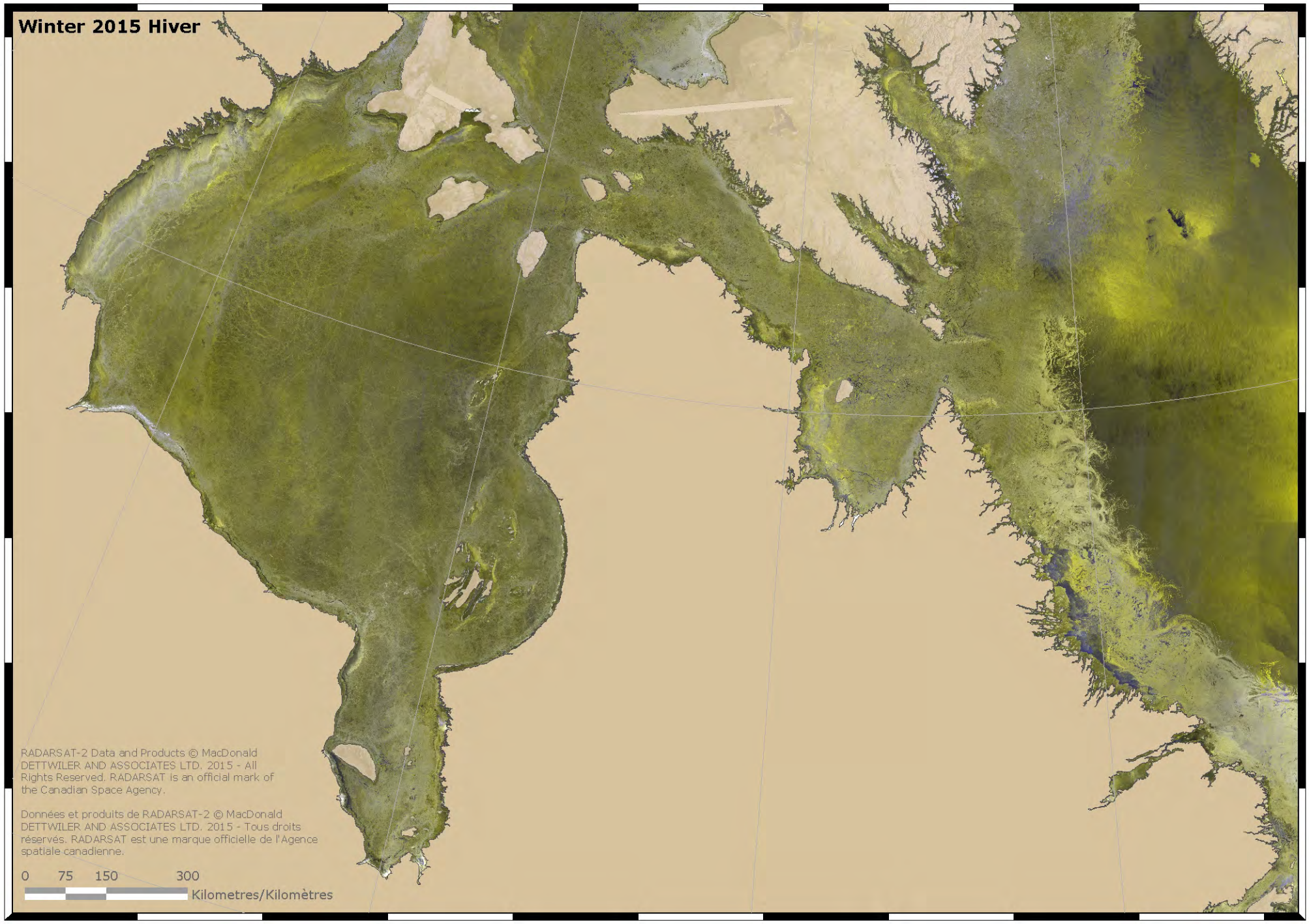
## WMO Colour Code - Stage of Development

## 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 / Blanch âtre
- First-year / Premi ère ann ée
- Thin First-year / Mince de premi ère ann ée
- Medium First-year / Moyenne de premi ère ann ée
- Thick First-year / Epaisse de premi ère ann ée
- Old Ice / Vieille glace
- Second-year / Deuxi ème ann ée
- Multi-year / Plusieurs ann ées
- Undefined Fast Ice / Ind éfini Banquise c ôtière
- Undefined / Ind éterminée




# Hudson Bay - Baie d'Hudson

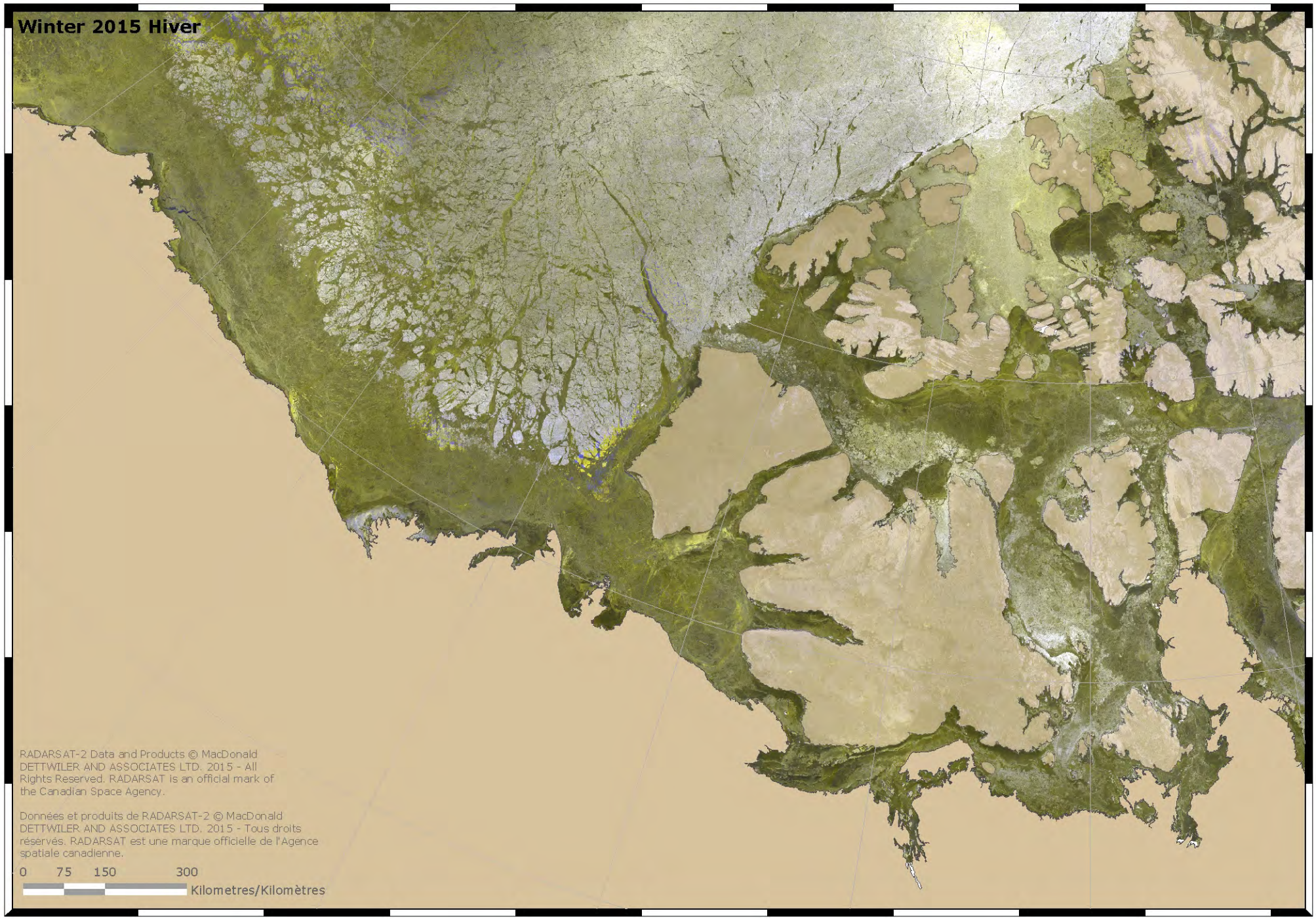
01/30/2015 - 02/02/2015

Canada

# Eastern Arctic - Arctique de l'Est

01/30/2015 - 02/02/2015

Canada




# Western Arctic - Arctique de l'Ouest

**01/30/2015 - 02/02/2015**

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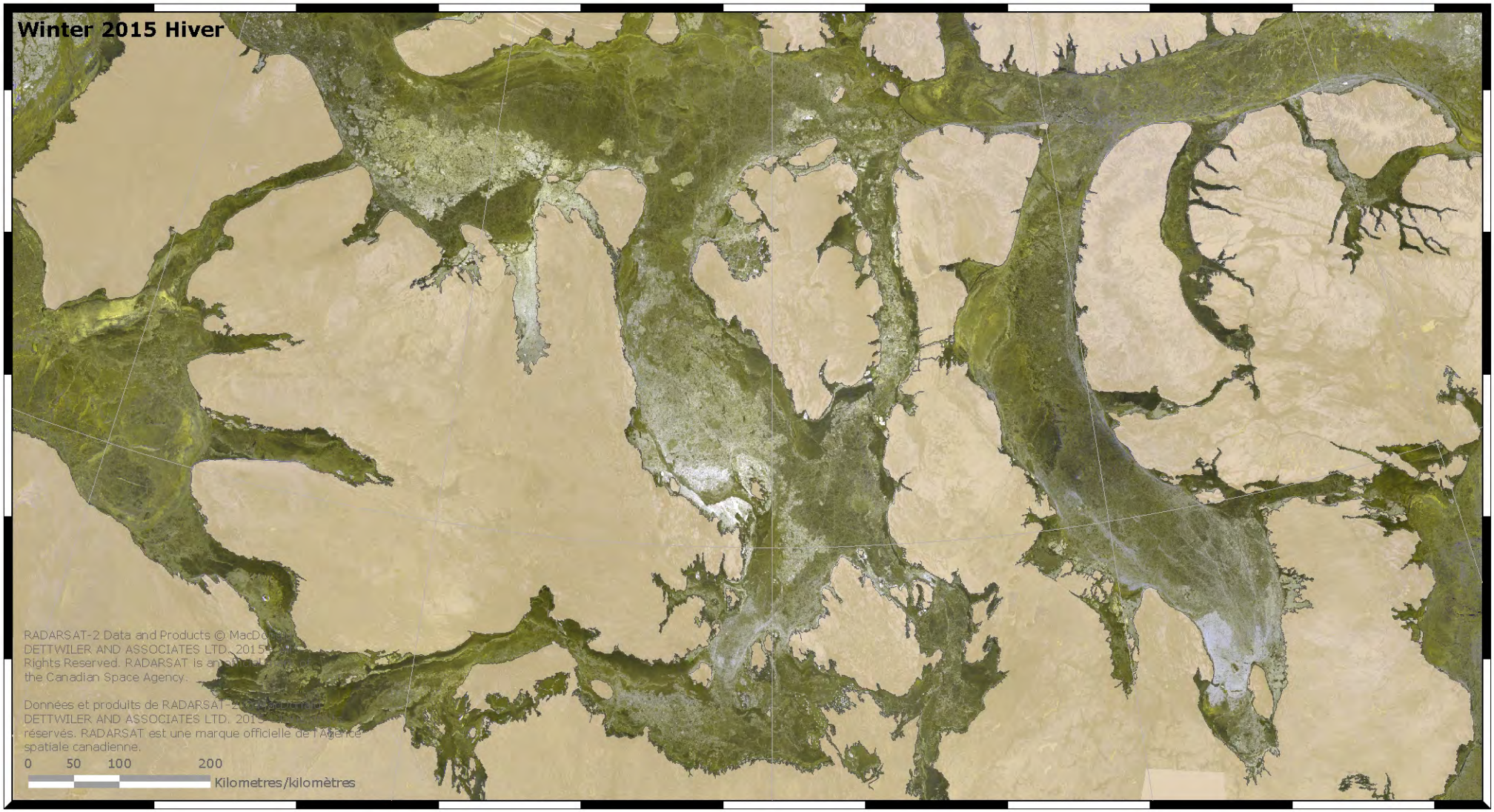
# Nares Strait - Détroit de Nares

01/30/2015 - 02/02/2015

Canada




# Canadian Northwest Passage - Passage du Nord-Ouest Canadien

**01/30/2015 - 02/02/2015**

Canada

90°W 80°W 70°W 60°W

Winter 2015 Hiver

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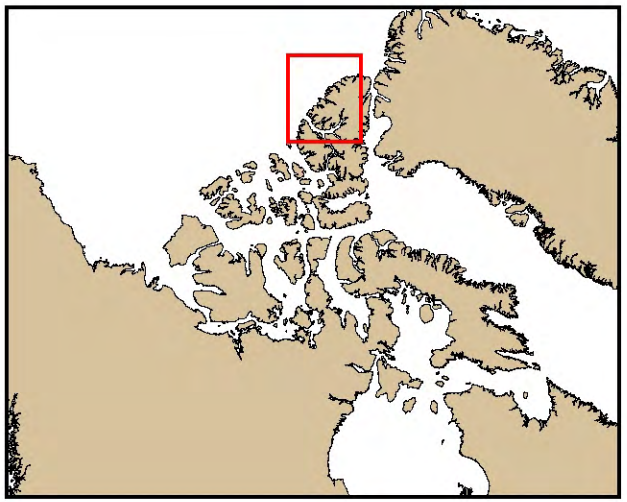
0 25 50 100

Kilometres/Kilomètres

90°W 80°W

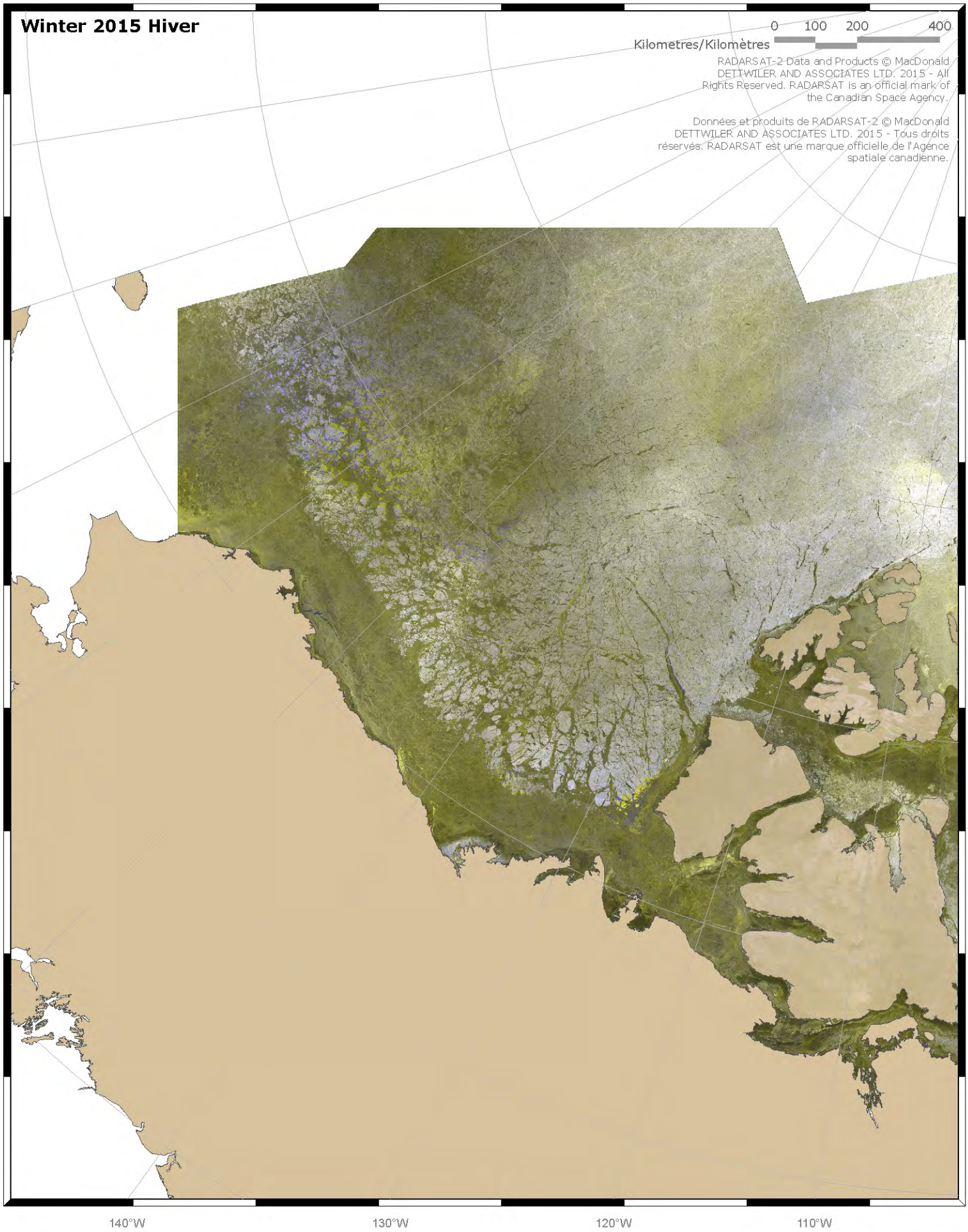
80°N

# Canadian Ice Shelves
# Plateaux de glace canadiens



**01/30/2015 - 02/02/2015**

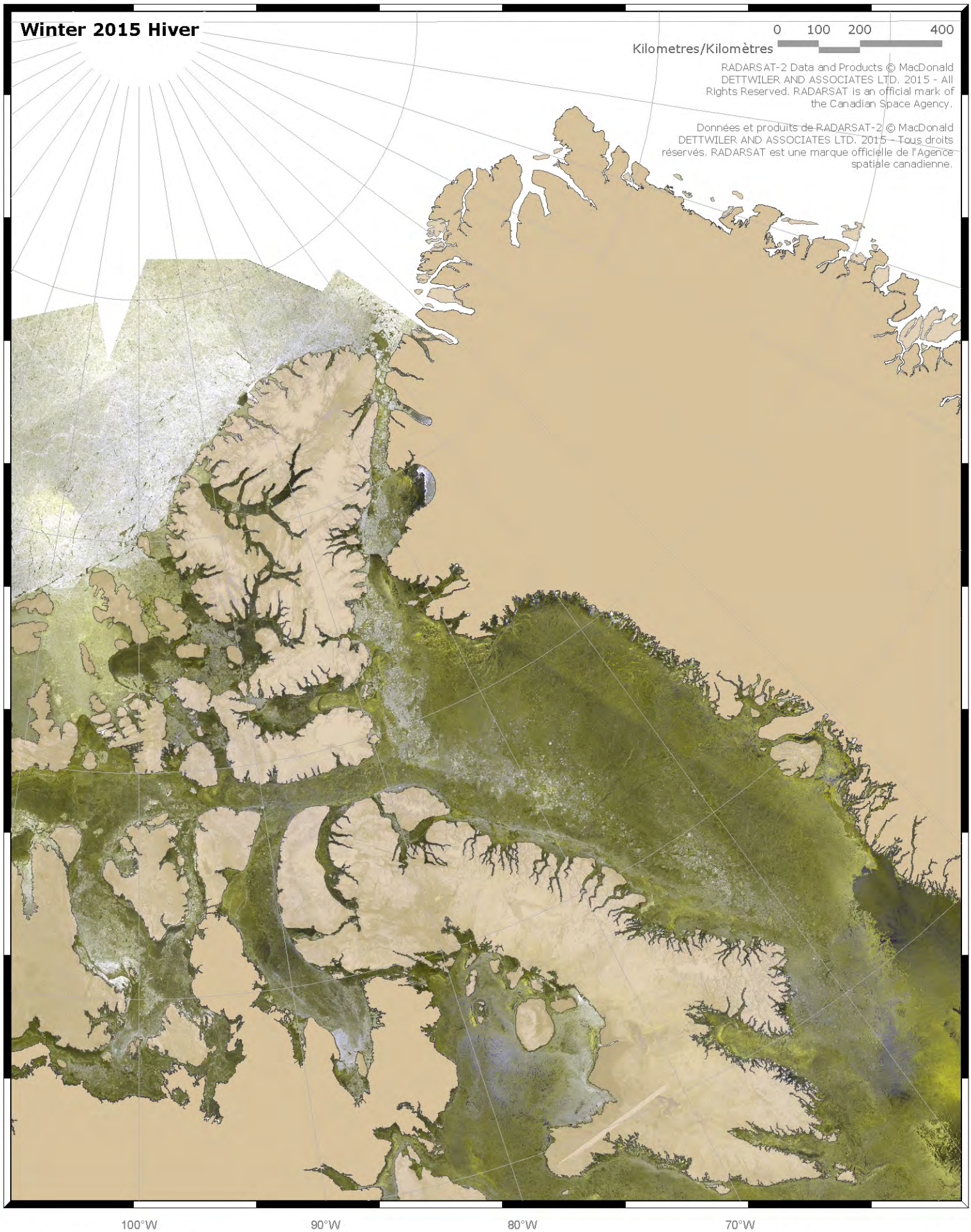
Canada




**Met Area 17**

**01/30/2015 - 02/02/2015**

Canada

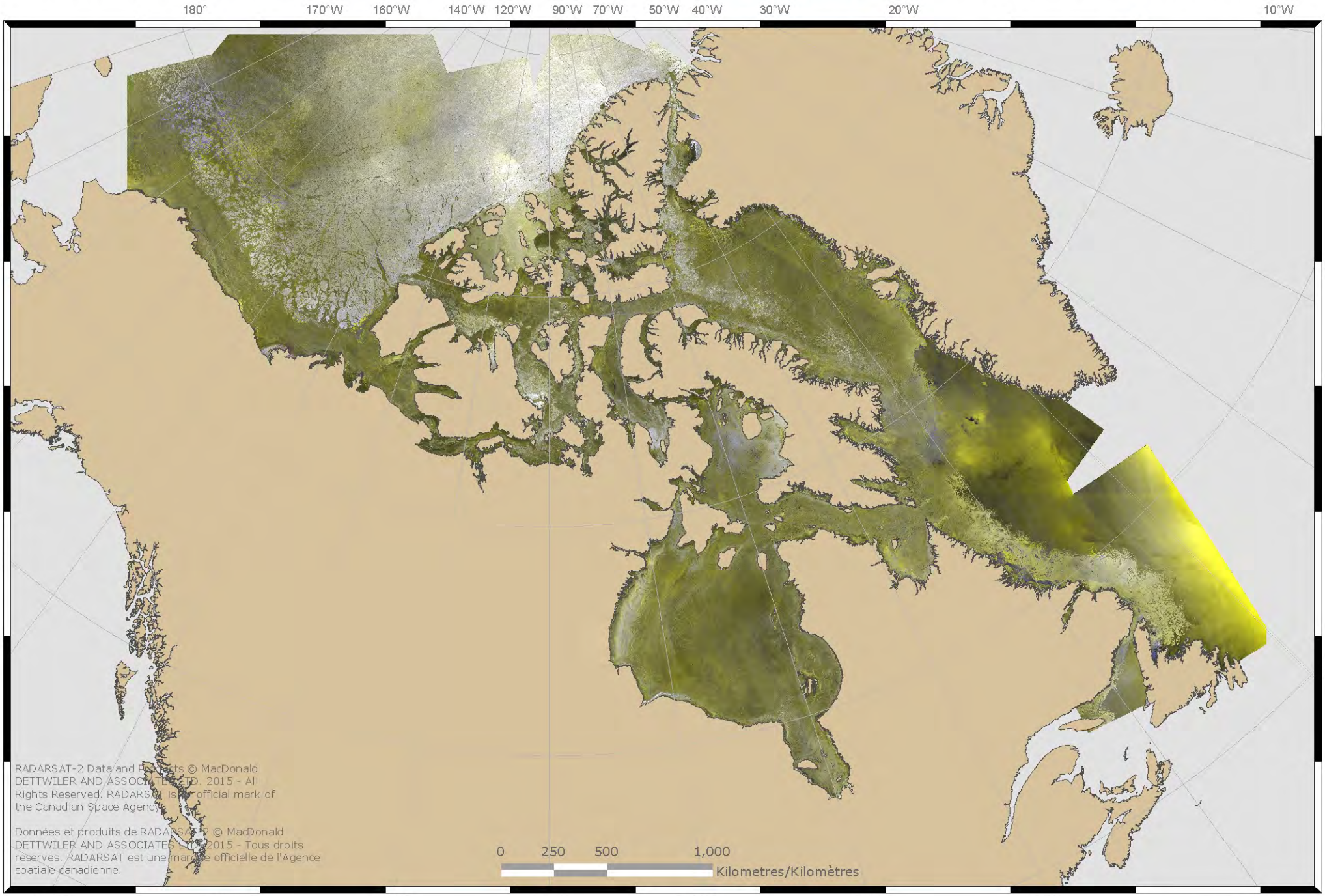



# Met Area 18

**01/30/2015 - 02/02/2015**

Canada

# Canadian Arctic Mosaic - Mosaïque de l'arctique Canadien

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**Winter 2015 Hiver**

Canada