

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

RUSSIAN FEDERATION

Summary and Purpose of Document

This document describes the sea ice information services provided in Russian Federation by Russian Federal Service for Hydrometeorology and Environmental Monitoring (Roshydromet).

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;

References: none

Appendices: none

Russian Federation Report

March 2014

Introduction

1. Sea-ice services in the Russian Federation are provided by the Arctic and Antarctic Research Institute in St Petersburg (AARI), the Hydrometeorological Centre (Hydrometcentre Moscow) and the Scientific Research Center of Space Hydrometeorology "Planeta" (SRC "PLaneta") and local hydrometeorological offices in the Arctic, Far-Eastern Russia, Baltic, Black and Caspian seas; all belonging to the Russian Federal Service for Hydrometeorology and Environmental Monitoring (Roshydromet).

2. AARI provides centralized general and customer-oriented services for shipping and coastal and harbour activities within the Northern Sea Route (NSR), for the Central Arctic Basin and Arctic seas – Greenland, Kara, Laptev, Eastern-Siberian, Chukchi as well as for the seas with the seasonal ice cover – Baltic, White, Bering, Okhotsk, Caspian and also Antarctic seas. AARI is responsible for coordination of the Marine Safety Information (MSI) provision for the GMDSS system for METAREAs XX and XXI. Most of the sea-ice charting services are provided by the AARI Centre for Ice Hydrometeorological Information while forecasting services are provided by the AARI research departments.

3. Hydrometcentre Moscow is providing sea-charting services for the seas with seasonal ice cover – Azov, Caspian and White and customized support for the seas within the NSR. The SRC "PLaneta" provides similar ice charting services and is responsible for provision of customized sea-ice products (Arctic, Antarctic) based on remotely-sensed data from various satellite systems (METEOR, NOAA, EOS etc.)

Data acquisition

4. Coastal weather stations of Roshydromet in the Arctic and Antarctic and on the coasts of the seas with seasonal ice cover make daily visual and instrumental ice observations on sea-ice concentration and stages of ice development, ice thickness, forms of ice, ice drift and other phenomena. Most of the icebreakers and vessels conducting ice navigation routinely report similar ice parameters plus parameters describing ice navigation. Observed data are relayed to analysing centres via the national meteorological network, WMO GTS and are generally available on-line, e.g. via Cliware system - <http://cliware.meteo.ru>.

5. Before 1992 aircraft ice reconnaissance flights were conducted in the Arctic on a regular 10-30 days basis from January to December and were the prime source of information for the ice charting. Since 1993 aircraft ice reconnaissance is conducted quite occasionally, commonly during tailored hydrometeorological support of applied and scientific activities and is used only for tactical support. The scope of ice information collected during air-ice reconnaissance included visual observations both on main ice parameters (mentioned above excluding thickness and ice drift) as well as discontinuities in sea-ice cover (leads, cracks, etc.) and various surface parameters (hummocks, ridges, snow, contamination, stages of melting, etc.). Huge collection of these historical log-books and ice charts (since 1930s till 1990s) is archived at the AARI and Hydrometcentre Moscow and is available on-line in the WMO SIGRID or SIGRID-3 formats within the GDSIDB project.

6. The AARI satellite reception station in St.Petersburg and the new one in Barentsburg,

Svalbard, opened in October 2013 (figure 1), provide visible and infrared satellite images for the whole Arctic from a series of satellites (NOAA, METOP, TERRA, AQUA, FY3). Customized access to the operational and archived data is provided online (<http://portal.esimo.aari.ru/portal/portal/esimo-user/services/SatView/>). Information for other regions (e.g. Antarctic) or from other satellites (METEOR, OKEAN, EROS, Radarsat etc.) is provided to AARI via Internet from other Roshydromet reception stations (Moscow, Khabarovsk etc, see figure 2) or from commercial satellite data providers (MDA, Scanex etc.). All data are further processed within an ice information system, including ArcGis versions 8 - 10 software and utilized for regional and pan-Arctic, sub-Arctic and pan-Antarctic sea-ice analysis by AARI. The SRC "Planeta" is responsible for Roshydromet satellite core ground segment and specializes on processing satellite imagery from the Russian METEOR-M, Elektro and Kanopus satellites, list of products is available online at http://planet.iitp.ru/english/products_eng.htm.

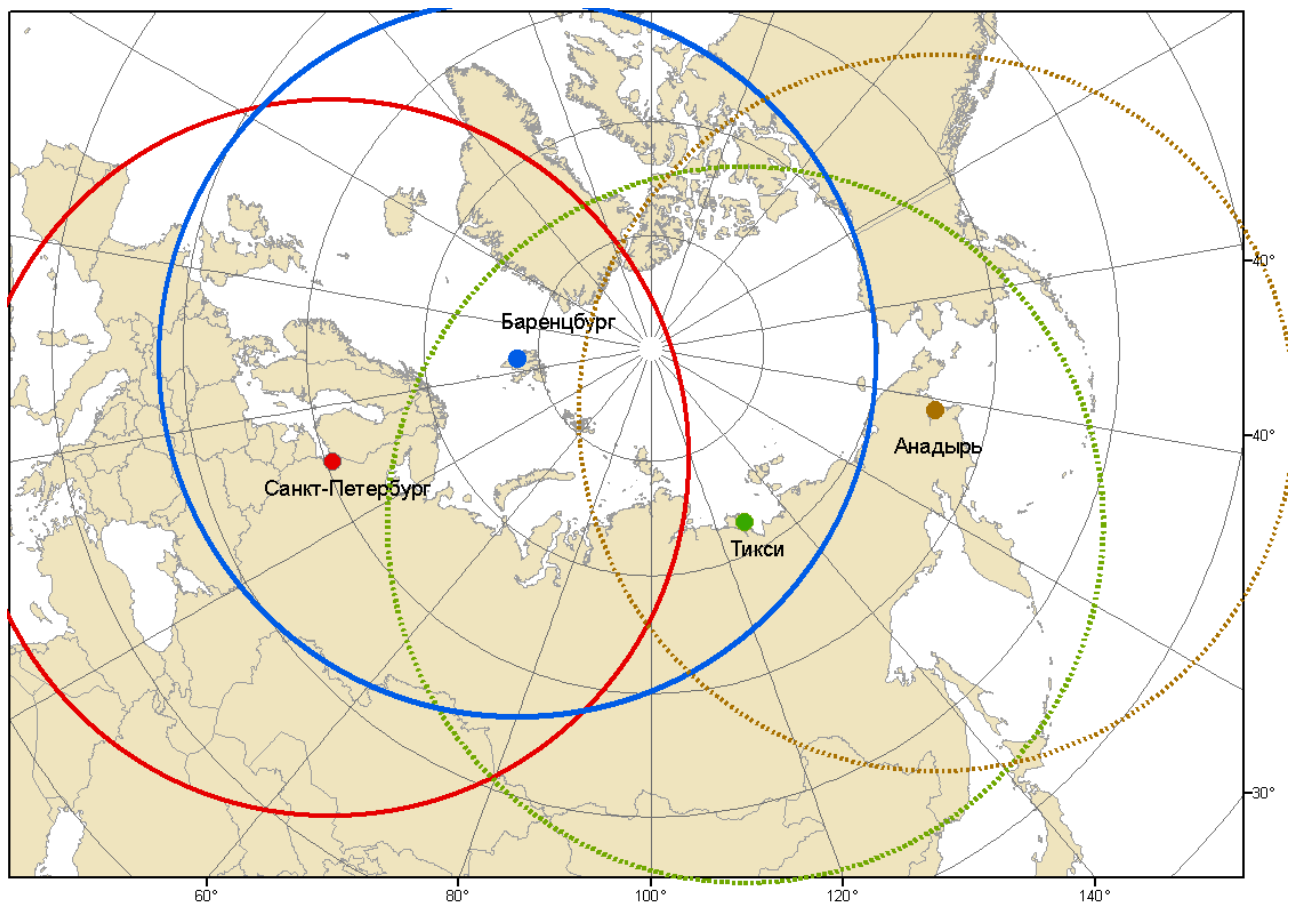


Figure 1 –Reception masks for AARI existing (solid line) and future (dotted line) receiving stations NOAA and EOS type satellites for elevation angle 5 degrees

Roshydromet core ground segment

3 main centers:

Europe

(Moscow-Obrninsk-Dolgoprudny)

Siberia

(Novosibirsk)

Far East

(Khabarovsk)

• - 68 regional centers

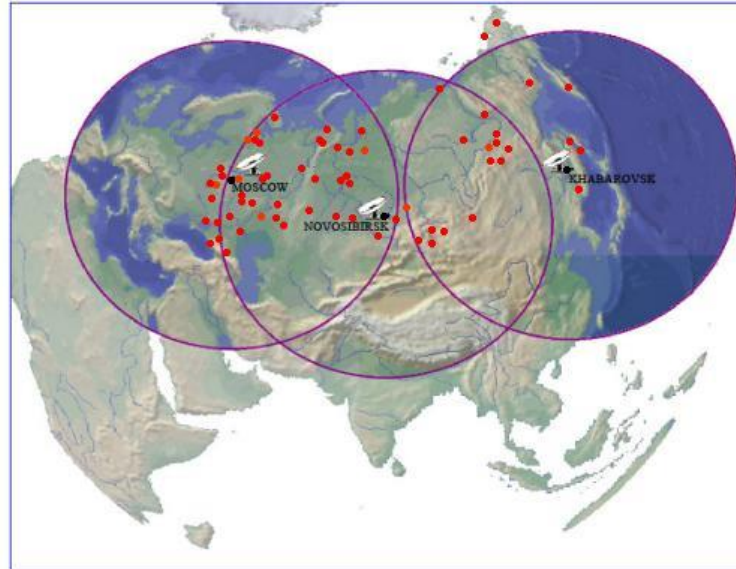


Figure 2 –Roshydromet satellite core ground segment

6. AARI, Hydrometcentre Moscow, SRC Planeta and the local meteorological offices of the Roshydromet exchange sea ice information and disseminate derived products to customers by applicable means and techniques (internet, radiofax, ground and satellite mobile operators, VSAT).

7. For the Baltic, Barents and White seas regions observers of the Northwestern, Murmansk and Northern departments of Roshydromet at the coastal hydrometeorological stations are providing visual and instrumental daily observations on ice conditions by internet, phone or telegraph. From 1960s till 1991 daily aircraft ice reconnaissance flights for the Gulf of Finland, the Gulf of Riga or Barents and White seas regions were carried out. Quite frequent flights over the White Sea region to monitor living conditions of seals populations continue up to present moment. From 1992 NOAA and EOS TERRA and EQUA satellite imagery is used in operative work. Sets of information are produced daily and include: SEA telegram, icebreakers report and review of ice conditions. The Baltic Group maintains a vast archive of daily ice charts (since 1927) and the stages of ice development (since 1920).

Operational support

Ice charts and satellite imagery

8. Review sea-ice conditions charts of the Arctic Ocean are compiled by AARI on weekly scale (every Tuesday). Charts depict drifting and fast ice boundaries and five classes of sea-ice concentration in the summer period or stages of development in the winter period and are

available in GIF and WMO SIGRID-3 format

(<http://www.aari.ru/projects/ecimo/ModuleLoad.php?mod=d0015&in=1> and <http://wdc.aari.ru/datasets/d0015/arctic/>). Review ice charts are based on generalization of the information from the regional ice charts which are produced on weekly scale or shorter scales and on request for the Arctic seas (Barents, White, Kara, Laptev, East-Siberian, Chukchi, Greenland, Beaufort), Arctic Basin, sub-Arctic and mid-latitude seas (Baltic, Bering, Okhotsk, Caspian). Detailed regional and local ice charts are disseminated via appropriate telecommunication means to the customers (masters, shipping companies, federal agencies, etc). Informational products are relayed to the users in graphic GIF/JPEG/GeoTiff/PNG formats, in WMO SIGRID-3 and in IHO S-57 formats. Archive of detailed regional sea-ice charts in national coding is available at <http://www.aari.ru/projects/ecimo/ModuleLoad.php?mod=d0004&in=1> and in SIGRID-3 at <http://wdc.aari.ru/datasets/d0004/> . Satellite imagery within the AARI responsibilities is available at (<http://portal.esimo.aari.ru/portal/portal/esimo-user/services/SatView/>).

9. Detailed sea-ice conditions charts for the 3 Antarctic sectors (Atlantic-Weddell Sea, Indian - Cosmonavtov-Sodruzhestva Seas and Pacific -Ross Sea) are prepared by AARI twice a month (every 10-15 and 25-31 days of month) to provide tailored support for operational activities of the Russian Antarctic Expedition (RAE – <http://www.aari.aq>) and general ice monitoring in the South Ocean. These products are available on-line as SIGRID-3 at <http://wdc.aari.ru/datasets/d0015/antarct/>.

10. In the recent years there is a growing request from the customers for operational properly documented satellite imagery for tactical and strategic analysis on the bridge inside the ENC software (NaviSailor, IceNavigator). After processing (in GIS or special package environment like ScanMagic or ENVI) the imagery is relayed by the AARI to the customers in georeferenced graphic formats (GeoTIFF or JPEG). Mercator projection is preferred but used till 84N°, polar stereographic projection is commonly used northward of 84N°. In many cases an accompanying ice chart is provided along with the imagery and is superimposed over it to facilitate decision.

Plain language information

11. Plain language reports in a form of weather (0600Z and 1800Z) and sea-ice (1800Z) GMDSS SafetyNET bulletins are prepared by AARI daily for METAREAs XX (year-round) and XXI (July-October) or on request by AARI and the local meteorological offices of Rosgydromet and are disseminated via formal and other applicable telecommunication means to the customers. Synoptic bulletins on weather conditions in the Eurasian Arctic are prepared routinely on daily scale by AARI and are disseminated via various telecommunication means to the customers and published on AARI web-site (<http://www.aari.ru/projects/ecimo/ModuleLoad.php?mod=d0011&in=1>).

Forecasts and forecasts methods

Numeric short-term forecasts

12. Daily diagnosis and forecast tabular and mapped patterns of mean daily and instantaneous ice drift, surface currents and sea level elevation in the Arctic Ocean and at selected coastal points of Eurasian Arctic for period 0d...+6d are provided on the basis of an

output from the AARI hydrodynamic model with viscous ice rheology, available at <http://www.aari.ru/projects/ecimo/index.php?im=102&sub=4>.

13. Weekly or shorter period diagnosis and forecast tabular and mapped patterns of the evolution of ice cover in Barents and Kara Seas including sea ice total concentration, thickness (stages of ice development), hummocks concentration and level of compacting for period 0d...+6d on the basis of the thermo hydrodynamic with elastic viscous-plastic ice rheology AARI model; available at <http://www.aari.ru/projects/ecimo/index.php?im=102&sub=1>.

14. Daily diagnosis and forecast charts for winds, wave significant height and direction and ice accretion for open water areas in the Western and Eastern Eurasian Arctic Seas for period 00...+72h with 6-h interval on the basis of the AARI spectral parametric wave model; available at <http://www.aari.ru/projects/ecimo/index.php?im=102&sub=2>.

Empirical and statistical long-term forecasts

15. Seasonal forecasts of ice conditions in the Eurasian Arctic seas and big Siberian rivers estuaries are produced in AARI in March, June and in August using empirical-statistical techniques in a form of textual bulletins. As a background to those forecasts a long-term AARI meteorological annual forecast with seasonal and monthly corrections is used.

16. Weekly-monthly forecasts of ice phenomena in the big Siberian rivers estuaries based on AARI empirical-statistical techniques are produced in spring (May-June) in a form of textual bulletins.

Support for navigation within the Northern Sea Route areas

17. Since 2013 AARI and other Roshydromet departments are routinely providing weather and sea-ice diagnostic and prognostic information and products to the Northern Sea Route Administration (NSRA). That includes weekly detailed regional and/or review ice charts, prognostic charts of sea ice parameters and type of ice conditions, daily weather bulletins. During the navigational period products and information are used by the NSRA administration for consideration of applications for navigation within the NSR or by the navigators. Information is available on-line at <http://nsra.ru/en/icecharts/>

Sea-ice Climatology

18. AARI continues to support the WMO “Global Digital Sea Ice Data Bank” (GDSIDB) project. Most of the sea-ice climatological data is available under the GDSIDB umbrella. That includes historical AARI Arctic Ocean ice charts in SIGRID format for 1933-1992 and the modern collection of AARI regional ice charts since January 1998 or Hydrometcenter Moscow regional ice charts since January 2000 till the present moment in SIGRID-3 format. Along with other collections, these data are available on-line at the AARI WDC Sea Ice server at <http://wdc.aari.ru/datasets/>.

19. Since 2012 AARI is developing access to sea-ice collections using geo-services approach. A tool in a form of a prototype AARI ice portal providing WMS-service is available at <http://gisa.aari.ru>.

International cooperation

20. AARI and other institutions of Roshydromet participate in most of the projects aimed to support the WMO International Polar 2007/2008 observing system legacy, including Polar Initiative, Sustaining Arctic Observing Networks (SAON), Southern Ocean Observing System (SOOS), Global Cryosphere Watch (GCW) etc. AARI is a member of the International Ice Charting Working Group (IICWG) and collaborates with the Russian Federation Ministry of Transport on the Arctic operations and Polar Code.

Training and capacity building

21. Hydrometeorological University of Roshydromet in St.Petersburg and AARI are supporting a number of educational facilities and CB in the field of Polar and marine meteorology including the sailing *UNESCO/IOC Universities* (training of the undergraduates is conducted during the ship-borne marine research) in the Baltic and Caspian Seas and North Atlantic, joint Norwegian – Russian Fram Laboratory and the joint German – Russian Otto Schmidt Laboratory. During the last years the AARI provided several bi-weekly training courses for the ice observers

Publications

22. The following publications are issued by AARI at different periods:

- The quarterly and yearly bulletin *Review of the hydrometeorological processes in the Arctic Ocean* (in Russian) - <http://www.aari.ru/misc/publicat/gmo.php>;
 - The quarterly bulletin *State of the Antarctic Environment* (in Russian and English) - http://www.aari.aq/bulletin/toc_en.html;
 - Bulletin “Long-term forecast of the ice conditions in the Arctic seas”: 3 bulletins are published per year in the end March, June and August (in Russian) - <http://www.aari.ru/projects/ECIMO/ModuleLoad.php?mod=f0022&in=1>;
 - *Trudi AANII* (AARI Transactions): irregular two to three volumes are published per year (in Russian);
 - *Problemi Arktiki i Antarktiki* (Problems of the Arctic and Antarctic): two volumes are published per year (in Russian);
 - Irregular express information, informational bulletins of the Russian Antarctic expedition, monographs etc.
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