

EXPERT TEAM ON SEA ICE – FIFTH SESSION

**ETSI-5/GDSIDB-13/Doc. 2.3.1(4)**

STEERING GROUP FOR THE PROJECT  
GLOBAL DIGITAL SEA ICE DATA BANK (GDSIDB) –  
THIRTEENTH SESSION

OTTAWA, CANADA, 25 TO 28 MARCH 2014

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## **REPORTS BY THE MEMBERS OF THE ETSI**

### **CANADA**

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#### **Summary and Purpose of Document**

This document describes the sea ice information services provided in Canada –  
March 2014

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#### **ACTION PROPOSED**

The Team is invited to:

- (a) Note and comment on the information contained in the report;
- (b) Consider using the information to update the WMO-No.574 publication;
- (c) Take other actions on the issue raised in the report, as appropriate;

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**References:** none

**Appendices:** none

## **Canada Report**

### **March 2014**

#### **Introduction**

1. The Canadian Ice Service (CIS) provides information about floating ice in the major navigable waters within the Canadian economic zone and METAREAS XVII and XVIII. This information is intended to meet two main objectives; to ensure safe operations in ice infested waters, and to provide climatological conditions for planning purposes. The Canadian Ice Service is divided into three main sections- operations using remote sensing, field support and science (remote sensing and modeling).

#### **Operational Support**

2. Throughout the intercessional period, the CIS provided operational ice information on a 7 day-a-week basis throughout the year. From December to May, the main areas of support included the Great Lakes, the Gulf of St Lawrence and the east coast of Canada. From June to December, the support areas shifted to the Canadian Arctic, including Hudson Bay. Information about ice conditions in the METAREAS is issued year-round. Products include:

- Weekly regional scale charts for climatology and planning purposes – these cover the Canadian areas.
- Daily charts for mariners
- Satellite image analysis based on RADARSAT-2 imagery over areas of Canadian Coast Guard activity.
- Ship-board or aircraft ice reconnaissance charts
- Daily ice bulletins – text messages including warnings of hazardous ice conditions present or developing within the next 36 hours
- Daily iceberg distribution chart showing the estimated numbers of icebergs in each degree latitude/longitude square as well as the Limit of All Known Ice (done in partnership with the International Ice Patrol)
- 30-Day Forecasts – text forecasts issued about the 1<sup>st</sup> and 15<sup>th</sup> of every month describing expected changes in ice conditions over the next 30 days
- Seasonal Outlooks – text and graphical products issued about December 1st to provide an outlook for the freeze-up and development of the ice season in southern Canadian waters, and about June 1 to provide an outlook for the break-up and development of the navigation season in northern Canadian waters
- Seasonal Summaries – text and graphical products issued at the end of each season (summer and winter) summarizing the recently completed ice season as a brief climatological record.

#### **Data Sources**

3. The CIS relies on a mix of satellite, aircraft and surface observations. The most important data sources are RADARSAT-2 from which about 11,000 images are acquired annually. AVHRR, Modis and VIIRS optical imagery from U.S. satellites is of almost equal importance. SSM/I data provide useful background information but have limited resolution. A small number of TerraSAR-X images have been used.

4. Aircraft ice reconnaissance is an important source of tactical data in direct support of navigation as well as “ground truth” for satellite data. Two aircraft routinely intermingle ice

reconnaissance, marine pollution and security patrols over Canada's ice covered waters.

## **Information Technology**

5. The CIS continues to update its ice chart production system known as "ISIS", while working on the new system called "Polaris". Polaris is based on ArcGIS10. All products are produced digitally and made available via the CIS website (<http://ice-glaces@ec.gc.ca>) and other means. Charts, bulletins and satellite images are sent to icebreakers by ftp using MrSID image compression.

## **Sea Ice Climatology**

6. Regional Charts (1968 – present) are updated in real-time and available on our web site at: <http://www.ice.ec.gc.ca/App/WsvPageDsp.cfm?Lang=eng&lnid=3&ScndLvl=no&ID=11715>. This dataset constitutes the climate database used in the production of the climatic ice atlases also available on our web site at:

<http://www.ice.ec.gc.ca/App/WsvPageDsp.cfm?ID=11700&Lang=eng>

7. This dataset is also used for the production of climate products in real time such as "Departure from Normal" and various "Ice Cover Graphs" comparing current conditions to normal and past years. A tool called "Ice Graph Tool" allowing users to create their own Ice Cover Graphs is available on the web.

8. Since January 2006, all current CIS charts are available in Sigrid-3 format and the regional products are provided to NSIDC in real time.

## **Training**

9. The CIS is planning to develop and implement standards and performance programs for its ice analysis and forecast component over the next few years and to increase its focus on training.

## **Science**

### Modeling

10. Seasonal Ice Forecasting - A multiple linear regression system (MLR) and optimal filter based model is used in a multi-model ensemble to provide guidance for CIS seasonal forecasts. These models use current or historical data to project future conditions. Forecasts from the Canadian Seasonal to Interannual Prediction System (CanSIPS) are also being investigated.

11. Short-Term Sea ice analysis and forecasting – the Regional Ice Prediction System (RIPS 2.0) provides analyses and forecasts of ice conditions every 6 hours at 5 km resolution. It was developed in collaboration with the Canadian Meteorological Centre (CMC) and covers Canadian waters and the Canadian METAREA regions. Work is underway to transition it to operational use at the CIS.

12. Iceberg modeling – Work is underway to adapt the NAIS iceberg model to forecast the drift and deterioration of ice islands. Field studies have been conducted in collaboration with Carleton University, University of Ottawa and others. These studies have provided valuable

information on the geometry and small scale features of ice islands and this work continues.

#### Remote Sensing

13. Estimation of Arctic Sea Ice Extent using MODIS Imagery
  - Research on high-resolution and accurate mapping of Arctic sea ice extent using MODIS sensors.
  - Producing daily MODIS circumpolar clear-sky composite images.
  - A regression based algorithm is used for determining ice concentration.
  - Improvement in land contamination near coast areas or small islands.
  - Improvement on mapping thin ice and melting ice.
14. AVHRR data assimilation
  - Developed a way of automatically assimilating AVHRR data into the regional sea ice analysis system,
  - Cloud detection algorithm and pixel classification scheme used for quality control.

#### **International Activities**

15. The CIS undertook an active role to support scientific activities during the International Polar Year. In addition to its participation in the ETSI-Polar View Ice Information Portal, the CIS provided ice information support for 10 IPY projects in Canadian waters including the Canadian Flaw Lead project that had the icebreaker CCGS Amundsen over-winter in the Beaufort Sea.
  16. The Canadian Ice Service is a member of the International Ice Charting Working Group (IICWG) and the North American Ice Service (NAIS).
  17. The Canadian Ice Service is involved in the Polar Code and the ISO TC67 SC8 on Arctic Operations.
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