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INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (OF UNESCO)

EXPERT TEAM ON SEA ICE – FIFTH SESSION

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

NORWAY

Summary and Purpose of Document

This document provides a brief description of the activities of the Norwegian Ice Service (NIS) between April 2010 and March 2014.

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

Norway Report
March 2014

Introduction

1. The Norwegian Ice Service (NIS) has been part of the Norwegian Meteorological Institute since 1967. Originally it was based Oslo but in July 1997 moved to the regional office in Tromsø. Although the ice service was one of the first to use satellite images, starting with optical infrared in the winter 1969-70, in the period to 1997 the ice charts were hand drawn based on these and observational data and only produced weekly. With the move to Tromsø, the production moved to an electronic Geographical Information System (GIS) software-based solution, and the frequency increased to every weekday (Monday to Friday). The volume and quality of satellite data used to draw the ice charts has increased over the years, with Radarsat-1 and -2 synthetic aperture radar (SAR) starting to be used in 2005.

2. This report is divided into 2 sections, describing operations and research activities of the NIS during the last period (April 2010 to March 2014).

Operations

3. During the period the NIS maintained its existing operational ice charting operations, and expanded its activities with a number of short ice charting projects for commercial customers. Existing operations are as follows:

a) Arctic - This is the primary area of ice charting, with an ice chart drawn every weekday (Monday to Friday). The area of interest is centred on Svalbard, but ice conditions are covered between the north-west coast of Greenland in the west and Cape Chelyuskin in the east. The ice charts consist of 6 ice concentration classes, and are principally drawn using dual-polarisation ScanSAR Wide SAR images acquired by the Canadian Radarsat-2 (RS2) satellite. Where RS2 data was not available, additional detail was filled in, until April 2012, by the ASAR instrument on the European Envisat satellite, and by AVHRR and MODIS optical images. Low resolution passive microwave imaging, from the processing of AMSR-E and AMSR2 by the University of Bremen (UB), is used as a data source of last resort. RS2 was chosen as the primary satellite because the overpass times for Svalbard are more convenient to the Norwegian working day (08:00 to 16:00 CET). Ice charts are drawn using late 1990's vintage ESRI ArcView GIS software and are made availbale at 15:00 CET every weekday.

b) Antarctic - An ice chart of the sector covering the Antarctic Peninsula and Weddell Sea is drawn every Monday during the austral summer (October to April). This is through support from the ESA Polar View project that is scheduled to end this season (2013-14). The ice chart uses the same types of satellite data as the Arctic chart, although RS2 data is more limited for this region. Trial use of ice charting using the QGIS (previously Quantum GIS) open source GIS software was conducted during the 2013-14 season to assess further its suitability as a replacement for the old ArcView GIS.

Other areas where the NIS has experience of drawing ice charts during the last period are as follows:

c) Northern Sea Route (NSR) - A limited number of ice charts were produced in support of large oil tankers transiting the NSR between Europe and the Far East in 2011 and 2012. In 2010 support was provided to the Borge Ousland yacht expedition circum-navigating the Arctic via the NSR and North-West Passage (NWP).

d) North-West Passage (NWP) - Support of the Borge Ousland yacht expedition in 2010. Additional RS2 scenes for this were supplied by the Canadian Space Agency (CSA).

e) Caspian Sea - An oil company environmental survey in collaboration with the Danish Meteorological Institute (DMI) in 2013. These ice charts also include ice stage of development information.

f) North-east Greenland - Supplementary charts from RS2 and Cosmo SkyMed (CSKS) SAR for oil industry actitivities. These charts included stage of development identification.

Other operational activities:

4. European Ice Services (EIS). NIS is a member of EIS. This has yet provide any benefit to operational routines, but has provided scope for coolllaborative work, particularly with DMI (see Caspian Sea above). EIS initially had ideas for a common ice charting production system and time was given to considering this. However the initiative appears to have stalled due to commercial GIS (ArcGIS) and proprietory systems (Norwegian Meteorlogical Institute DIANA) being pushed despite these being unacceptable to some of the participant organisations. Limited EIS cooperation was achieved during the ICEMAR project (see below) where the ice services particpated under the EIS grouping.

5 Expansion in number of personnel. NIS started the period with 4 part-time ice analysts (sharing duties as meteorologists), 1 sea-ice researcher (modelling), 1 project manager, and 1 head of the ice service. Total 7 persons. In 2011 the Norwegain Meteorological Institute reorganised its internal structure into divisions, with the NIS being part of the Meteorology and Climate (MetKlim) division, and the 1 sea-ice researcher (modelling) and 1 project manager being moved to the Research and Development (FoU) division. Although still nomially part of the NIS, their management is now in Oslo. Following the delay of work on a number of research projects, see next section, a new full-time sea-ice researcher (remote sensing) post was advertised in April 2013 and filled in September. This was followed by a second full-time sea-ice researcher (climatology) position advertised in February 2014 and expected to be filled by the summer. These positions are directly part of the NIS and MetKlim division, and the new appointments are also expected to undertake their share of ice charting duties and specialist user support.

Research

6. During the last period, NIS was engaged in a number of research projects with the aim of expanding and automating its primary ice charting activity. At the start of the period, there were a number of limited legacy activities such as the ESA Polar View project that supported Antarctic ice charting. NIS was subsequently invited to participate in a number of successful research proposals that led to international collaboration on project work:

a) SIDARUS (December 2010 to December 2013) - EU Framework Programme 7 (FP7) project to develop new sea ice infromation products for the ESA MyOcean programme. NIS working

on determining user needs, and extraction of sea ice thickness from the CryoSat-2 radar altimeter.

b) ACCESS (March 2011 to March 2015) - EU FP7 project following on from the DAMOCLES IPY project. NIS involved in assessing passive microwave sea ice products, determining user information requirements, and oil spill detection/modelling in sea ice studies.

c) ICEMAR (January 2011 to January 2013) - EU FP7 project developing improved framework for delivery of ice information to ships. NIS participated as part of EIS, was as well as being a data supplier (ice charts) was also involved in determining user requirements.

d) ICE-ARC (January 2014 to January 2018) - EU FP7 project with similar activities to ACCESS. NIS engaged in assessing error in passive microwave sea-ice concentration climtology records.

e) PRODEX ThinIce-2 (September 2012 to March 2014) - Norwegian Space Centre (NRS) project developing sea ice thickness products from optical (infrared) MODIS satellite data. NIS involved to evaluate final products.

f) Ice Warning System (January 2014 to January 2015) - NRS project to integrate sea ice classification from RS2 SAR and model forecasts into an early warning system for sudden ice movements north of Svalbard.

g) ESA MyOcean - NIS providing ice chart data.

h) Barents Watch - Norwegian governmental project creating an information portal for the Barents Sea. NIS providing ice chart data.
