WORLD METEOROLOGICAL ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (OF UNESCO)

EXPERT TEAM ON SEA ICE – FIFTH SESSION

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

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REPORTS BY THE MEMBERS OF THE ETSI

DENMARK

Summary and Purpose of Document

This document describes the sea ice information services provided in Denmark by the Danish Meteorological Institute (DMI).

ACTION PROPOSED

The Team is invited to:

(a) Note and comment on the information contained in the report;

(b) Take other actions on the issue raised in the report, as appropriate;

References: none

Appendices: none

Denmark Report
March 2014

Introduction

1. The Danish Meteorological Institute (DMI), Greenland Ice Service, is responsible for operational monitoring and charting of sea ice conditions in the waters around Greenland. The service to shipping is focused on the harsh environment near the southern tip of Greenland. DMI istributes this information to ships primarily as ice charts, compressed image products and text reports. The purpose of the sea ice service is to aid navigation and provide tactical and strategic support to the shipping community. The present ice service was established in 1959 but information about sea ice conditions has been gathered by the DMI since 1872. The ice service is managed by DMI and the two operational offices are located in the DMI headquarter in Copenhagen and in Narsarsuaq (southern Greenland). The Greenland Ice Service is a division under the DMI Center for Ocean and Ice. The Copenhagen ice branch is manned with DMI academic staff plus one navigator from Royal Arctic Line. The Narsarsuaq branch is staffed purely with navigators from Royal Arctic Line.

Operations, data, services and products

2. The service provided by the Danish Meteorological Institute, Greenland Ice Service, is mainly based on the SAR satellite platforms, primarily from RADARSAT-2 , secondly from CosmoSkyMed and TerraSAR-X. The data delivery is provided via own contract with MDA Corporation and via GMES MyOcean. Near Real Time access to SAR data in combination with visible satellite data sources like NOAA-AVHRR, AQUA/TERRA MODIS and NPP satellite data constitute the most important source of information for the ice service production of navigation ice charts.

3. The operational use of SAR data from satellites since 1999 for ice charting has indeed proven very successful. Therefore, the need for air reconnaissance has been reduced only to be performed by helicopter in support of inshore shipping and passenger routes. Main area of this activity is the South Greenland Waters south of 62°N. Here ice charts for navigation are normally issued 3-5 times weekly. Other regions are mapped infrequently ship traffic dependent. Twice a week (normally every Monday and Thursday) a general ice chart for all Greenland waters is published. All products are freely available at http://www.dmi.dk/en/groenland/hav/ice-charts/, 350 navigation ice charts, 104 general ice charts and numerous inshore ice reports are issued every year. NAVTEX messages with relevant ice information are circulated routinely from Ice Patrol Narsarsuaq. All ice charts are produced in Near Real Time seven days a week.

4. Near shores ice reports in plain language and ice piloting are carried out on a routine basis from Narsarsuaq with a contracted helicopter as platform. 89 locations south of latitude 62°N may potentially be surveyed during one helicopter recce. A written near shore ice report in Danish and Greenlandic is published after the recce along with a web based photo series of local ice conditions.

Ice Charting System

5. DMI's ice charting system is based on ESRI ARCGIS the add-on ice charting module is called SIKU is used for operational ice analysis and chart production. SIKU is a new state of the

art development based on ESRI ArcGIS.. SIKU follows all international ice charting standards and WMO Nomenclature including export of ice analyses in SIGRID-3, graphical formats and NetCDF.

Distribution of ice information

6. Operational ice information (ice charts and ice reports) is typically distributed via dmi.dk or directly to dedicated users on attachments to emails. Specific requests on ice conditions or offline requirements are handled by the ice operations team hooked up on iskort@dmi.dk (ice charting team Copenhagen) or icepatrol@dmi.dk (Ice Patrol Narsarsuaq)

7. Sea ice analyses are routinely exported to SIGRID3 and netcdf format and transferred to US National Ice Center, International Ice Charting Working Group and MyOcean data sites.

8. Specialized sea ice and iceberg products to defense and commercial clients are circulated with restricted access

Research, Development and Other Activities

9. The primary goal of the Greenland Ice Service is to provide timely and accurate information to the marine customers. DMI has set up an experimental high resolution sea ice model (HYCOM-CICE) for the North Atlantic including the Greenland Waters. The model is currently ingesting OSI-SAF data as ice field but to enhance quality the long term goal is to include gridded sea ice analyses.

10. In recent years significant progress has been made in iceberg detection, classification and characterization based on radar satellites.

11. Experimental usage and testing of high resolution radar imagery for supplement or potential replacement of helicopter based observations is ongoing

12. Testing of dual usage of radar data for ice charting and vessel/oil spill monitoring with the Danish Defense are ongoing.

Sea Ice Climate

13. No regular products. A climatological Arctic sea ice atlas based on passive sensors is available at http://ocean.dmi.dk/arctic/index.uk.php

14. The Greenland Ice Service general ice charts produced since 1999 are available in SIGRID3 format and ready for shipment to the National Snow and Ice Data Center

Icebergs

15. No routine products. Regular navigation ice charts contain iceberg information using the WMO symbology in terms of bergy water and few/many icebergs/growlers eventually polygons with concentrations of glacial ice. Automated target products based on all available Radarsat2 data are automatically shipped to GMES MyOcean data sites.

Training

16. A significant amount of training material has been compiled; most of which is developed in house but valuable material has also been made available by other ice services through international cooperation. This has helped to make the training more effective and to decrease the amount of time needed to perform the training. A substantial part of the ice analyst training takes place in open sea as onboard training on some major client vessels operating in ice infested waters. It is important to be familiar with the offshore environment as well as the crews' daily routines and decision making. This also includes exchange of information, product contents, ship focused requirements and ice recognition.

17. The JCOMM ETSI 3rd Ice Analyst Workshop was held at DMI in June 2011.

International Cooperation

18. The Greenland Ice Service is also involved in international cooperation with the aim of improving cooperation, services and products. The cooperation between the ice centres within the International Ice Charting Working Group is fruitful and recognized internationally. DMI participates in several international projects.

Commercial activities

19. Since February 2005 DMI has been contracted to provide Near Real Time ice information for the North Caspian Sea to operating oil companies and local Kazakh authorities. The current contract includes also training and transfer of expertise to Kazakhs and Kazakh agencies.

20. Since 2006 oil/gas exploration at the Greenland continental shelf has increased significantly. The local authorities and oil companies has a strict set of Health, Safety and Environment regulations which through the recent years had required many ice related field/desktop programs in all waters of Greenland.

21. DMI has through two seasons provided operational ice charting and ice routing advisory to a Danish commercial ice-classed vessel serving bases in Antarctica.

22. DMI has in 2012 and 2013 provided onboard ice advisory to a 2D-seismics vessel operating in ice off the NE Greenland Shelf by combining satellite based ice products and helicopter/onboard visual/radar observations.

23. DMI has in 2012 provided onboard ice advisory to a 3D-seismic vessels operating in bergy waters off NW Greenland by combining satellite based iceberg products and onboard visual/radar observations.

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