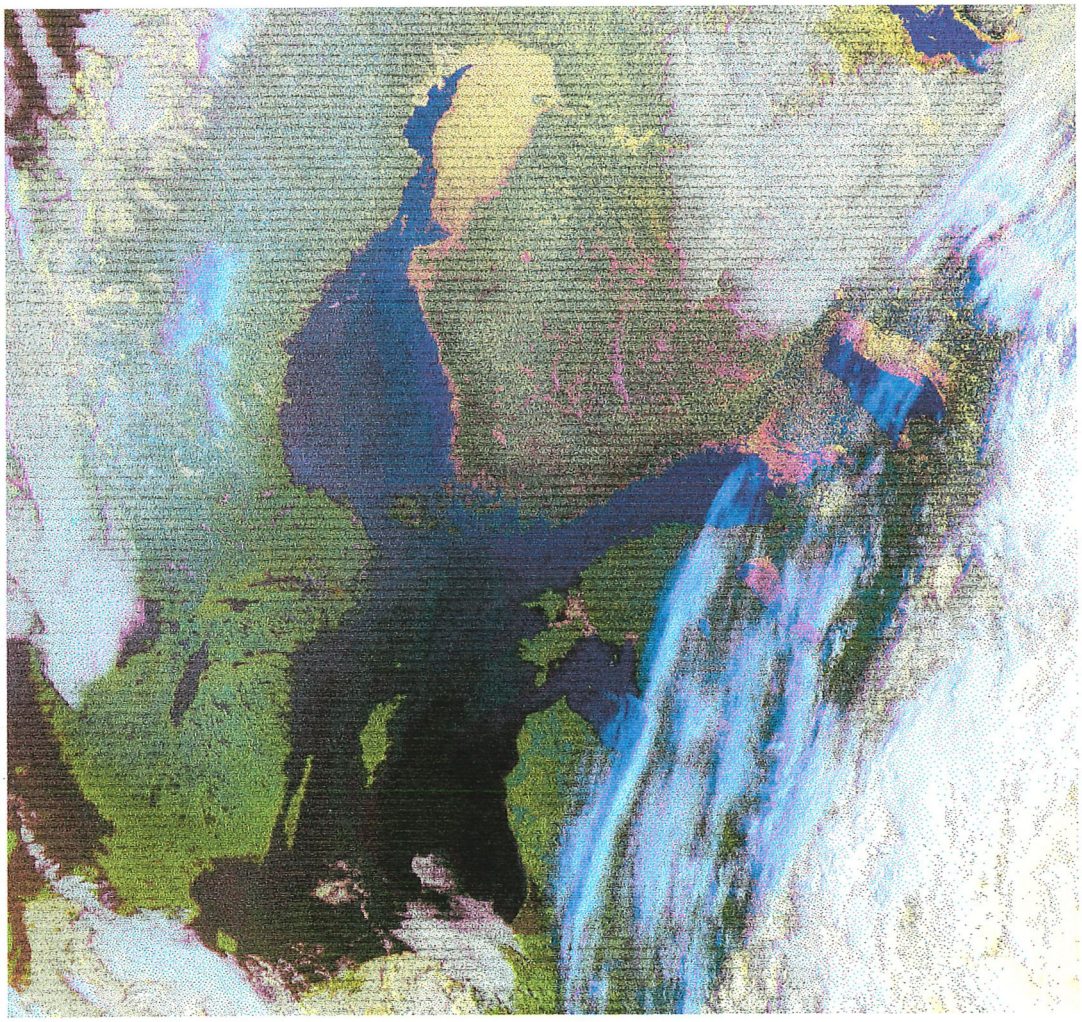

BSIM - 20
RIGA
25 - 29 SEPTEMBER 2000

20th Baltic Sea Ice Meeting

(BSIM-20)

Riga, 25 - 29 September 2000

F I N A L R E P O R T

Latvian Hydrometeorological Agency

December 2000

0. Introduction

The 20th Baltic Sea Ice Meeting was hosted by the Latvian Hydrometeorological Agency in Riga, Latvia. The Meeting opened on Monday, 25 September, at 2 p.m., and closed on Friday, 29 September, at 12 o'clock. The agenda of the Meeting and the list of participants are given in Annex 1 and Annex 2, respectively. The basic results of the Meeting are listed in a table of action items attached as Annex 3.

1. Opening of the Meeting

Mr. Andris Leitass, Director of the Latvian Hydrometeorological Agency, opened the Meeting and expressed his welcome to the participants. He stressed that for a long time sea ice has been the central topic of research joining together people from countries around the Baltic Sea. History has provided evidence of past co-operation initiatives in order to solve problems at a high scientific level. In closing his welcoming speech, Mr. Leitass stated that it is a great honour to host BSIM, which was initiated 20 years ago. In his response, the acting Chairman of the Baltic Sea Ice Meeting, Mr. K. Strübing, BSH, thanked Mr. A. Leitass and added that it was not only the 20th Meeting but that we also looked back on a 75-year history[1].

Mr. Mikhail Krasnoperov expressed the gratitude of the WMO Secretary General, Prof. G.O.P. Obasi, to the Latvian Hydrometeorological Agency and to the director, Mr. Andris Leitass, for hosting this Meeting and providing friendly and stimulating working conditions for the participants. Mr. Krasnoperov welcomed all participants to the 20th BSIM and wished them very fruitful discussions of sea ice activities during the Meeting.

2. Organization of the Meeting

[1] An overview of the history, which was given during the Meeting, reads as follows: On 7 and 8 June, 1925, the first meeting of ice service experts took place in Hamburg upon the invitation of the "Deutsche Seewarte", one of the BSH's roots. The main issues at the time were the standardization of sea ice reporting and coding and the organization of information exchange between the Baltic Sea States based on telegrammes and radio telegraphy. A second meeting of experts took place in Tallinn in 1927. and in the following period until the beginning of the Second World War, all relevant issues were discussed during five meetings of the *Hydrological Conferences of the Baltic States* (Tallinn 1928, Warsaw 1930, Leningrad 1933, Helsinki 1936, Berlin/Lübeck 1938). It was not until 1954 that the tradition could be resumed by organizing the 8th Ice Meeting in Helsinki. The 9th meeting took place in Hamburg in 1956, after which the intervals of Baltic Sea Ice Meetings became longer: 1968 once more in Helsinki, 1977 in Norrköping (where first the term *Baltic Sea Ice Meeting – BSIM* was introduced). After 1977, meetings had to be held routinely every two to three years because of rapid technological progress and due to the higher technical and organizational efforts needed to achieve the required improvement of the safety and ease of shipping in the ice-covered areas of the Baltic Sea (see Annex 4).

2.1 Election of the chairman

The Chairman of the 19th Meeting, Mr. K Strübing, asked Mr. A. Leitass as host of the Meeting to initiate the election of the chairman. All participants agreed to the proposal of Mr. Jan-Eric Lundqvist that Mr. Strübing should be elected chairman of this jubilee Meeting.

Mr. Strübing thanked for the honour and promised to do his best to make it a fruitful and successful Meeting.

2.2 Adoption of the agenda

The Meeting adopted the agenda as given in Annex 1.

2.3. Working arrangements

Mr. Strübing highlighted some topics that should be discussed in more detail with a view to the future (e.g. joint web-page and logo, seasonal reports, use of colour code, ECDIS). He invited the participants to introduce themselves and the institutions they represented because some colleagues participated for the first time in the Meeting. Furthermore, the Chairman announced that for each item on the agenda a 'rapporteur' would be nominated to assist the secretary in writing the minutes.

3. Sea ice observation techniques and exchange procedures.

3.1 Baltic Sea countries

Focusing on recent activities and new products, the participants informed the Meeting about the different methods used in the Baltic countries to obtain, process, transmit and exchange sea ice information. A list of regularly published products is given in Annex 5.

Finland, Germany and Sweden are using modern techniques like ICEMAP which enable the services to digitise ice maps, while Denmark and Latvia, for example, are making maps by hand in a time-consuming process. Finland and Sweden used RADARSAT operationally in the ice seasons 1998-2000 and were able to produce detailed charts.

Mr. Strübing reported on the activities at BSH. He emphasized that the INTERNET is the modern tool for disseminating information and recommended that more ice information

products should be made available on the INTERNET. Samples of web pages of the German ice service were presented.

Mr. Jan-Eric Lundqvist informed about the changes at SMHI concerning the status of the institute and the financial changes which the institute is presently facing as governmental resources are decreasing. He covered ice information obtained from various sources, including retrieved RADARSAT and NOAA data as well as icebreaker and helicopter observations. Regular users no longer receive data via letter post. E-mail and telefax are the most common transmission tools, but even Internet with code key (PIN number) is available and the number of users has increased. The chairman noted that the daily Swedish plain language GTS ice report generally is transmitted late because it is the NAVTEXT version which covers not only the Swedish waters. He asked for an exclusively national ice report, which should be transmitted to the other services on time. **Mr. Lundqvist promised to consider this from the forthcoming ice season.**

Mrs. Marzena Sztobryn of the Institute of Meteorology and Water Management, Poland, reported that the staff provided sea ice services mostly based on the "come and take'' principle because the main customers (Marine Administration and other institutions) are located close to the institute. As the routine work also includes water level forecasts they have a staff of 7 persons, only 3 of which work in the ice service, however. The routine products of the service are free of charge. So far no ice products have been presented on the INTERNET. She stated that new organizational concepts concerning the 'classification' of governmental institutions are being developed in Poland, but the outcome is still open.

Mrs. Helve Kotli, Estonian Meteorological and Hydrological Institute (EMHI), Estonia, stressed that in the two and a half years that have passed since BSIM-19 the service has been fully computerized. EMHI produces computer-based ice charts. The products are delivered by e-mail, partly by fax, to the customers, whose number has increased from 25 to 30. However, the general situation at the institute is not good, both with regard to personnel and to the financial situation. The commercial organizations refuse to pay, some of them have even refused to purchase EMHI products due to the mild winters. At the same time, governmental organizations do not finance EHMI as much as they should (according to the SOLAS Convention). The forecaster staff has been reduced from five to three people in spring 2000. The most experienced oceanographer has retired, and the position is taken by newly graduated people, who still need some training. The institute has a home page on the

INTERNET (via the Ministry of Environment), but it contains mostly meteorological information.

Klaas Wierenga, RIZA, The Netherlands, highlighted the activity of RIZA, an advisory and research institution for inland water management not only for The Netherlands. Using tables and charts for illustration (Annex 6), he described the functions and tasks of the INFO centre, the application of BC 2000 to provide information to shipping by using GIS which is much better and quicker, etc. About 500 observers provide coded ice reports for 7 sea harbour approaches and all inland waters in The Netherlands to 42 monitoring centres. The new information system based on INGRES software includes all relevant parameters for ice navigation. It can be 'dialled in' free-of-charge. Information can be extracted to navigate from A to B. Ice charts are offered on the INTERNET. Customers can zoom in by selecting special sections of the chart. The reports for the Wadden Sea have to be shortened considerably as the available NAVTEXT transmission time is rather limited. To improve warning services, transponders are used for ship identification.- Jan-Eric Lundqvist stressed the limited value of coded ice information in dynamic areas as the North Sea coast, but also in the Baltic Sea. The coded information is valid for only a limited period of time. Mr. Bellmann stated that the transponder technique for ship identification would be introduced by IMO regulations from 2002.

Mr. Shishkin reported that three persons within the Coastal Hydrology Division of LMHA are responsible for the Ice Service. The main user is the Maritime Administration, besides 4 other customers. The problem is that the latter wait with their subscription order to the very last moment. Icebreaker VARMA is informed via the Port Authority. The plain language report and the coded ice information, which is automatically integrated, are transmitted to Norrköping for further distribution via GTS. The main source of ice information is the NOAA weather satellites, the AVHRR data of which are processed with the SCANEX system. One to three ice charts are hand-drawn per week. In the future, LHMA's basic needs will be: PC-based ice maps, transmission of satellite images to the customers and data transmission techniques to the icebreaker and other vessels.

Commander Kim Möller Petersen, Admiral Danish Fleet (Søværnets Operative Kommando - SOK), told that from 1 January 1996, the Danish Ice and Icebreaking Service is under the responsibility of SOK. 142 ice observers - 20 of them on ferries - provide daily (coded) ice information. A list with the daily observation plus plain language report is offered

free of charge via dial-in-telefax and INTERNET to the public. The international station list is presented via coastal radio transmission.- Mr. Strübing also pointed out that BSH and SOK have decided to jointly produce an ice chart of the western region of the Baltic Sea.

Mr. Ari Seinä from FIMR, Finland, highlighted the great value of RADARSAT data, automatic SAR image classifications and networks capable to transmit high resolution sea ice information in digital format to the users at sea. Special information systems have been set up for icebreakers (in early 1990s called IBPlott) and for selected ship owners (in 1997 called ViewIce). Special ice information products, including merged AVHRR and SAR satellite images, ice charts and SAR based high resolution classification maps are transmitted via e-mail. The 3-day ice drift forecasts are given in plain language to Finnish icebreakers. These forecasts were delivered also to merchant ships in 1997-1999 but not in 2000. Once a week the Finnish ice service also publishes the simplified sea ice and SST chart in Internet (http://ice.fmi.fi/tilanne.htm). Legal and economical aspects are preventing to release the high resolution ice charts into the Internet.

Mr. Georgy Pastukhov, Regional (North-Western) Administration for Hydro-meteorology and Control of Natural Environment, informed about economic policy in the Russian Ice Service. The main requirement is to offer safe navigation, and the ice service is considered a governmental authority with commercial aspects. There is a need to sell products and services to users in order to cover the budget. However, there are even problems with the main customer, St. Petersburg Harbour. Important progress has been achieved in technology, mainly with respect to data processing and data transmission to icebreakers (cp. 8.2).

3.2 Other countries/areas

As there were no participants from countries outside the Baltic Sea region this item of the agenda could be skipped.

3.3 Exchange procedures

Most countries transmit the coded ice observations and plain language reports via GTS and telefax. The possibility of transmitting ice reports also via e-mail was discussed. The **Meeting decided that** in the winter of 2000/01 reports between the ice services should

also be transmitted via e-mail, in addition to GTS and telefax. **If the experiences are positive, there is no need to use telefax in the winter of 2002.** Furthermore, **it was agreed that administrative and technical information about the ice services would be listed and that the lists of telephone numbers, telefax numbers, e-mail addresses and web-site addresses from various institutes and ice services would be updated and added to the minutes in Annexes 7 to 9.**

3.4 Harmonization: Requirements and possibilities

It was decided to discuss this item in detail in connection with item 13 of the agenda: *Perspectives of the national ice services.*

4. Baltic Sea Ice Code (BSIC)

4.1 Experiences

Jan-Erik Lundqvist stated that BSIC was originally an observing code. During the last 20 years, it has been good for statistical purposes and data exchange between the ice services. It is still of good use, but customers rely more on the ice reports in plain language, which provide the ice information in a more user-friendly format. Furthermore, due to the automatization of lighthouses and the reduction of staff in relevant agencies, it is becoming more difficult from ice season to ice season to engage a sufficient number of ice observers. - There were no comments on the need to change the Baltic Sea Ice Code. Therefore, the present code will continue to be used.

Klaas Wierenga pointed out that there were several discrepancies within the fairway section of the present BSIC booklet that needed correction. Mr. Lundqvist agreed to take care of the editing of the new version of the present booklet. He said **the new booklet would be ready by the spring of 2001**, although due to the missing language contribution from Lithuania it may be later. **The delegates were asked to report any additional discrepancies they may find to Jan-Erik Lundqvist.**

4.2 Need for further development

The Meeting recommended that section 7 (fairway sections and areas for ice reports) in the booklet *Baltic Sea Ice Code* should be checked with respect to changes made in some countries during the last 20 years.

As SMHI agreed to issue the second edition of the booklet, and in section 6 (multilingual vocabulary of sea ice terms for the Baltic region) that information also has to be included in the Estonian, Latvian and Lithuanian languages, **the Meeting requested the chairman to write a letter to the head of the national service of Lithuania asking him to provide the still missing Lithuanian translation.**

5. Review of the WMO/JCOMM Sea Ice Activities

The Meeting noted that the information provided by the WMO representative M. Krasnoperov (see Annex 10) summarized the main achievements and activities in the field of sea ice relevant to JCOMM which have taken place since the twelfth session of the former CMM. In particular, activities were reviewed in relation to the Global Digital Sea Ice Data Bank (GDSIDB)[2], processing, exchange and quality control of sea ice data, sea ice publications and future structure of the former CMM Sub-group on Sea Ice.

Furthermore, the Meeting was informed that WMO appreciated the important work that was being done by regional and international groups such as the BSIM and IICWG in sea ice activities. It was agreed that collaboration should be continued between the recommended Expert Team on Sea Ice and these groups, and the future chairman of the Expert Team and WMO and IOC Secretariat were requested to arrange for such collaboration, as appropriate. The proposed Expert Team on Sea Ice will consist of six to eight elected members.

Mr. Lundqvist recommended the new updated version of WMO publication No 574: *Sea Ice Information Services in the World,* one copy of which has been mailed to each

---

[2] The GDSIDB, including the Baltic Sea, is available on the web sites
http: // www.aari.nw .ru/gdsidb/gdsidb.2.html
http://www.dmi.dk/pub/GDSIDB_mirror/content.html
and
http: // www-nsidc.colorado.edu

A list of additional relevant Web Site Addresses was provided as Annex 11.

member state. If required, additional copies can be purchased from the WMO secretary. An extract covering the BSIM services is given as Annex 12.

6. Digitizing of Sea Ice Charts for the Period from 1960/61

6.1 Status

Klaus Strübing informed the Meeting of the ice chart data bank at the BSH. Information in the bank is related to dates, geographical position, international codes. There are problems concerning the presentation of the coastal areas, as ice charting only starts when the ice formation has spread to the sea areas. However, except the winter of 1996 and some local areas, the data are complete for the time period from 1961. The compatibility of the data format with SIGRIG has to be checked. Assistance from the GDSIDB (e.g. Vasily Smolyanitsky) may be required.

Information just available with respect to activities of the International Ice Charting Group (IICWG) was presented by the Chairman. A questionnaire on ice climate products and relevant data banks was explained. **The chairman proposed to copy and distribute the questionnaire among the participants, asking them to complete it during the Meeting as far as possible**. The Meeting agreed to this procedure (see Annexes 13a and 13 b).

6.2. Future activities

Jan-Eric Lundqvist informed the Meeting about the planned continuation of work on the Baltic Sea ice chart digitization covering the period 1979/80-2000. SMHI has started a project in order to digitize these ice charts in a simple digital code, presenting only ice concentration and ice thickness.

Some information added is minor ridges, heavy ridges and rotten ice. It will then be connected to SIGRID code, hopefully with the help of Vasily Smolyanitsky, AARI, for implementation in the GDSIDB. **The plans provide for delivery of the data by Finland/Sweden in the year 2002.** The chart will cover the whole Baltic region including the Belts, Kattegat and Skagerrak.

7. International System for Sea Ice Symbols

Klaus Strübing discussed the different philosophies of the European and North American ice services in presenting ice information. He showed samples of the Canadian and US Ice Services' charts which are 'crowded' with eggs, as compared to the more user friendly ice charts of the Baltic Sea services which prefer the hatching symbology. Besides, that the symbols will get a revision by members of the JCOMM Sub-group on Sea Ice (SGSI) as stated by Mr. Krasnoperov.

The Chairman emphasized that the development of new presentation techniques includes **colour coding** as a new tool for easier reading of ice charts, which should be discussed. 'We have to approach WMO with a recommendation', he declared, and presented German, Canadian and U.S. sample charts. The recently presented draft proposal of the Canadian Ice Service can be used as a basis for further discussion.

Jan-Erik Lundqvist stressed that the transmission of colour charts is good for land lines but very expensive for, e.g., satellite transmission to vessels because of the bigger file size. Swedish experience is that vessels refuse to receive them if they have to pay for them.

The Meeting recognized the advantages of coloured ice charts. The Chairman declared to initiate further action at the IICWG meeting in Rejkjavik, Iceland (3-5 Oct. 2000), where the topic will be discussed in detail, in order to approach the chairman of the JCOMM Sub-Group on Sea Ice with a proposal to be considered at the JCOMM-I session (June 2001, Akureyri - Iceland).

8. Ice Charts

8.1 New satellite related ice charts

K. Strübing reported on new products of DCRS and BSH, which are presented on their respective web-sites (http://www.dcrs.dtu.dk/ftp/ssmi/icemaps/latest/ice.html and http://www.bsh.de/Oceanography/Ice/Publications.htm, respectively). The products mentioned are:

- daily SSMI based automatic generated ice chart, with a resolution of 12 km,
- daily NOAA quick-look images, which are also generated automatically immediately after a satellite pass,

- weekly SST/Ice-charts. The chart is a composite chart of one week NOAA-images.

8.2 New production techniques and products

Mr. Pastukhov (Russia) presented their new techniques for ice charting and product distribution. The system is based on Windows and GIS software as well as on the Russian-made dkPort-program. Users are port authorities and icebreakers. Further-more, the Russian Ice Service uses NOAA images and coastal observations, helicopter and icebreaker observations for ground truth data. The ice charts produced with the data are transmitted to the users by telefax and e-mail within eight hours.

The Meeting acknowledged Mr. Pastukhov for the progress that has been made in the Russian Ice Service, especially with respect to the presentation of ice charts. The relevant PC-based ice charting programme was of special interest, but no further technical details could be given.

Finland and Sweden mentioned that they have used RadarSat Narrow Scan SAR images routinely for ice charting since the winter of 1997/98 (more information will be provided in Topic 9.2).

9. Remote Sensing

9.1 ESA data politics, products and prices

Klaus Strübing gave an introduction to SAR satellites, with emphasis on the existing ERS-2 and RadarSat-1 satellites and the new ENVISAT, which will be launched next year. Although the radar images are essential for sea ice monitoring, their use is rather limited because of the high prices, mainly for RadarSat data. The Finnish and Swedish ice services nevertheless use the data. The German Ice Service uses the comparatively cheap ERS data. With respect to ENVISAT, there were complaints that due to the ESA pricing policy governmental operational services are in the same user category as commercial customers, even as ESA member states.

9.1 RADARSAT and ENVISAT data utilization

ENVISAT is scheduled to be launched in the summer of 2001. The data will be available at the earliest at the end of the year 2001.

Jan-Erik Lundqvist presented the Swedish experiments using RadarSat SAR data and gave some examples.

Jouni Vainio presented the Finnish experiences with the use of RadarSat images. The data have to be ordered at Tromsø Satellite Station (TSS) about two weeks in advance. The time lag between data receiving at the satellite station and data use by the ice service and on board the icebreakers has been improved since 1998. It varies between about 4 hours for day orbits and up to 22 hours for data received at TSS during the night. - The user experiences, both within the ice services and on board the icebreakers, have been mostly positive.

Hannu Grönvall and Jan-Erik Lundqvist confirmed that the essential problem in the use of RadarSat SAR data is the high price. Finland is more keen on continuing the use of RadarSat SAR data than Sweden. Jan-Erik Lundqvist mentioned that the special navigation conditions on the routes to the Swedish harbours in the Bay of Bothnia do not necessarily require SAR data, as the bathymetry scarcely allows alternate routes.

Klaus Strübing presented some general views concerning the use of SAR data in ice studies and how to interpret it by using additional information (see Annex 14).

10. Reports of the Ice Breaking Services: Co-Operation with Ice Services, Requirements

Short statements of the Icebreaking Services were presented.

Mr. Karl-Uwe Bellmann, Germany, gave a short introduction to the new German multi-purpose vessel "Neuwerk", which was tested with good results in March 1999 in the northern Gulf of Bothnia and off Helsinki.

Björn Sjöman reported that Finland has 23 winter ports with some kind of industrial activity. Icebreaking services are widely provided. The icebreaker fleet consists of icebreakers of various types. Some of them have technical problems. A new icebreaker is about to be put into operation and will replace the oldest one. Figures on the operation of the icebreakers

were provided. The problems are: trouble with the ship operators who present papers which are suspicious regarding tonnage and ice class of ships. Instructions will be given to surveyors to be more strict with certificates.

Anders Backman reported that the 8 vessels in the icebreaker fleet are meant for different operational areas. Two vessels have been sold and are being replaced by three combined offshore and icebreaking vessels within the framework of a new building programme. One of the vessels was delivered last winter, and the other two will be put into operation in the winter of 2000/01. During tests, the performance of the vessels exceeded expectations. The number of vessels in operation depends on the severity of the winter. A severe winter requires more icebreakers. Mr. Backman reported also on the new structure of the Maritime Administration. The Ship Management and Icebreaking Department will be more independent within the Administration and have responsibility for the operation of all vessels belonging to the Administration, besides the icebreakers. The new structure seems to be very effective. This season the Swedish state icebreakers carried out 353 escort missions including 13 towings.

Kim M. Petersen, Denmark, reported on the Danish Icebreaking Service, which consists of 3 icebreakers plus chartered tugs. A fourth icebreaker presently is not operational. Due to severe technical problems it was laid up pending a final decision on its future. When ice conditions are severe, priorities have to be set for icebreaker assistance. The order of priority is as follows: (1) ships in distress, (2) ships bound to Danish ports, (3) ships bound to foreign Baltic ports, and (4) ships in transit. Furthermore, Mr. Petersen informed the Meeting that Denmark had hosted the annual Baltic Icebreaking Meeting on 12 to 14 September. Among others, the problem of severe winters in the southern Baltic Sea was discussed, and a *letter of intent* for a new agreement on icebreaker co-operation in the southern and western Baltic had been drawn up to be discussed with the relevant national authorities (see Annex 15).

Mr. Dreimanis , the representative of the Latvian Maritime Administration, informed the Meeting that there is no special icebreaking service in Latvia. Just one icebreaker owned by the port authority of Riga is available. Besides the Gulf of Riga, in normal winters the Latvian ports (Liepaja, Ventspils) are not influenced by ice. In more severe winters in the northern Baltic Sea, as in 1993, when ice also occurs along the coast of the Baltic Proper - especially

under onshore wind conditions, Latvia co-operates with Danish colleagues. Since 1996, the icebreaker VARMA has been bound to the ports of Riga and Ventspils. It is not a modern vessel (built 1968 in Finland), but has good technical characteristics. Problems arise with the maintenance of the vessel during the summer and unemployment of 10-12 crew members. Re-organization is under way in the structure of the administration. Future actions include the launching of a Coast Guard vessel to monitor pollution of the marine environment.

The Chairman asked whether the total Baltic icebreaker fleet would be sufficient to provide proper assistance in case of a very severe winter. Nobody could give an exact figure. However, Mr. Backman said that a tentative answer may be about 3 vessels. The most critical areas would very likely be the transit fairways in the southwestern Baltic Sea (Belts and Sound) and the routes towards the harbours of the Baltic States. The Meeting encouraged an agreement to be concluded among the authorities/governments on the operation of icebreakers.

Mr. Krasnoperov noted that it had been recommended at the last meeting (BSIM-19, Lelystad) that all icebreaking services of the Baltic region should be invited to the Meeting in 2000. The Chairman answered that obviously some addresses were missing in the mailing list. **It was again recommended that the mailing list should be updated for the next BSIM. The Chairman promised to take action together with the local organizer.**

11. Baltic Sea Ice Climate

M. Sztobryn from Poland reported on the 3rd Workshop of Baltic Sea Ice Climate held in Poland in October 1999. Participants were from Estonia, Finland, Germany, Latvia, Poland, Sweden, and WMO. Prof. M. Leppäranta from the Helsinki University was the chairman of the workshop. The main topics covered a) mathematical modelling of Baltic sea ice, b) interpretation of satellite images, c) description of sea ice conditions of some coastal waters of the Baltic Sea, d) classification of ice seasons.

The participants of the 3rd Workshop decided to prepare the long-term description of sea ice conditions along the Southern Baltic in the 20th century. A relevant Working Group was established, and the first Meeting of this group will be held in Riga, 29-30 September, 2000.

Klaus Strübing informed about climatological investigations of sea ice conditions in Germany.

Jan-Erik Lundqvist discussed regional differences in the severity of ice conditions in Swedish coastal waters during the same winter season.

The Chairman stated that the Ice Services need reliable seasonal forecast not only of the severity of the winter but also of the expected obstruction to navigation. However, research so far has not provided satisfactory data to meet these requirements.

12. International Activities (Data Banks, Workshops, Projects, Co-Operation)

Klaus Strübing introduced the International Ice Charting Working Group (IICWG), which was formed in October 1999 to promote co-operation between the World's ice centres in all matters concerning sea ice and icebergs. He emphasized the objectives (actions) of the WG by presenting Annex 16.

Ari Seinä reported about the Finnish ice service related research projects in the 1990s. The ice service has been benefited from these projects especially concerning SAR classification, ice drift modelling and the development of presentation systems for information products. He also presented the European Commission shared-cost ongoing IWICOS projects (Weather, Sea ice and Ocean Service System), which is aimed at providing high resolution weather, sea ice and oceanographic data and forecasts in digital format to users at sea. In the Baltic Sea area these products are planned to include weather products like wind, temperature and pressure, sea ice products like charts, satellite images, SAR ice class maps, ice drift forecasts and ocean products like wave and water level data as well as wave forecasts.

The participants were informed by the representative of WMO and other participants of the following Meetings on sea ice activities in the near future:

1) 2nd IICWG meeting, Reykjavik, Iceland, October 3-5, 2000,

2) 4th ERS-ENVISAT Symposium, Gothenburg, Sweden, 16-20 October 2000,

3) 16th International Symposium on Okhotsk Sea & Sea Ice ", Mombetsu, Japan, 4-8 February, 2001,

4) 1st session of the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology, Akureyri, Iceland, 19-29 June, 2001, and

5) 9th session of the Steering Group for the GDSIDB, Argentina, October 2002.

13. Perspectives of the National Baltic Sea ice services

Klaus Strübing introduced this important item by highlighting the situation at the BSH, which is facing a possible reduction in its budgets for staff and materials within this decade. The tasks of the institute were reviewed, and the core tasks were identified. The core tasks presently are: i) marine forecasting and warning services covering wind set-up and storm surge warning service, ii) ice service that will be put into co-operation with the countries bordering the Baltic Sea (if this cannot be realized, the services will be merged with the wind set-up and storm surge warning service in Hamburg). The consequences of an expected staff reduction are e.g.:

- delays in data handling and interpretation and in the provision of products and services,
- less advice and expertise available to authorities.

Jan-Erik Lundqvist said that SMHI had been asked some years ago to save money, and they had to reduce people. Lateron, when the situation changed, the matter was re-considered and they were allowed to employ these people again. Experience has shown that all of these changes negatively affect people's lives and the work itself. For example, research on climate change is now essential, but it cannot be performed by the staff of the Marine Forecasting Service which is occupied with daily routine operations.. 'We need, and we have, a good co-operation within the Baltic region, and I am not sure that we have to reduce ice services'.

The Meeting recommended that concepts should be developed concerning the future, that the managers of the respective institutes should be informed of what their Ice Services are doing and what they are thinking about. Klaas Wierenga stated that the Ice Services and the Meeting have to do something which is really visible (e.g. regular information in newsletters, WMO publications and the like).

Mr. Krasnoperov proposed to create (and demonstrated) the ACTION SHEET, a kind of action plan which strictly identifies the actions to be taken, the responsible person and the implementation date (the rest may be added).

Hannu Grönvall said that the winters show a wide range of variations, but they are always of importance to Finland, Sweden and Russia, while milder seasons are of no relevance to the countries of the southern Baltic region, as for instance Poland Therefore, it is difficult to find joint projects.

Klaas Wierenga stressed that the national agencies are - and will continue to be – indispensable for ice reporting and forecasting in their 'home waters'. **The Meeting unanimously agreed on this statement as the basis for future joint activities.**

As a result of further discussions on this item, the following **first step actions were suggested:**

(i) **To link the INTERNET addresses,**

(ii) **To create a joint web page for the Baltic Sea ice services.** Klaus Strübing proposed a draft logo. The Finnish delegation offered their support in the creation of a logo as they have some ideas in this regard. **The Meeting agreed on the development of a logo and decided that Finland and Germany should carry out this task;**

(iii) **The contents of the web page should include general sea ice information products free of charge on the joint INTERNET site. The Finnish delegation proposed, e.g., their recent simplified ice map for use on the INTERNET. Klaus Strübing suggested the daily coded ice information, which can be evaluated and contributed by the German Ice Service**

(iv) **Exchange of reports and maps via e-mail;**

(v) **A joint summary on the character and development of the ice winter in the Baltic Sea shortly after the end of the season, which will be based on and comprehend existing Finnish, German and Russian reports.** (Jan-Erik Lundqvist presented the year-book published by SMHI and the Ice Service. The publication will be continued. He pointed out problems that arise when talking about a joint publication: what should be included, printing of figures, who would do what, etc.).

Hannu Grönvall proposed to make available common information on the web site, provided that someone takes care of the work. **It was decided to create a Working Group**

of 4 persons for Web communication/presentation between the Baltic Sea Ice Meetings, consisting of Jan-Erik Lundqvist (Sweden), Klaus Strübing (Germany), Jouni Vainio (Finland), and Klaas Wierenga (The Netherlands).

14. Other Questions

There were no contributions

15. Adoption of the Draft Report

After some changes the draft report was adopted. Written comments provided by the participants will be adapted by the Chairman and, after a last review, the final version of the report will be delivered to LHMA for technical termination and distribution to the participants of the Meeting and relevant agencies.

16. Date and Place of the Next Meeting

The 21st Baltic Sea Ice Meeting will be held in Finland in the last week of September 2003.

17. Closing of the Meeting

The Chairman thanked the participants for their valuable contributions to the success of the Meeting. Especially the activities of the colleagues from LHMA as hosts were acknowledged. Björn Sjöman, Finland (the day before) and Karl-Uwe Bellmann were discharged from the Meeting with hearty thanks and small gifts, as they will retire during the intersessional period.

The Meeting was closed exactly at noon, September 29.

ANNEXES

to the

Final Report BSIM-20

List of Annexes

Agenda

BSIM-20 **Riga, 25-29 Sept. 2000**

SCHEDULE	AGENDA
	Monday, 25 September
14.00 – 17.00	**1. Opening of the Meeting by Mr. A. Leitass, Director LHMA**
	2. Organization of the Meeting
	2.1 Election of the chairmen
	2.2 Adoption of the agenda
	2.3 Working arrangements
	Tuesday, 26 September
09.00 – 13.00	**3. Sea ice observation techniques and exchange procedures**
	3.1 Baltic Sea countries
09.00 -- 13.00	3.2 Other countries/areas
	3.3 Exchange procedures
	3.4 Harmonization: Requirements and possibilities
	4. Baltic Sea Ice Code
	4.1 Experiences
	4.2 Need for further development
14.00 - 17.30	**5. Review of the WMO/JCOMM sea ice activities**
	6. Digitizing of sea ice charts for the period from 1960/61
	6.1 Status
	6.2 Future activities
	7. International System for Sea Ice Symbols
	7.1 Experiences
	7.2 WMO Sea Ice Nomenclature, Symbols and Codes
	7.3 Colour Coding
	Wednesday, 27 September
09.00 - 12.30	**8. Ice charts**
	8.1 New satellite-related ice charts
	8.2 New production techniques and products
	8.3 Transmission techniques
	8.4 Joint production
	9. Remote Sensing
	9.1 ESA data politics, products and prices
	9.2 RadarSat and ENVISAT data utilization
14.30 - 17.30	**EXCURSION: Tour about OLD RIGA**
18.30	**Official Dinner offered by Mr. A. Leitass, Director LHMA**

Thursday, 28 September

09.00 - 13.00

10. Reports of the Icebreaking Services
(co-operation with Ice Services, requirements)

11. Baltic sea ice climate

11.1 Classification of ice seasons

11.2 International activities

14.00 - 18.00

12. International affairs and events
(workshops, projects, co-operation, working groups as IICWG

13. Perspectives of the national Baltic ice services

Acquaintance with Latvian Hydrometeorological Agency

Friday, 29 September

09.00 - 12.00

14. Other questions

15. Adoption of the Draft Report

16. Date and place of the next Meeting (BSIM-21)

17. Closing of the Meeting

List of Participants

BSIM-20, Riga 25-29 September, 2000

List of participants

Institute:	Swedish Maritime Administration (SMA)
Name:	Anders Backman
Address:	Slottsgatan 82
Place:	601 78 Norrköping
Land:	SWEDEN
Telephone:	+46 11 19 12 15
Telefax:	+46 11 10 31 11
E-mail:	anders.backman@sjofartsverket.se

Institute:	Wasser- und Schiffahrtsamt Kiel-Holtenau (WSA K-H)
Name:	Karl-Uwe Bellmann
Address:	Schleuseninsel 2
Place:	24159 Kiel
Land:	GERMANY
Telephone:	+49 431 3603450
Telefax:	+49 431 3603454
E-mail:	vkz.nok@t-online.de

IDEM.

Institute:	Rijkswaterstaat (RIZA)
Name:	Robin Bontenbal
Address:	Postbus 17
Place:	8200 AA Lelystad
Land:	THE NETHERLANDS
Telephone:	00 31 320298568
Telefax:	0031320298580
E-mail:	r.bontenbal@riza.rws.minvenw.nl

NIEUWE NAAM OF ER UIT.

Institute:	Maritime Administration of Latvia Region of Ventspils
Name:	Arvids Buks
Address:	77a Ostas Str.
Place:	Ventspils, LV-3600
Land:	LATVIA
Telephone:	+371 36 23324
Telefax:	+371 36 23176

Institute:	Maritime Administration of Latvia Hidrographic Service (MAL HGS)
Name:	Laila Bunzha
Address:	5 Trijadabas Str.
Place:	Riga, LV- 1048
Land:	LATVIA
Telephone:	+371 7062135
Telefax:	+371 7062123
E-mail:	laila@lhd.lja.bkc.lv

Institute:	Maritime Administration of Latvia (MAL)
Name:	Valdis Dreimanis
Address:	5 Trijadabas Str.
Place:	Riga, LV- 1048
Land:	LATVIA
Telephone:	+371 7062120
Telefax:	+371 7860082
E-mail:	dreimanis@ lja.bkc.lv

Institute:	Latvian Hydrometeorological Agency (LHMA)
Name:	Lydmila Gavrisha
Address:	P.O.Box 60
Place:	Ventspils, LV-3601
Land:	LATVIA
Telephone:	+371 36 81732
Telefax:	+371 36 81731

Institute:	Finnish Institute of Marine Research/Ice Service (FIMR)
Name:	Hannu Grönvall
Address:	P.O.Box 304
Place:	00181 Helsinki
Land:	FINLAND
Telephone:	+358 9 6139 4422
Telefax:	+358 9 6857 638 or 9 6857 639
E-mail:	hannu.gronvall@fimr.fi

Institute:	Latvian Hydrometeorological Agency (LHMA)
Name:	Janis Kostjukov
Address:	165, Maskavas Str.
Place:	Riga, LV-1019
Land:	LATVIA
Telephone:	+371 7032617
Telefax:	+371 7145154
E-mail:	marine@meteo.lv

Institute:	Estonian Meteorogical and Hydrological Institute (EMHI)
Name:	Helve Kotli
Address:	10143 Ravala 8
Place:	Tallinn
Land:	ESTONIA
Telephone:	+372 6461629
Telefax:	+372 6461577
E-mail:	helve.kotli@emhi.ee

Institute:	WMO (WMO)
Name:	Mikhail N.Krasnoperov
Address:	7 bis. Avenue de la Paix, Case postale N 2300
Place:	CH-1211 Geneve 2
Land:	SWITZERLAND
Telephone:	+41 22 730 82 23
Telefax:	+41 22 730 80 21
E-mail:	krasnop@www.wmo.ch

Institute:	Swedish Meteorological and Hydrological Institute (SMHI)
Name:	Jan-Eric Lundqvist
Address:	SMHI, Marine Services
Place:	S-601 76 Norrköping
Land:	SWEDEN
Telephone:	+46 495 85 39
Telefax:	+46 495 84 03
E-mail:	jan-eric.lundqwist@smhi.se

Institute:	North-Western Regional Administration for Hydrometeorology and Environmental Monitoring (NWRA/HEM)
Name:	Georgy V.Pastukhov
Address:	23 Line, 2a, Basil Island
Place:	199026 St.Petersburg
Land:	RUSSIA
Telephone:	+ 7 812 328 14 67
Telefax:	+ 7 812 328 09 62
E-mail:	adm@nwmet.nw.ru

Institute:	Admiral Danish Fleet (SOK)
Name:	Kim Moller Petersen
Address:	Po Box 483
Place:	DK-8100 Aarhus C
Land:	DENMARK
Telephone:	+45 89433253
Telefax:	+4589433230
E-mail:	bkif@sok.dk or istseneste@sok.dk

Institute:	Maritime Administration of Latvia Hidrographic Service (MAL HGS)
Name:	Yury Ryzhov
Address:	5 Trijadabas Str.
Place:	Riga, LV- 1048
Land:	LATVIA
Telephone:	+371 7062135
Telefax:	+371 7062123
E-mail:	jurijs@lhd.lja.bkc.lv

Institute:	Finnish Institute of Marine Research/Ice Service (FIMR)
Name:	Ari Seinä
Address:	P.O.Box 304
Place:	00181 Helsinki
Land:	FINLAND
Telephone:	+358 9 6139 4440
Telefax:	+358 9 6857 638 or 9 6857 639
E-mail:	ari.seina@fimr.fi

Institute:	Latvian Hydrometeorological Agency (LHMA)
Name:	Yuriy Shishkin
Address:	165, Maskavas Str.
Place:	Riga, LV-1019
Land:	LATVIA
Telephone:	+371 7032616
Telefax:	+371 7145154
E-mail:	hydro@meteo.lv

Institute:	Finnish Maritime Administration (FMA)
Name:	Björn Sjöman
Address:	P.O.Box 171
Place:	00181 Helsinki
Land:	FINLAND
Telephone:	+358 204484216
Telefax:	+358 204484431
E-mail:	bjorn.sjoman@fma.fi

Institute:	Bundesamt für Seeschiffahrt und Hydrographie (BSH)
Name:	Klaus Strübing
Address:	Bernhard-Nocht-Straße 78
Place:	20359 Hamburg
Land:	Germany
Telephone:	+49 403 190 3120
Telefax:	+49 403 190 5032
E-mail:	klaus.struebing@bsh.d400.de

Institute:	Institute of Meteorology and Water Management (IMGW)
Name:	Marzenna Sztobryn
Address:	Waszyngtona 42
Place:	PL-81 342 Gdynia
Land:	POLAND
Telephone:	+48 586205221
Telefax:	+48 586205493
E-mail:	sztobryn@stratus.imgw.gdynia.pl

Institute:	North-Western Regional Administration for Hydrometeorology and Environmental Monitoring (NWRA/HEM), Ice service
Name:	Dmitry Taliev
Address:	23 Line, 2a, Basil Island
Place:	199026 St.Petersburg
Land:	RUSSIA
Telephone:	+ 7 812 321 30 18
Telefax:	+ 7 812 323 45 19
E-mail:	sea@nwmet.nw.ru

Institute:	Finnish Institute of Marine Research/Ice Service (FIMR)
Name:	Jouni Vainio
Address:	P.O.Box 304
Place:	00181 Helsinki
Land:	FINLAND
Telephone:	+358 9 6857 659
Telefax:	+358 9 6857 638 or 9 6857639
E-mail:	jouni@ice.fmi.fi

Institute:	Rijkswaterstaat (RIZA)
Name:	Klaas Wierenga
Address:	Postbus 17
Place:	8200 AA Lelystad
Land:	THE NETHERLANDS
Telephone:	00 31 320298888
Telefax:	00 31 320298580
E-mail:	k.wierenga@riza.rws.minvenw.nl

Institute:	Maritime Administration of Latvia Hidrographic Service (MAL HGS)
Name:	Imant Zemlyakov
Address:	5 Trijadabas Str.
Place:	Riga, LV- 1048
Land:	LATVIA
Telephone:	+371 7062124
Telefax:	+371 7062123
E-mail:	imants@lhd.lja.bkc.lv

Table of Action Items

Action Items resulting from BSIM-20, Riga, 25-29 September 2000

Item	Subject	Action	Responsibility	Date
3.1/3.3	National Ice Reports	Sweden provides early plain language report for only national waters	Jan-Eric Lundqvist (SMHI)	Start season 2000/01
3.3	National Ice Information Products	Exchange of ice information products between the Ice Services routinely also by e-mail	BSIM Members	Start season 2000/01
4.1	Baltic Sea Ice Code of 1980	Review of the 1980 booklet, mainly fairway sections	BSIM Members	12/2000
4.2	Baltic Sea Ice Code of 1980	Letter to head of Lithuanian Service with respect to contribution to multi-lingual ice terms in Lithuanian language	Klaus Strübing (BSH)	11/2000
4.2	Baltic Sea Ice Code of 1980	2nd edition on booklet BSIC	Jan-Eric Lundqvist	05/2001
6.1	GDSIDB Questionnaire on climatological products	To fill in/review as far as possible	BSIM Members; Klaus Strübing for the return to F. Fetterer (GDSIDB)	12/2000
7.3	Colour Code	Recommendation to WMO/JCOMM within IICWG activities	Klaus Strübing	05/2001
10	Mailing List	Up-date (incl. Icebreaking Services) for BSIM-21	Klaus Strübing	02/2002
13	Web Addresses	Linking of all national Ice Service addresses on the Internet	BSIM Members	Start season 2000/01
13	BSIM Logo and Web Site	Creation of BSIM logo and web site and web site maintenance	Jouni Vainio (FIMR) Klaus Strübing (BSH)	Start season 2000/01
13	Info and Products on the joint BSIM web site	Coordination, contributions, editorial activities	J.-E.Lundqvist (SMHI) K. Strübing (BSH) J. Vainio (FIMR) K. Wierenga (RIZA)	From season 2000/01
13	Ice Season Overview	Description of the development and character of the Baltic ice season for the Web	K. Strübing (BSH) with contributions from other services	06/2001 06/2002 etc
16	BSIM-21	Preparation of the Meeting Official invitation Meeting	FIMR, K. Strübing FIMR FIMR	 03/2003 09/2003

Tables of BSIM History

THE ROOTS

of the

BALTIC SEA ICE MEETINGS (BSIM)

09/2000

No	Date	Place/Participant	Main Topics
01	July 1925 07 - 08	Hamburg very likely most countries	**Expert Meeting (Ice Services)** - Baltic Sea Ice Code - Exchange of Ice Observation
	May 1926 26 - 28	Riga EST, LT, LV, PL	**1st Hydrological Conference of the Baltic States** Co-Operation of the Baltic States in hydrological research, standardizing in data handling and presentation
02	Aug 1927 25 - 27	Tallinn most countries	**Expert Meeting (Ice Services)** - Baltic Sea Ice Code - Exchange of Ice Observation
03	June 1928 17 - 22	Tallinn D, EST, Fi, LT, LV, PL, S, USSR	**2nd Hydrological and Hydrometric Conference of the Baltic States**
04	May 1930 15 - 18	Warzawa all countries beside N	**3rd Hydrological Conference of the Baltic States**
05	Sep 1933 05 - 09	Leningrad all countries beside N	**4th Hydrological Conference of the Baltic States** -
06	June 1936	Helsinki all countries beside N	**5th Hydrological Conference of the Baltic States** - Organization of the national ice services - Status reports - Data exchange - Terminology - Baltic Ice Code
07	Aug 1938 15 - 20	Berlin/Lübeck all countries	**6th Hydrological Conference of the Baltic States**

PUBLISHED PRODUCTS OF THE BALTIC SEA ICE SERVICES

COUNTRY	BULLETINS						CHARTS	
	Report	Forecast	Code	Restrictions	Language	Region	Days	Region
Denmark	Mon - Fri		Mon - Fri		Danish, English	national international	Mon, Thu	regional
Estonia	Mon - Fri	Mon - Fri	Mon - Fri		Estonish, English	national/re-gional	Mon - Fri	regional
Finland	Mon - Thu Mon-Sun*	Mon - Sun	Mon – Thu Mon-Sun+	Mon - Thu Mon-Sun*	Finnish, Swedish, English	international	Mon, Thu Mon-Sun*	standard
Germany	Mon - Fri	Mon - Fri	Mon - Fri	Mon - Fri	German, English	international	Mon, Thu Mon - Fri	**standard** regional
Latvia	Mon - Fri	Mon - Fri	Mon - Fri		Latvian, English	national, regional	Tue, Fri	regional
Lithuania								
Netherlands	Mon - Fri	Mon - Fri	Mon - Fri		Dutch, English	national	Mon – Fri	national
Norway								
Poland	Mon - Fri	Mon - Fri	Tue, Fri	Tue, Fri	Polish	international	Tue, Fri	standard
Russia	Daily	Mon, Thu	Daily	Daily	Russian, English	regional	Daily	regional
Sweden	Mon - Fri	Mon, Thu	Mon - Fri	Mon - Fri	Swedish, English	international	Mon, Thu	standard

Remarks: The mentioned products must be made available to the public. This list does not consider the routine daily national GTS ice reports exchanged between the Baltic Sea Ice Services. The plain language report is *national*, when it is restricted to the home waters, *regional* when bordering countries are included and *international* , when the whole Baltic Sea area is covered. The *standard* ice chart covers the agreed area (i.e. in normal ice seasons the area north of 56° N. *Regional* ice charts cover sub-areas (e.g. the Gulf of Finland).

- Mon - Thu by mail/fax, Mon – Sun by e-mail and call-fax service, + Mon.Thu by mail/fax

RIZA Info Centre

Infocentre Inland waters RIZA

Presented by Klaas Wierenga

manager infocentre

Company profile RIZA

- The name RIZA stands for "Institute for Inland Water Management and Waste-Water Treatment". RIZA is the research and advisory institute that operates under the authority of the Dutch Department of Public Works.
- RIZA specialises in all matters concerning freshwater areas in the Netherlands and has developed into a centre of expert knowledge in the domain of integrated water management.

RIZA Services

- To carry out national policy planning tasks relating to water management;
- To carry out physical, chemical and biological research;
- To provide concultancy services relating to the fresh water deltas, rivers and lakes in the Netherlands under the authority of the department of Public Works and Water Management;
- To collect and analyze data about water quality and quantities for the purpose of integrated water management;
- To monitor discharges, waste water treatment, policy and research relating to discharges and granting permits.

Tasks of the Infocentre (1)

- Water levels (distributed daily by e-mail [200 adresses], by telefax, through the Internet, BICS and Videotext);
- Notices to skippers (distributed daily by e-mail [400 adresses], by post [450 adresses], through the Internet, BICS and Videotext);
- Ice reports (distributied by priority mail [600 adresses], through the Internet and Videotext, in the future by e-mail);

Tasks of the Infocentre (2)

- Flooding forecast/monitoring;
- Special warning service for the dikes surrounding the Dutch IJsselmeer-lake situated in the centre of the Netherlands;
- Calamity abatement.

BC2000

- Collects information automatically
- Distributes information automatically
- BC2000 presents information about waterlevels, notices to skippers and ice information in GIS (Geographical Information System)

Data flow Infocentre

BICS

Ice reports (1)

Ice reports (2)

List of Administrative Information on Baltic Sea Ice Services
(incomplete draft)

Baltic Sea Ice Services: Administrative Information (incomplete draft)

		D	DK	EST	FI	LT	LV	N	NL	PL	RUS	S
number of staff	typist	0,5	0,5		1						0	
	technician	2	1		0				4		1	[1] 4
	engineer	1	1		0				2		2	
	scientist	2	0		3-4					0,5-2	0	[1] 4
total		**5,5**	**2,5**		[1] **4-5**				**6**	**0,5-2**	**3**	**8**
Number of issues of	Ice Report	123	80		[2]173						80	115
regular products	Ice chart	50	-		[3]194				600		40	51
number of customers	paying	49	0		213				400		40	90
for regular products	exchange	44	0		10				200		20	63
	others	11	[1] 80		10						0	0
total		**104**	**80**		**233**				**600**		**60**	**153**
means of distribution	letter post	33			170				600			[2] 9
	telefax	47			60				3			31
	e-mail	17			[4] 3							85
	internet	[1]			[5]				?			16
	internal	07										12
total		**104**			**233**				**600**			**153**

Comments

D: [1] 19,334 visits between 01.10.99 and 30.09.2000
DK: [1] products are free of charge
FI: [1] 33 working months per year, [2] 94 numbered (printed) and 79 unnumbered reports, [3] 63 numbered (printed) charts to customers and 131 unnumbered charts to other ice services, [4] only reports , [5] more than 37,000 visits between 15.10.99 and 08.06.2000

S: [1] not only working with ice, [2] to libraries once a week

Tables of Technical Equipment of Baltic Sea Ice Services

Denmark
Finland
Germany
Sweden
The Netherlands

BSIM-20
Item 3.4

List of technical equipment for the preparation of Ice Information Products and for advanced Communications within the Baltic Ice and Icebreaker Services

Service: ADMIRALDANFLEET **Contact Person:** CDR K. M. Petersen

Telephone: +45 89433353 **Telefax:** +45 89433230

Products	Hardware	Operating System	Software
Local PCs			
Workstation	2	Windows NT	Office 97
Host System			
Communications			
Local			
E-Mail	Istjeneste@sok.dk		
Internet	www.sok.dk		
FTP option (y/n) (if yes please address)	Planned		
Ice Data Bank	On Paper only		
Planned Development (comments)			

BSIM-20
Item 3.4

List of technical equipment for the preparation of Ice Information Products and for advanced Communications within the Baltic Ice and Icebreaker Services

Service: FINNISH ICE SERVICE
Contact Person: Jouni Vainio
JOUNI@ICE.FMI.FI
Telephone: +358-9-6857659 **Telefax:** +358-9-6857639

Products	Hardware	Operating System	Software
Local PCs	3 x	WINDOWS 98 WINDOWS-NT 4	MS-Office etc. ViewIce
Workstation	HP C200 (?)	HP-UX 10.20	IceMap
Host System	- " -	HP-UX 10.20	
Communications			
Local			
E-Mail			
Internet	http://ice.fmi.fi		
FTP option (y/n) (if yes please address)	N/A		
Ice Data Bank			
Planned Development (comments)			

BSIM-20
Item 3.4

List of technical equipment for the preparation of Ice Information Products and for advanced Communications within the Baltic Ice and Icebreaker Services

Service: Swedish Ice Service **Contact Person:** Torbjörn Grafström

Telephone: +46-11 495 8533 **Telefax:** +46-11 495 8403

Products	Hardware	Operating System	Software
Local PCs		Windows-NT	MS Word, Exel mm
Workstation	Digital Decstation	Unix	ICEMAP + satellite image system PROSAT
Host System			
Communications			
Local			
E-Mail	Ice@prod.smhi.se		
Internet	www.smhi.se	(Presently not any specific ice information on the web)	
FTP option (y/n) (if yes please address)	ftp.smhi.se/ice	(Username, password required)	
Ice Data Bank	Yes. Grid values Available 1998/99, 1999/2000		
Planned Development (comments)	Planning to extract gridpoint info also from years 1979-1997 within next 12-24 months.		

BSIM-20
Item 3.4

List of technical equipment for the preparation of Ice Information Products and for advanced Communications within the Baltic Ice and Icebreaker Services

Service: RIZA **Contact Person:** KLAAS WIERENGA

Telephone: +0031-32029888 **Telefax:** +0031-320298580

Products	Hardware	Operating System	Software
Local PCs 8x	PIII 550 Mhz 10GB 128MB	WINDOWS95	BC 2000 ....View
Workstation			
Host System			
Communications			
Local			
E-Mail			
Internet			
FTP option (y/n) (if yes please address)	ON REQUEST		
Ice Data Bank	HP9000-SERVER	UNIX+SAMBA	ORACLE DATABASE
Planned Develop-ment (comments)			

Table with Telephone Numbers, E-Mail and WWW Addresses of the Baltic Sea Ice and Icebreaker Services

Telephone Numbers, E-Mail and WWW Addresses of the Baltic Sea Ice and Icebreaker Services

Country – Agency	Telephone/Fax	E-Mail	WWW
Denmark – SOK	+45 89 433-253/ -3230	bk4@sok.dk istjeneste@sok.dk	http://www.sok.dk/
Estonia – EMHI	+372 64615-61/ -77	mere@emhi.ee	
Finland – FIMR	+358 9 68576-59/ -39	Info: info@ice.fmi.fi Staff: ice@ice.fmi.fi	http://ice.fmi.fi/main_uk.html
Finland - FMA	+358 204484-216/ -431		http://www.fma.fi
Germany – BSH	+49 40 3290-3290/ -5032	ice@bsh.d400.de	http://www.bsh.de/Oceanography/Ice/Ice.htm
Germany – WSA Kiel-Holt.	+49 431 3603-450/ -454	vkz.nok-ii@t-online.de poststelle@wsa-ki.wsd-nord.de	http://www.wsa-ki.wsd-nord.de
Latvia – LHMA	+371 70 32617/7145154	marine@meteo.lv	http://www.meteo.lv
Lithuania			
Poland – IMGW	+48 58 620-5221/ -641	pga@imgw.gdynia.pl hydrologia-gdynia@imgw.pl	http://www.imgw.gdynia.pl/
Russia – NWMET	+7 812 328-1467/ -0962 or +7 812 321-3018 -	adm@nwmet.nw.ru sea@nwmet.nw.ru hidro@nwmet.nw.ru	http://www.nwmet.nw.ru
Sweden – SMHI	+46-11 495-8400/ -8403	ice@smhi.se	http://www.smhi.se/sgn0104/sjofart/text.html#Ice service
Sweden – SMA	+46 11 191210/ -103100	opc@sjofartsverket.se	http://www.sjofartsverket.se
The Netherlands – RIZA	+31 320 298-888/ -580	~~bc@riza.rws.minvenw.nl~~ infocentrum@riza.rws.minvenw.nl	http://waterland.net/bericht/centrum/engels/index.html

2000-09-27

WMO/JCOMM Activities

Review of the JCOMM (former CMM) Sub Group on Sea Ice activities

1. Sea ice is a component of the climate system and for this reason, national sea-ice information services have been established in many countries, including Baltic area, to provide support both climatological and real-time ice analyses. WMO has for a number of years assisted in effecting coordination and cooperation in sea ice activities through the JCOMM (former CMM) Sub Group on Sea Ice (SGSI). Therefore one of the main responsibilities of this group is maintenance of liaison with the WCP, JCOMM, IOC, BSIM and other international programs, organizations and groups on sea ice matters.

2. At present Sub-group includes members from Argentina, Baltic Sea Ice Meeting, Canada, China, Denmark, Iceland, Japan, Russia, USA. The Steering Group for the WMO project "Global Digital Sea Ice Data Bank" (GDSIDB) has been formed with co-chairs Dr Ivan Frolov (AARI, St.Petersburg, Russia) and Prof Roger Barry (WDC-A for Glaciology-USA / National Snow and Ice Data Center, Boulder, USA) supervised by the SGSI.

3. During the intersessional period, progress was made in the following areas of this Group's responsibilities:

(i) Aspects of the current and future SGSI activities were discussed at the informal SGSI session combined with the 7-th session of the GDSIDB in Boulder (August, 1998.) and during the 8-th session of the GDSIDB in Ottawa (April-May, 2000). These meetings also reviewed the main achievements of national sea ice services in the development of sea ice activities. Electronic versions of the final reports of these meeting are available at the GDSIDB Internet-site
http://www.aari.nw.ru/gdsidb/pub/content.html.

(ii) Contacts between the experts from AARI, BSIM, CIS, DMI, JMA, NSIDC and USA NIC promoted to get, within the GDSIDB, newly digitized data sets for Arctic and Antarctic areas, including data sets for the Sea of Okhotsk, Baltic Sea and Canadian Arctic area. In this connection it could be noted with appreciation that the Argentinean Navy Hydrographic Service started to submit an information on sea ice observations to the GDSIDB's centres, and offer by China and Australia to contribute sea ice data to the bank. The special report on availability of sea ice data for Caspian, Black seas and the Sea of Azov was prepared and discussed during the 8-th session of the Steering Group for the GDSIDB. Summary of the GDSIDB holdings by April 2000 is given in Annex I. According to the GDSIDB working plan for 2000-2002 (Annex II) members of the bank agreed to make efforts to prepare historical sea ice data sets for Sea of Bohai from 1952 to present (SOA, China); Baltic Sea for 1980-1998

(BSIM) and for 1960-1982 (BSH, Germany); Antarctic for 1970-1990 (AARI, Russia and Australia through the ASPeCT programme). Additional sea-ice data sources were identified as: Denmark for Greenland waters in XX century; Chile and South Africa for the Antarctic; Russia, Ukraine and Kazakhstan for the Black, Azov and Caspian seas.

The home page addresses of the GDSIDB centers are:

- http://www.aari.nw.ru/gdsidb/gdsidb_2.html (AARI, St.Petersburg, Russia)
- http://www.dmi.dk/pub/gdsidb_mirror/content.html (mirror of AARI site at DMI).
- http://www-nsidc.colorado.edu (NSIDC, Boulder, Colorado, USA)

(iii) Spesial ad-hoc working groups were designated to develop a new format COUNTOUR-2 to standardize the international exchange of operational sea ice data aimed for constraction of electronic sea ice charts and to issue sea ice data formats preferred by egencies producing ice information. Experts from SMHI and AARI developed of appropriate amendments and extention to the SIGRID and SIGRID-2 formats in odder to preserve an accuracy of original data in the Baltic Sea Ice Data Bank (BASIS) while converting it to the SIGRID formats.

(iv).....Dr V.Gavrilo (Russia) and Dr W.Weeks (USA) have prepared an English version of the publication - *Analysis and Forecast of Sea Ice,* recommended by CMM-XII, which was now being reviewed prior to issue by the WMO Secretariat at the beginning of 2001. The new version of the WMO publication No 574- *Sea Ice Information Services in the World* has been completely revised by the members of the former SGSI and issued by the Secretariat in 2000. On-line electronic version of this publication in pdf. format is available at: http://www.aari.nw.ru/gdsidb/pub/wmo-574.pdf. In August 2000 Dr A. Bushuev (Russia) prepared a new version of the *WMO Sea Ice nomenclature* which has to be distributed soon among users by the Secretariat.

4. In response to developing requirements for a more coordinated approach to operational ocean monitoring and services, the WMO Congress and IOC Assembly formally established in 1999 a Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) which replaces the Commission for Marine Meteorology (CMM) and Joint IOC/WMO Committee for the Integrated Global Ocean Services (IGOSS). The new body will be supported in equal measure by WMO and IOC, with responsibilities to include those of the existing CMM and IGOSS, as well as for the coordination and management of the implementation of an operational ocean observing system in support of GOOS and GCOS. In this connection experts of the SG SI participated at the *First (JCOMMTRANS-I, St.Petersburg, July 1999) and Second (JCOMMTRANS-II, Paris June 2000) JCOMM Transition Planning Meetings.* According to the decision of the 8-th session of the SG for the GDSIDB the JCOMMTRANS-II recommended possible ways to widen the areas of responsibility of the SG SI in JCOMM structure including its future transformation as an Expert Team on Sea Ice of the Services Programme Area, whose membership should include 6-8 selected experts (Annex III). This proposal will be discussed at the First JCOMM session in Akureyri, (Iceland) in June 2001.

5. The last WMO meetings on sea ice activities noted with appreciation the important work being undertaken in this area by regional and international groups, such as the BSIM, the International Ice Charting Working Group (IICWG) and the Electronic Chart Display Information System (ECDIS). During the JCOMMTRANS-II meetings it was agreed that future collaboration should be continued between the recommended Expert Team on Sea Ice and these groups, and requested the future chairman of the Expert Team and the WMO and IOC Secretariats to arrange for such collaboration, as appropriate.

ANNEX I

WORK PLAN FOR COOPERATION BETWEEN THE MEMBERS OF THE SG FOR THE GDSIDB (MAY 2000 - OCTOBER 2002)

	Institute	Region	Time interval	Exchange date (notes)
1.	AARI	Antarctic	1971-1990 (10-days period)	When the data are available for WDC-B
2	Argentinean Navy Hydrographic Service	Weddell and Bellingshausen Seas	App. 1982 to 1990, point observations Current observations	By 2002 Point observations in NIC-code in .db format, submitted with weekly interval to NSIDC and AARI ftp-servers
3.	Australia, within the ASPeCT project	Antarctic, en-route and pintail observations	1980-1997	In WMO code
4.	BSIM (jointly SMHI and FIMR)	Baltic Sea	1980 – 1998, 3-4 days interval 1999 – 2000	SIGRID By 2002, exchange formats will be determined by ad-hoc group
5.	CIS	Canadian Arctic	1999- ongoing data forward in time	Exchange formats will be determined by ad-hoc group
6	China, State Oceanic Administration	Bohai Sea	1968 – up to present 1952/53 – up to present	0,1° by 0.1° grid, total and partial concentrations and stages of development maximum annual extent to be submitted before the next meeting
7.	DMI	Greenland waters	March 1999 – March 2000	December 2000, exchange formats will be determined by ad-hoc group
8.	Germany, Federal Maritime and Hydrographic service (BSH),	Baltic Sea (south of 56°N and to the west of 14 20')	1960-1982 and updates	to be determined
9	Icelandic Meteorological Office	Icelandic waters	to be determined	to be determined
10.	JMA	Sea of Okhotsk	ongoing data forward in time	Once a year in SIGRID-2 format
11.	NIC	Arctic and Antarctic Arctic Antarctic Arctic Antarctic	1972 –1994 1973 –1994, 7-days period 1995 – 1996 1995 – 1997 1996 - till present 1998 – till present	Final version is anticipated by mid-2000 in SIGRID, EASE-GRID and ArcInfo e00-format need to be converted to standard format and undergo QC before submission ArcInfo e00-format, available on-line via NIC web-site, exchange formats will be determined by ad-hoc group

ANNEX II

SUMMARY OF GDSIDB DATA HOLDINGS (BY MAY 2000)

Area Covered	Time interval	Originator	Format	Notes
Arctic	1950-1992, every 10 days	Russian Federation, Arctic and Antarctic Research Institute	SIGRID, EASE GRID	Discontinuous in time and space
Arctic Antarctic	1972-1994, 1973-1994, every 7 days	US National Ice Center	SIGRID, EASE GRID [1)]	Preliminary revised and corrected version.
Sea of Okhotsk	1971-1999, every 5 days	Japan Meteorological Agency	SIGRID, SIGRID-2, EASE GRID [1)]	Total concentration only-
Baltic Sea	1960-1979, every 3-4 days	Baltic Sea Ice Meetings, jointly SMHI and FIMR	SIGRID, Baltic Sea Ice Code, EASE GRID [1)]	Land mask different from NIC
Gulf of Newfoundland Hudson Bay Eastern Arctic	1962-1982 1962-1983 1959-1980 all every 7 days	Canadian Ice Service	SIGRID, 60 ' resolution	Starting point not included
Canadian Eastern Seaboard Eastern Arctic Western Arctic Hudson Bay	1968 to 1998 1968 to 1998 1968 to 1998 1971 to 1998		SIGRID, 15 ' resolution ArcInfo .e00 format in WMO-code	High resolution raster SIGRID and vector ArcInfo sea ice data
Local waters near Greenland	1990 (sample)	Danish Meteorological Institute	In original gridded format (.xls table)	-
Weddell and Bellingshausen Seas	1998- to present moment	Argentine Navy Hydrographic Service	Point observations in NIC-code in .db format	-

[1)] Conversion from SIGRID into EASE-grid carried out by the AARI part of GDSIDB.

ANNEX III

WMO's Application of Meteorology Programme

MARINE PROGRAMME

Proposed JCOMM Substructure and Terms of Reference

Management Group

a. Advise the co-presidents on the short and long-term planning of the work programme of JCOMM and on its implementation;

b. Advise the co-presidents regarding the resources required for the implementation of the work programme, as well as approaches to identifying and mobilising these resources;

c. Assist the co-presidents in the coordination and integration of the work of JCOMM, as implemented through the various working groups, teams and rapporteurs;

d. Review the internal structure and working methods of the Commission, including its relationship to other bodies, both internal and external to WMO and IOC, and develop proposals for modifications as appropriate;

e. Advise on the implementation of activities and projects referred to JCOMM for action by WWW, WCP, GOOS, GCOS and other programmes, including in particular the GOOS/GCOS Implementation Action Plan;

f. Contribute as required to the WMO Long-term Planning process, in particular with respect to the development and monitoring of the implementation of the marine programme component.

Membership

2 co-presidents

4 Programme Area coordination group chairmen

Representatives of relevant scientific design and planning bodies

No more than 2 other experts, if necessary, to ensure full geographical coverage

Data Management Coordination Group

a. Plan, initiate and oversee the implementation of the DM work programme;

b. Advise on actions required to implement, maintain and make available to users a fully integrated ocean/atmosphere data stream, including identification of the required resources;

c. Ensure full and effective collaboration, coordination and compatibility with other data management bodies and programmes, including IODE, CBS, CCl, CEOS, GOSSP and the WDCs;

d. Keep under review and encourage the use of advanced information technology in marine data management;

e. Encourage and assist countries to identify, rescue, digitise and archive historical marine meteorological and oceanographic data;

f. Develop, where possible generic, QC, metadata, analysis, data flow and data exchange standards, formats and procedures for JCOMM data;

g. Keep under review the requirements of operational centres for real time, integrated marine data delivery and develop and recommend improved procedures to ensure that

data and metadata are available to these centres with appropriate timeliness and quality;

h. Collaborate with CBS in the development and maintenance of real time data quality and data flow monitoring and follow-up procedures.

Membership

PA/DM coordinator (chair)

Chairs Expert Teams (2)

Rapporteurs (3)

Representatives of IODE, CBS, CCL and WDCs, as necessary

Expert Team on Ocean Data Management

Largely as for GTSPP now, expanded as appropriate to cover surface salinity.

Expert Team on Marine Climatology

a. Operate a programme for the development and maintenance of end-to-end systems for the assembly and management of marine climatological data and related metadata sets required for GOOS, GCOS, WCP, other programme and marine users;

b. Develop and recommend QC, metadata, analysis, data flow and data exchange standards, formats and procedures to meet the requirements and time scales of users;

c. Keep under review the operations of the MCSS and related existing data management schemes and make recommendations for improvement as necessary;

d. Design, recommend and maintain data flow monitoring systems;

e. Encourage and facilitate the enhanced submission of data to the MCSS and other specific data management systems;

f. Keep under review the work of Data Assembly Centres and recommend enhancements and/or additional centres as appropriate;

g. Keep under review and, as necessary, propose procedures for the preparation and/or updating of relevant technical publications;

h. Keep under review developments with Beaufort equivalent scales.

Membership

8-10 selected experts from Member States (including, as a minimum, representatives of MCSS/GCC centres)

Representatives of CBS and CCl as necessary

Services Coordination Group

a. Keep under review and advise on the effectiveness, coordination and operation of the Services work program, including performance with respect to timeliness, standards, quality and relevance to established user requirements.

b. Through the assembly of requirements identified by specialist service groups, and other PAs of JCOMM, provide advice on JCOMM services that need to be implemented or discontinued.

c. Develop interfaces to representative user groups in order to monitor the strength and weaknesses of existing services.

d. Ensure effective coordination and cooperation with appropriate groups and bodies of CBS, GOOS and GCOS in the area of service provision;

e. Liaise with external bodies, in particular those representing user communities.

Membership

PA/Services coordinator (chair)

Chairs expert teams (3)

Rapporteurs (2)
Representatives of user organizations and groups as appropriate

Expert Team on Maritime Safety Services

a. Monitor the operations of the marine broadcast system for the GMDSS and develop improvements as necessary;
b. Liaise with IMO, IHO, ICS, Inmarsat and other concerned organizations and bodies on maritime safety issues, including the GMDSS;
c. Monitor requirements for international coordination of meteorological and related services provided through NAVTEX and propose actions as appropriate;

Membership

Minimum membership to include representatives of the AMC for the GMDSS
Representatives of IMO, IHO, ICS, Inmarsat, other user groups as appropriate

Expert Team on Wind Waves and Storm Surges

a. Monitor and assist in the implementation of the JCOMM Wind Wave and Storm Surge Programme and propose amendments as required;
b. Develop technical advice on wave and storm surge modelling, forecasting and service provision and provide assistance and support to Member States as required;
c. Monitor projects for verification of operational wind wave and storm surge model outputs and assist in their implementation as required;
d. Ensure effective coordination and cooperation with appropriate GOOS bodies on requirements for and implementation of wind wave and storm surge products and services.

Membership

6-8 selected experts

Expert Team on Sea Ice

a. Keep under review and catalogue the products and services required by user communities in sea ice areas;
b. Encourage and advise on the relevant numerical models and forecast techniques for products and services;
c. Develop technical guidance material, software exchange, specialized training and other appropriate capacity building support with regard to sea ice observations and services;
d. Maintain linkages with relevant international organizations and programmes, in particular CLIC, IICWG and ASPeCt;
e. Keep under review the operations of the Global Digital Sea Ice Data Bank, provide guidance as appropriate, and encourage and facilitate enhanced submissions of sea ice data to the bank;
f. Recommend and promote appropriate QC, error analysis and archiving mechanisms;
g. Review and propose amendments to formats, nomenclatures and procedures for sea ice data and information exchange as well as to relevant terminology, coding and mapping standards.

Membership

6-8 selected experts

Rapporteurs

a.MPERSS
b.JCOMM Products Bulletin – Editor

Observations Coordination Group

a. Keep under review and advise on the effectiveness, coordination and operation of the observations work program, including performance measured against scientific requirements, delivery of raw data, measurement standards, logistics and resources.
b. Provide advice to JCOMM and to Observation Teams on possible solutions for newly identified requirements, consulting as appropriate with relevant scientific groups and CBS.
c. Taking into account the continuing development of satellite observations and their capabilities, review in situ data requirements and recommend changes as appropriate.
d. Coordinate the development of standardized, high quality observing practices and instrumentation and prepare recommendations for JCOMM.
e. Examine trade-offs and use of new and improved techniques/developments against requirements and available resources.
f. Liaise with and input to CBS activities regarding the consolidated requirements database and operational satellites.

Membership

PA/Obs coordinator (chair)
Chairs Ship Observations Team, DBCP, GLOSS, (Argo Science Team), (TIP)
Technical coordinator DBCP/SOG, Rapporteurs as required
Satellite expert
One other expert
1.Ship Observations Team

TOR

Merger of existing TOR for ASAP, SOOPIP, VOS
Membership
Open, existing operators

Data Buoy Observations Team
Existing TOR for DBCP, TIP and Action Groups
Membership
Open, existing DBCP members, Action Groups, TIP

Sea Level Observations Team
GLOSS Group of Experts
Existing GLOSS GE and GLOSS Scientific subgroup
Membership
Existing GLOSS GE and GLOSS Scientific Subgroup
Liaison to PAs DM, ETIS
Liaison to C-GOOS

ETIS Coordination Group

a. Plan, initiate and implement the ETIS work programme, including in particular the JCOMM Capacity Building Strategy;
b. Keep under review existing training and guidance material (paper and electronic) and advise on procedures for updating, as well as for the development of new material;
c. Monitor regional requirements for capacity building and develop regional projects as appropriate;
d. Develop and implement integrated training and support activities, in collaboration with other programme areas and external bodies and programmes (e.g. WMO ET/TCO, IOC-TEMA, GOOS, GCOS, IGOS).

Membership
PA/ETIS Coordinator (chair)
Chair Task Team Resources
Rapporteurs as appropriate

Task Team Resources
a. Monitor the existence, fields of interest and procedures of international and national aid programmes, foundations and all other possible sources of funding and advise on proposal development;
b. Where possible, develop links and contacts to funding sources and aid programme management;
c. Develop a plan for obtaining resources for JCOMM Capacity Building, in collaboration with GOOS and GCOS.

Membership
2-3 selected experts
Donor agency representatives

Regional Rapporteurs
WMO regional rapporteurs
Links to IOC regional bodies

Liaison Rapporteurs
GLOSS and other PAs as appropriate
GOOS, GCOS and external capacity building programmes
IOC TEMA programme
User Forum
Ad hoc seminars, workshops, conferences involving both data and service providers and users.

Annex III

LIST OF WEB SITE ADDRESSES

PROGRAMMES AND PROJECTS

Arctic Climate System Study (ACSYS): http://www.npolar.no/acsys/impplan/index.html

Arctic Sea-Ice Thickness Research Project (ASITP):
http://www.npolar.no/oelke/ice_n.html

Antarctic Sea-Ice Thickness Research Project (ANSITP):
http.//www.awi-bremerhaven.de/Research/ansitp/index.html

Baltic Sea Ice Meeting (BSIM):

Danish Ice Service:
http://www.sok.dk/info/is/seneste.htm

Finnish Institute of Marine Research (FIMR): http://ice.fmi.fi/main_uk.html

Bundesamt für Seeschiffahrt und Hydrographie (BSH):
http://www.bsh.de/Oceanography/Ice/Ice.htm

Rijkswaterstaat (RIZA):
http://waterland.net/bericht/centrum/engels/index.html

Institute of Meteorology and Water Management (IMWM):
http://www.imgw.gdynia.pl

Swedish Meteorological and Hydrological Institute (SMHI):
http://www.smhi.se/sgn0104/sjofart/text.html#Ice service, ftp://ftp.smhi.se (ftp-server)

Global Sea-Level Observing System (GLOSS):
http://www.nbi.ac.uk/psms/gloss.info.html

International Arctic Buoy Programme(IABP):
http://IABP.apl.washington.edu

International Programme for Antarctic Buoys (IPAB):
http://www.antcr.utas.edu.au/antcrc/buoys/buoys.html

WCRP JSC/ACSYS) Task Group on Climate and Cryosphere (CLIC):
http://www.npolar.no/acsys/CLIC/clicindex.htm

WMO EC Working Group on Antarctic Meteorology:
http://www.wmo.ch/web/www/osy/antarctic.html

INSTITUTIONS AND SERVICES

AARI- Arctic and Antarctic Institute, St. Petersburg:
http://www.aari.nw.ru/

AMRC – Antarctic Meteorological Research Center: http://uwamrc.ssec.wisc.edu/amrc

ASF – Alaskan Synthetic Aperture Radar Facility:
http://www.asf.alaska.edu

CIS-Canadian Ice Service, Ottawa:
http://www.cis.ec.gc.ca/free/index.html

DCRS-Danish Center for Remote Sensing, Lyngby: http://www.dcrs.dto.dk/DCRS/latest-ice.html

DMI-Danish Meteorological Institute, Copenhagen:
http://www.dmi.dk/vejr/gron/index.html

FIMR-Finnish Institute of Marine Research, Helsinki: http://ice.fmi.fi/main_uk.html

FNMOC – Fleet Numerical Oceanographic Center, Monterrey, USA: http://metoc-ul.fnmoc.navy.mil/otis_nhem_ice.gif,
http://metoc-ul.fnmoc.navy.mil/otis_shem_ice.gif

FU – Freire Universität, Institut für Meteorologie, Berlin: ftp://130.1333.7.203/pub//SEA-ICE/icetext.html

IIP – International Ice Patrol, U.S. Coast Guard, Groton:
http://www.uscg.mil/lantarea/iip/home.html

MEDS – Marine Environmental Data Service, Canada:
http://www.meds-sdmm.dfo-mpo.gc.ca/Meds/RNODC

NGDC – National Geophysical Data Center:
http://www.ngdc.noaa.gov

NIC – National Ice Center, Washington, D.C.:
http://www.natice.noaa.gov/

NCDC – U.S. National Climatic Data Center (NCDC):
http://www.ncdc.noaa.gov

NCEP OMB – http://www.natice.noaa.gov/seaice/Welcome.html

NCRN – NOAA Coastwatch Regional Nodes:
http://coastwatch.noaa.gov

NNODC – NOAA National Oceanographic Data Center: http://www.nodc.noaa.gov

NNESDIS – NOAA National Environmental Satellite Data Service:
http://manati.wwb.noaa.gov/doc/oceanwinds.html

NSIDC – National Snow and Ice Center:
http://www-nsidc.colorado.edu/NSIDC/about.html

RADARSAT SAR – RADARSAT Synthetic Aperture Radar:
http://manati.wwb.noaa.gov/sar/alaska

RGPS – RADARSAT Geophysical Processing System:
http://www_radar.jpl.nasa.gov/rgps/radarsat.html

WDC-A – World Data Center A for Glaciology, Boulder, USA:
http://www-nsidc.colorado.edu

Icelandic Ice Service:
http://www.vedur.is/ur/hafis/enska/enska.html

Japanese Ice Service: http://www.jhd.go.jp/cue/KAN1/ice_center/ice_center.html

Poland Ice Service:
http://www.imgw.gdynia.pl/

NERSC:
http://fram.nrsc.no/Service/seaice.html

Sea ice advisory – Western Arctic – FZAK70 PANC:
http://asp 1.sbs.ohio-state.edu/text/wxascii/marine/FZAK70.PANC

Alaska Region – National Weather Service (NWS):
http://www.alaska.net/~nwsar

Beaufort Sea Ice Charts:
http:/www.alaska.net/~nwsar/html/ice/ice_marine.html

RECOMMENDATIONS OF THE MEETING

RECOMMENDATIONS TO GOOS

The meeting makes the following recommendations to GOOS and GOOS-related bodies.

1. **OOPC**

   - Review, refine and more clearly specify polar region ocean data requirements for climate.
   - In conjunction with GLOSS, consider the critical requirement for enhanced in situ sea level measurements in polar regions.

2. **GSC**

   - Consider the requirements for a GOOS Polar Region Panel, possibly with separate treatment for Arctic and Antarctic regions.

3. **GOSSP**

   - Seek advice on the future availability of satellite missions specifically covering polar regions – operational or research; continuity; variables; data availability.

4. **Coastal and other panels**

   - Advise on data requirements other than climate from polar seas.
   - Include polar regions in work and science plans.

5. **EuroGOOS**

   - Undertake a survey of user requirements in European Arctic and Baltic Seas.
   - Pass the results of this survey to the GSC and/or GOOS Polar Panel, for extension to other Arctic regions.
   - Pass examples of operating practices from Baltic GOOS (BOOS) to the GSC and/or GOOS Polar Panel for extension to other Arctic regions.

6. **Black Sea GOOS**

   - Survey user data and service requirements in ice covered waters in the Black Sea.

Presentation of the Baltic Sea Services in WMO Publ. 574 (Draft Summary)

Ice Services for the Baltic Sea and the eastern North Sea

Compiled by Klaus Strübing, BSH – 09/1999

Seasonal ice cover, which can extend over the whole region of the Baltic Sea and the south-easternmost North Sea between Blåvands Huk (DK) and Texel (NL), intensive shipping activities of up to 20.000 vessels during the ice season, and economic requirements are requesting professional ice information and icebreaker services for the whole region.

The bordering countries of the Baltic Sea and the Netherlands are providing ice information since many years by Ice Services as part of **governmental agencies**.

The ice information activities are harmonized by the **Baltic Sea Ice Meeting (BSIM)**, an institutional assembly of the governmental Ice Services and Icebreaker services.
BSIM-19 was performed in May 1998 in Lelystad, The Netherlands, **BSIM-20** is planned for September 2000 in Riga, Latvia.

Ice observations are performed and exchanged daily via **GTS** between all Services according to the standards of the **Baltic Sea Ice Code** (from 1980). Furthermore English plain language reports are included.

Telefax and e-mail are used as additional communication tools for operational exchange of coded information, plain language reports and ice charts. Furthermore products are presented in the INTERNET.

Close bilateral co-operation (e.g. between Finland and Sweden, Finland and Russia, Denmark and Germany, Poland and Germany, Germany and The Netherlands) is improving the service for the public.

The following information is a summary of the draft presentation for WMO Publ. 574 (as of 10/1999). The status of the given addresses (beside Lithuania) is of September 2000.

DENMARK

1. Organization

The Danish Ice Service is operated by Admiral Danish Fleet HQ situated in Århus. The Service is assisting navigation in Danish waters and harbors by distributing ice information daily (in English and Danish) via special coastal radio station Lyngby. The information contains a short review of the ice and navigational conditions in Danish domestic waters.

2. Data acquisition

Visual surface observations are reported daily from approximately 140 ice observers, who reports the ice conditions for about 260 different sections in Danish domestic waters. Observers are reporting daily information concerning ice concentration, thickness, type and navigational conditions to Admiral Danish Fleet HQ.

3. Output products

(a) Ice charts

Compiled ice charts are mailed as a weekly (or daily) annex to the Danish bulletin.

(b) Coded information

Coded sea ice information from 48 areas in Danish waters is issued once a day in the Baltic Ice Code and is distributed by coastal radio station Lyngby by radiotelephony and radiotelegraphy. The specific waterways are identified by an alphanumeric code, nine districts of six areas each. The ice information is also mailed to various agencies and ship owners.

(c) Plain language information

Sea ice reports – a description of the ice conditions at sea, operational areas for icebreakers – issued in Danish and English once a day are transmitted nation-wide through Denmark Radio and via coastal radio station Lyngby. The sea ice reports are also transmitted via TELEX or TELEFAX to the Baltic Sea countries once a day.

4. Forecasts

Forecasts are only given in qualitative form

5. Publications issued

An annual publication indicating the number of frost days, freezing degree-days, etc. from selected stations and number of days with various ice types present at each reporting site is made. Further, the annual report may contain several statistics comparing various years.

6. Mailing address

Søværnets Operative Kommando (SOK)
Istjenesten
Postboks 483
DK-8100 Århus C
Denmark

telephone: +45 89 43 30 99, +45 89 43 32 53 (Icebreaking Service)
telefax: +45 89 43 32 30
telephone answering unit: +45 89 32 44.
telex: 64527 SHIPPOS DK
e-mail: bk4@sok.dk (Attention.: Danish Ice Service)
Internet: http://www.sok.dk/info/is/seneste.htm

ESTONIA

1. Organization

Estonian Meteorological and Hydrological Institute (EMHI) is responsible for the sea-ice information service in Estonia. The service is in particular intended to meet the needs of international and Estonian shipping services.

2. Data acquisition

Daily ice information reported in Baltic Sea Ice Code, from 16 stations which are situated along the Estonian coast.

In addition to the daily coded information each station send some information about thickness of fast ice with the depth and density of snow cover on it. Most observations are visual. EHMI at present receives satellite pictures from NOAA and METEOR.

3. Output products

(a) Ice charts

- the ice bulletin/chart covers the Gulf of Finland, Gulf of Riga, the northern part of Baltic Proper, the Irben Strait;

(b) Coded information

- A complete listing of Estonian areas in the Baltic Sea Ice Code is issued daily and sent by GTS to Riga.

(c) Plain language information

- sea-ice bulletin – a description of the ice situation at sea, restrictions to navigation, - is issued in Estonian and English and daily sent by fax.

4. Forecasts and forecast methods

Generally one-day forecast: ice forecast for next day is provided on a daily basis.

5. Publications issued

Table of sea-ice observation from shore stations are prepared as internal reports of EMHI, but not published.

6. Mailing address

Estonian Meteorological and Hydrological Institute (EMHI)
Rävala 8
EE – 0001 Tallinn
Estonia

telephone: +372 64 61 561
telefax: +372 64 61 577
e-mail: mere@emhi.ee

FINLAND

1. Organization

Institution providing sea services: Finnish Institute of Marine Research (FIMR).

2. Data acquisition

Daily ice information reported in Baltic Sea-Ice Code. Sources of information: coastal stations, icebreakers, satellites, ships, stations (plain language), 20 – 30 reconnaissance flights.

3. Output products

Ice charts issued daily in ice seasons. Mailed/telefaxed to the users via: call-fax daily, mailed Monday and Thursday, telefaxed Monday – Friday.

Type of ice charts (scale, areas, others) : Mercator projection, whole Baltic Sea and Baltic Sea north of the latitude 58°50' N.

Coded and/or plain language information issued.

Bulletins on ice conditions in the Baltic Sea (mailed, broadcast, telefaxed on request) : Finnish Ice Report mailed, broadcast, telefaxed, telefaxed by call-fax, telex, coastal radio stations. Mailed/telefaxed Monday – Thursday, others daily.

4. Forecasts and forecast methods

- Forecast methods: Thermodynamical model (Finnish – Chinese).
- Forecasts are provided for: Bothnian Bay, northern Baltic Sea and Gulf of Finland; 36 hours.

5. Publications issued

(a) Regular: in 5 years intervals
(b) Irregular

6. Mailing and Internet addresses

Finnish Institute of Marine Research
Ice Service
P.O. Box 304
FIN-00181 HELSINKI
FINLAND

telephone: +358 9 68 57 659
telefax:+358 9 68 57 638 or 68 57 639
e-mail: ice@ice.fmi.fi
Internet: http://ice.fmi.fi/main_uk.html

GERMANY

1. Organization

Institution providing sea services: Bundesamt für Seeschiffahrt und Hydrographie (BSH), Federal Maritime and Hydrographic Agency.

2. Data acquisition

Daily ice information reported in Baltic Sea Ice Code.

Number of areas, regions, stations: International - 5/10/56, National – 5//131.

Other sources of information are given by governmental ships, reconnaissance aircraft, satellites (NOAA, ERS, RadarSat).

3. Output products

(a) Ice charts are issued daily, twice weekly in the ice season, directly mailed and telefaxed, radio facsimile, e-mail.

(b) The type of ice charts in Mercator 1:1.9 to 1:3.7 Mio for German Bight Baltic Sea, tailored charts in larger scales.

(c) Coded and/or plain language information issued.

(d) Bulletins on ice conditions in the Baltic Sea: EISBERICHT (Amtsblatt) German Ice Report, reports for broadcast, coastal radio stations.

4. Forecasts and forecast methods

Forecast methods: empirical, thermodynamical model (subject to improvements).

Forecasts are provided for German Coasts, Baltic, 3-5days, Model 72 h.

5. Publications inssued

Regularly -	Seasonal summary.
Irregularly -	Station reports, atlas, climatological summary

6. Mailing and Internet addresses

BSH – Eisdienst
Postfach 301220
D-20305 Hamburg
Germany

telephone: +49 40 3190 3290
telefax:+49 40 3190 5032
e-mail: ice@bsh.d400.de
Internet: http://www.bsh.de/Oceanography/Ice/Ice.htm

LATVIA

1. Organization

The sea-ice services are provided by the Latvian Hydrometeorological Agency (LHMA).

The collection, processing and dissemination of operational sea-ice information as well as ice forecasts are carried out for the Gulf of Riga and the Latvian economic zone in the Baltic Sea.

2. Data acquisition

The principal data sources are coastal observations and satellite data (visual and infra-red imageries).

Visual sea-ice observations are made daily at 06 GMT during the season by the LHMA's regular coastal hydrometeorological network of 10 stations on the Baltic coast and in the Gulf of Riga.

Since the 1996/97 ice season the NOAA satellite images received by a Russian made SCANEX HRPT receiver are operationally used in preparing of ice reports and ice charts of the Gulf of Riga and adjacent Baltic Sea waters. Visual aerial observations are made on special occasions only.

3. Output products

(a) Coded and plain language information

A brief description of the actual ice conditions is included in the LHMA's hydrometeorological bulletin issued five times a week (on weekdays). Occasionally brief reports are made on the public radio and TV.

(b) Ice charts

Compiled ice charts for the Gulf of Riga and for the Latvian territorial waters in the Baltic Sea are prepared one to three times a week during the ice season.

4. Forecasts

Outlooks of the expected ice development in the Gulf of Riga with a lead time of up to 3-4 days based on the meteorological forecasts are included in the daily local ice reports.

Monthly ice forecasts for the Gulf of Riga and the Latvian economic zone in the Baltic Sea based on the analogous and statistical analyses and monthly meteorological forecasts are made during the ice season.

5. Publications

Short monthly summaries in Latvian are included in the LHMA's monthly reports. The seasonal summaries are prepared and published both in Latvian and English in the LHMA's Annual Reports, mainly in case of severe winters.

6. Mailing address

Latvia Hydrometeorological Agency
165, Maskavas Str.
LV-1019 Riga
Latvia

telephone: +371 70 32617 telefax: +371 71 45154
e-mail: marine@meteo.lv

LITHUANIA

1. Organization

At present there are two subdivisions of the Ministry of Envirionment involved activity on sea-ice information: Centre of Marine Research (CMR) and the Klaipeda Department of the Lithuanian Hydrometeorological Service (LHMS). The Centre of the Marine Research, besides the other observation units on sea hydrology, includes three sea-ice observation posts.

Referring to CMR data on sea-ice and including extra information the Klaipeda Department of the Lithuanian Hydrometeorological Service provides information and advises on sea-ice state as well s on navigation conditions in the Baltic sea according to the consumers request.

2. Data acquisition

There are three sea-ice observation posts in the Lithuanian coastal area.

CMR daily sea-ice observation data in the Lithuanian Baltic Sea coastal area.

All available information on sea-ice distribution and development received from fishing-boats and merchant vessels entering Klaipeda sea port.

3. Output products

coded and plain language reports

4. Forecasts and forecasts methods

In addition to the sea-ice observations and forecast on sea-ice distribution the Centre of Marine Research and LHMS Klaipeda Department also carry on observations and forecast ice situation in the Curonian Lagoon.

5. Publications

6. Mailing address

CMR
Taikos str. 26,
LIT-5802 Klaipeda
Lithuania

tel.: +37 06 250 324
fax: +37 06 250 930
e-mail: CMR@klaipeda.omnitel.net

LHMS Klaipeda Department
Taikos str. 26
LIT-5802 Klaipeda
Lithuania

tel.: +37 06 252 247
fax: +37 06 250 277
e-mail: CMRkhmo@klaipeda.aiva.lt

NETHERLANDS

1. Organization

Institution providing sea ice services: Rijkswaterstaat/Riza

2. Data acquisition

Daily ice information reported in Baltic Sea Ice Code.

Other sources of information: NOAA Satellite, governmental ships.

3. Output products

(a) Ice charts are issued daily and mailed/telefaxed to the users.

(b) Coded and/or plain language information issued: report in Dutch and English.

(c) Ice bulletins covering other areas: waters at Dutch / German border.

4. Forecasts and forecasts methods

Forecasts are provided for the Dutch coastal waters for 24 hours.

5. Publications

Irregularly: Seasonal summaries

6. Mailing address

Rijkswaterstaat/Riza
Information and Warning Centre
Postbox 17
NL-8200 AA Lelystad
NETHERLANDS

telephone: +31 320 29 85 50
+31 320 29 88 88
telefax: +31 320 29 85 80
e-mail: bc@riza.rws.minvenw.nl
Internet: http://waterland.net/bericht/centrum/engels/index.html

POLAND

1. Organization

The Ice Service is provided by the Institute of Meteorology and Water Management, Maritime Branch (Instytut Meteorologii Gospodarki Wodnej, Oddzial Morski), Hydrological / Ice Section of Maritime Weather Office in Gdynia – and covers Polish waters.

2. Data acquisition

Visual data are collected from 35 coastal stations and ships. Aerial reconnaissance is made only under very servere ice conditions.

3. Output products

A coded ice report is broadcast daily by Gdynia Radio on ice conditions in Polish waters and via GTS. Plain language report is also provided in Polish and English.

Ice charts (scale 1:4400000 in conic projection) of the whole Baltic Sea, the Kattegat and Skagerrak are prepared twice a week (Tuesday, Friday) in the ice season for distribution by messengers and mail (by fax on request).

Ice bulletins are prepared three times a week for distribution by messenger and mail giving plain-language report on ice conditions in Polish waters and coded reports from all the Baltic countries.

Ice bulletin in plain-language (Polish) giving ice conditions in the Polish waters, is prepared daily from Monday to Friday during the ice season for distribution by messenger and mail. It includes coded reports for the open Baltic Sea and coastal waters of all the Baltic countries.

4. Forecasts and forecast methods

A 35-hour ice forecast for Polish waters is included in the ice bulletins. It uses subjective dynamical methods and the forecast of meteorological conditions.

5. Publications

Descriptive summaries of sea-ice conditions are published by the Maritime Branch in Gdynia in the year-book containing hydrological and oceanographic data.

6. Mailing address

Instytut Meteoroligii i Gospodarki Wodnej, Oddzial Morski
Waszyngtona 42,
PL-81342 GDYNIA
Poland

telephone: +48 58 620 5221 (operator)
+48 58 620 1641 (ice team 06-14Z)
telefax: +48 58 620 5493
email: pga@stratus.imgw.gdynia.pl
Internet: http://www.imgw.gdynia.pl/

RUSSIA

1. Organization

Institution providing sea ice services: North-Western Regional Administration for Hydrometeorology and Environmental Monitoring (NWRA HEM)

2. Data acquisition

Daily ice information reported in Baltic Sea Ice Code from 17 sites in 4 fairway section

Other sources of information: METEOR/NOAA Satellites, icebreakers.

3. Output products

(a) Ice charts are issued daily and mailed/telefaxed to the users for the Gulf of Finland and the northeastern Baltic Proper.
(b) Coded and plain language GTS reports issued daily in Russian and English.
(c) Ice bulletins in Russian covering northern areas issued on Monday and Thursday.

4. Forecasts and forecasts methods

Forecasts are provided for the northern areas 24 hours.

5. Publications

6. Mailing address

North-Western Regional Administration for Hydrometeorology
and Environmental Monitoring (NWRA HEM)
23 Line, 2a, Basil Island
RUS-199026 St. Petersburg
Russia

telephone: +812 328 1467
telefax: +812 328 0962 or +812 321 3018
e-mail: adm@nwmetnw.ru
Internet: http://www.nwmet.nw.ru

SWEDEN

1. Organization

The Swedish Meteorological and Hydrological Institute (SMHI) is responsible for the sea-ice information service in Sweden.

2. Data acquisition

Daily ice information is reported in the Baltic Sea Ice Code from 337 areas or fairway sections along the Swedish coast. A section and/or combination of these form 129 main areas or fairways grouped in 19 districts.

Icebreakers report on the ice situation is obtained four times a day in plain language.

Helicopter ice reconnaissance is carried out by icebreakers deck officers and ice charts are transmitted to SMHI by fax via mobile telephone.

At present SMHI receives AVHRR images from NOAA satellites. RadarSat is used periodically.

3. Output products

(a) Ice charts

All ice charts are in Mercator projection and cover the whole Baltic Sea.

The scales are at 60°N 1:2 000 000 on the Facsimile chart) northern and southern part due to ice extension) or 1 : 4 000 00 (whole area).

Ice charts are issued daily in ice season and transmitted by telefax, e-mail or Internet and mail (twice a week). The Swedish ice chart is retransmitted once a day on radiofacsimile by the German stations Hamburg/Pinneberg, Offenbach/Mainflingen.

(b) Ice report or ice bulletins

Coded and / or plain language. A sea ice bulletin – a description of the ice situation at sea, restrictions to navigation, operational areas for icebreakers – is issued in English twice daily from coastal stations and by Navtex and once daily by the GTS or telex to Baltic countries. Coded sea-ice information from 129 areas or fairways in the Baltic Sea Ice Code is included on GTS. An abridged bulletin is issued in Swedish once daily by Swedish Radio Broadcast.

A printed sea-ice bulletin – as above – is issued in Swedish and English during weekdays and sent by mail, E-mail, Internet or telefax to subscribers.

4. Forecasts and forecast methods

General five-day forecasts: ice forecasts for subsequent five days are provided for the icebreaking service on a daily basis. They describe in general terms the expected ice developments.

5. Publications

A monthly summary with meteorological, oceanographical and hydrological conditions are published.

Further more a summary of the ice seasons.

6. Mailing and Internet address

Swedish Meteorological and Hydrological Institute, SMHI.
Marine Forecasting Services
S – 601 76 Norrkøping
Sweden

telephone: +46 (0)11 495 8400
telefax: +46 (0)11 495 8403
e-mail: ice@smhi.se
Internet: http://www.smhi.se/sgn0104/sjofart/text.html#Ice service
Internet: ftp://ftp.smhi.se (ftp-server)

Ice Climate Data Questionnaire

Ice Climate Data Questionnaire

Ice Climate Products (Letter of Intent)

Ice Climate Products (Letter of Intent)

2 August 2000

Dear colleagues,

At the 1999 IICWG meeting, I was charged by the IICWG Standing Committee on Data, Information, and Customer Support with the action to "Identify a subset of ice climate product statistics (for example, digital ice extent products) to be shared among the centers and their users". The identified "ice climate products" must be useful for studying trends in sea ice extent or coverage, and must be convenient for the ice centers to produce.

Fundamentally, every ice center's archive of ice charts or ice observation constitutes an "ice climate product". When these data are available to researchers they are used to look at trends in coverage and extent. I would like to identify ice climate products that are more convenient for researchers than these raw operational chart data. I see three possibilities:

1. An ongoing record of ice year severity for the area covered by a center, where "severity" is determined by some documented standard. (The standard need not be the same for all services, but it does need to be defined.)
2. An ongoing record of ice extent, where extent is the area in square km covered by ice (at any concentration).
3. An ongoing record of ice "coverage", where coverage is a summation of each area covered weighted by concentration within the area. (Coverage is a measure of an equivalent area of 100% concentration of ice).

By "ongoing", I mean that the statistics would be produced with the same frequency as the operational products from which they are derived, and that the severity index would be published every year. Of course, any summary or average products would also be welcome. (For example, NIC has compiled mean extent and coverage by week of the year using analyses from a 20 year period).

In addition to the products above, charts of median extent for a given time period, along with charts of maximum and minimum extent for each year (where appropriate) would be useful for research even if only available in =2Egif form. The method used to determine the median would need to be documented.

The products above are not appropriate for every center. For example, AARI, CIS, and NIC cover large areas with their analysis, and may not produce a "severity" index for individual ports or coasts. The Icelandic and Danish services may not be able to produce extent or coverage records, because the areas covered by operational analysis are not enclosed.

I am writing to get your comments on these proposed products.

a. Would your center be able to produce one or more of the above ice climate products, and would you be willing to make the products available to the other centers, and to the research community (for example, by contributing them for posting on the IICWG and GDSIDB web pages).
b. Do you have comments on the proposed products, or suggestions for other products?
c. The attached file has a Word 95 format table with information on the ice centers that I have gathered from GDSIDB and IICWG meetings, and from your web pages.
Please help me fill in any blanks and correct any mistakes. There is a column for "climatological products" available from the centers. I am using the information in the table to prepare for our meeting in October where we will discuss data formats as well as climatology products.

If you have samples of climatology products (for example, plots of trends in coverage for different regions), I would like very much to see them and to post them on our IICWG web site with your permission.

Thank you for your help, and if I have sent this message to the wrong person at your center, please forward it to the correct person.

Regards,
Florence

Florence Fetterer
NOAA Liaison
University of Colorado
National Snow and Ice Data Center
Campus Box 449
Boulder, CO 80309-0449 - USA
Tel. (303) 492-4421 Fax. (303) 492-2468
Email:fetterer@kryos.colorado.edu

Arctic and Antarctic Research Institute
Mr. Vasily Smolyanitsky, Scientist
Email. vms@aari.nw.ru

Bundesamt fur Seeschiffahrt und Hydrografie
Mr. Klaus Struebing, Head of
klaus.struebing@m1.hambueg.bsh.d400.de

Canadian Ice Service
Mr. Richard Chagnon, Ice Operations
Email. richard.chagnon@ec.gc.ca

Climate and Marine Department - Marine Meteorological Division
Japan Meteorological Agency - 1-3-4
Mr. Yoshio Shinohara, Chief/Sea Ice

DMI/Ice and Remote Sensing Division
Mr. Henrik S. Andersen, PhD/Senior Scientist
Email. hsa@dmi.dk

Finnish Institute for Marine Research
Mr. Hannu Gronvall, Head of the
Fiinnish Ice Service
Email. gronvall@fimr.fi

Icelandic Meteorological Office
Mr. Thor Jakobssen, PhD, Research
Email. thor@vedur.is

Norwegian Meteorological Institute
Mr. Frode Dinessen, Leader of the Ice Patrol
Email. frode.dinessen@dnmi.no

Swedish Meteorological and Hydrological Institute
Mr. Thorbjörn Grafström,
Deputy Operational Mgr/Ice Service
Email. torbjorn.grafstrom@smhi.se

U.S. National Ice Center
Ms. Cheryl Bertoia, Director, Ice Operations
Email. bertoiac@natice.noaa.gov

Ice Climate Products (Tables)

Ice Climate Products (tables)

Information compiled from service web sites, GDSIDB report, and IICWG notes. Please correct or fill in blanks. This table will be used to aid discussion at the IICWG meeting. It will not be published anywhere.

2000-10-06

Ice Service	Analysis chart frequency	Analyis or GIS system used	Operational product format	Climatological products produced by the ice service	Contributor to GDSIDB? (Note - may not include holdings at AARI)
Arctic and Antarctic Research Institute Note - Involved in Ad-Hoc group to agree on new archive (and possible exchange) format	Weekly (available as .gif or SIGRID on web site)			Numerous, though not always available as digital databases. For example, probability of ice formation for Black, Caspian, and Azov Seas. Mean (and many other statistics) total concentration by decade, 1950-1990, on AARI GDSIDB web page. (Available as digital product?)	1950-1993 SIGRID (at AARI) 1953-1990 EASE-Grid (at NSIDC or AARI) Chart every 10 days.
Argentine Navy Hydrographic Service				Data base of point observations back to the 1970s, or earlier	1998-2000, point observations in NIC-code in .db format (so like the attribute table for a shape file?) Ongoing contributions planned

Austrialia (ASPeCt Project)	Point measurements, field program				Not now, but data for 1980-1997 planned. In ASPeCt data base format.
Canadian Ice Service Note - Involved in Ad-Hoc group to agree on new archive (and possible exchange) format			e00 files (Use e00 files for transfer with NIC, but with different SIGRID string.)	Climatic Ice Atlases -- 30-year Median of Ice Concentration by region -- 4 regions. Digital (Arc?) and on CIS web site. One chart per week. Ice Thickness Climatology 1961-1990 Normals (Publication) Weekly Ice Thickness and On-Ice Snow Depth Measurements for [195] Canadian Stations. Digital, available via web, archived and documented at CIS	1968-1998 in SIGRID. Some earlier data in SIGRID. 1968-1998 in .e00 as well, with SIGRID attributes (15' resolution). Ongoing contributions planned.
China, State Oceanic Administration				1952-present, Maximum annual extent, Bohai Sea	(To be submitted before next mtg) 1968-present, 0.1 degree grid, total and partial concentrations, stages of development
Danish Meteorological Institute Note - Involved in Ad-Hoc group to agree on new archive (and possible exchange) format		Analysis: ERDAS Imagine Chart production: ESRI ArcView (Polygons with SIGRID attributes)	e00 files		1990 (sample) in original (?) gridded format, available from AARI. Ongoing contributions (starting with 1999) planned

Finland. Institute of Marine Research, Finnish Ice Service	Two times a week			Many climatologies, atlases, statistics, etc. on Baltic sea ice covering back to 1719 available as paper copies of reports. One example: image showing classification of maximum extent of ice in Baltic Sea 1720-1995, characterized as extremely mild to extremely severe. Digital ice charts from 1992-1996. On-line narrative summary characterizing winter conditions, for ice winters from 95/96, with graphic of maximum ice extent.	Baltic sea ice meeting country - charts contributed as a group. 1960-1979 SIGRID (every 2-3 days) EASE-Grid available from AARI Ongoing contributions planned
Germany, Federal Maritime and Hydrographic Agency (BSH), Ice Service				Narrative summary of ice winter on German coast and in Baltic Sea area (from 98/99) with images of maximum extent charts	Baltic sea ice meeting country - charts contributed as a group. See Finland entry.
Icelandic Meteorological Office	Variable (from Icelandic Coast Guard)				Not now, but would like to per T. Jakobsson, 10/99
Japan Meteorological Agency	Daily bulletin Every 5 days?				1971-1993 in SIGRID 1994-1999 in SIGRID-2 (Every 5 days) EASE-Grid available from AARI
Norwegian Meteorological Institute	Every weekday	ESRI ArcInfo, ArcView			

Poland (IMGW)	2-3 times a week Polish coast and Baltic Sea			Summary on ice winter on Polish coast (from 1984/85) with maximum extent charts. Data Bank: Daily ice and meteorological observations along the Polish coast since 1955, seasonal data of winter ice conditions from 1896/97	Baltic Sea Ice Meeting
Sweden (SMHI)					Baltic sea ice meeting country - charts contributed as a group. See Finland entry.
U.S. National Ice Center Note - Involved in Ad-Hoc group to agree on new archive (and possible exchange) format	Weekly (available as .jpeg, .gif or arc or e00 on website)	Analysis: PV-Wave transitioning to ERDAS Imagine GIS: ESRI ArcInfo and ArcView	e00 files with modified SIGRID text string jpeg charts (color and B&W) gif charts	Average coverage and extent in sq. kilometers, by week of the year, for about 1973-1994, for regions of Arctic, and Antarctic.	1972-1994 in SIGRID, EASE-Grid (on upcoming EWG CD-ROM) (Every 7 days) Ongoing contributions planned, format TBD. Current data are available as e00 and gif files.

ANNEX 14

Tools for the Interpretation of Radar Satellite Data

WHAT HELPS

IN THE INTERPRETATION AND CLASSIFICATION OF SEA ICE ON SAR IMAGES ?

(on-line analog tools)

- ground truth information (if available)

- general knowledge of the region with respect to the seasonal development of the ice cover (ice regime)

- knowledge of the actual development of the ice cover (advantage of operational ice services) in a given area

- special relations to bathymetry (coastal morphology) e.g. for the position of fast ice edges and boundaries

- meteorological information, mainly wind direction and velocity, air and sea surface temperature (influence on ice drift, deformation processes, freezing and melting conditions)

- experience in visual ice observation and reconnaissance from shore, ship, helicopter and aircraft (i.e. knowledge on how ice is looking like)

- experience in the use and interpretion of optical and TIR images (LANDSAT, SPOT, NOAA) for sea ice monitoring

The texture only, the areal pattern of an ice surface on a SAR scene resulting from the different backscattering (grey tones) combined with the geographical relations and the back-ground knowledge of the experienced interpreter allows to exclude several ambiguities.

Klaus Strübing, BSH – 10/1995
revised 09/2000

Protocol of the Baltic Ice-Breaking Meeting, Århus, DK – Sept. 12-14, 2000

(available only as hardcopy)

ADMIRAL DANISH FLEET
ICE-BREAKING SERVICE

SOK OP1
046.2
9713297-009

Xnr.: IB

15 SEP 2000

Protocol from The Baltic Ice-Breaking Meeting held in Aarhus september 12th – 14th 2000 at Hotel Kong Christian d. X.

Participants: see annex A.

Protocol of the meeting.

1. The meeting was opened by Commander S.G. Arne Mikkelsen, Admiraldanfleet who welcomed the delegates. For the remainder of the meeting it was hosted by Commander Kim Møller Petersen.

2. The agenda see annex B was approved.

3. The delegates gave their reports on the previous season, see annex C.

4. Kim Møller Petersen and Roy Jaan explained the situation for severe winters in the W. Baltic, Danish straits and Kattegat, where in spite of cooperation between Swedish and Danish services, icebreaker capacity would be insufficient. Roy Jann suggested, that there should be created a foundation. The foundation should hold due collected from shipping. Markku Mylly pointed out that the creation of such a foundation was not this gatherings business. In order to get anything done about this every delegate would have to present it for their political masters. Markku Mylly and Roy Jaan drafted the letter shown in annex E. It was agreed upon that each delegate should make their political masters aware of this problem.

5. During the meeting the problem of how to handle vessels which are not suitable for navigation in ice. The Finnish delegation made their rules on this problem available, see annex F.

6. The Polish delegate Piotr Zenni offered on behalf of Poland to host the next Baltic Icebreaker Meeting to be held SEP 2001. It was also agreed upon that the duration of the meetings should not extend more than one full day.

Denmark:

Kim Møller Petersen

Estonia:

Lembit ~~Mölbeck~~
MOTLIK

Finland

Markku Mylly

Germany:

Karl-Uwe Bellmann

Poland:

Piotr Zenni

Russia:

Anatoly GorshKovsky

Sweden:

Roy Jaan

Port of Skt Petersburg

Oleg M. Koudriavtsev

Annex A

Baltic Ice-Breaking Meeting in Aarhus september 12th - 14th 2000

List of participants:

Søværnets operative Kommando Postboks 483, 8100 Aarhus C Denmark	Kim Møller Petersen +45 89433253 +45 89433230 istjeneste@sok.dk
Estonian Vessel Traffic Services Uus-Sadama 19 -13, 10120 Tallinn Estonia	Lembit Mötlik +370 5068033 +370 6205746 lembit@laevaljk.ee
Finnish Maritime Administration, Traffic Department Post Box 171, 00181 Helsinki Finland	Björn Sjöman +358 204484216 +358 204484431 bjorn.sjoman@fma.fi
Finnish Institute of Maritime Research Post Box 33, 00931 Helsinki Finland	Hannu Grönvall +358 9613941 +358 961394494 gronvall@fimr.fi
Finnish Maritime Administration, Traffic Department Post Box 171, 00181 Helsinki Finland	Markku Mylly +358 204484205 +358 204484431 markku.mylly@fma.fi
Wasser- und Schifffarthsamt Kiel-Holtenau Schleuseninsel 2, 24159 Kiel Germany	Fred Volbert +49 431 3603450 +49 431 3603454 vkz.nok-ii@t-online.de

Wasser- und Schifffarhtsamt Kiel-Holtenau Schleuseninsel 2, 24159 Kiel Germany	Uwe Bellmann +49 431 3603450 +49 431 3603454 vkz.nok-ii@t-online.de
Maritime office, Gdynia Harbour Master's office, Port of Gdynia, Polska 2 str Poland	Piotr Zenni +48 586274930 +48 586616051 zenni@hmgdy.gov.pl
Northern Sea Route Administration Rozhdestvenka 1/4, 103759 Moscow Russia	Anatoly Gorshkovsky +7 0959261762 +7 0959284556 gorshkovskyaa@morflot.ru
Port Authority of St. Petersburg 10 Gapsalskaya Street, 198035 St. Petersburg Russia	Oleg Mikhailovich Koudriavtsev +7 8123274050/4166 +7 8123274020 gaf@mail.pasp.ru
Sjöfartsverket, Isbrytningsavdelingen 601 78 Norrköbing Sweden	Roy Jaan +46 11191211 +46 11103100 roy.jaan@sjöfartsverket.seA 2

Annex A

Baltic Ice-Breaking Meeting in Aarhus september 12th - 14th 2000

List of participants:

Søværnets operative Kommando Postboks 483, 8100 Aarhus C Denmark	Kim Møller Petersen +45 89433253 +45 89433230 istjeneste@sok.dk
Estonian Vessel Traffic Services Uus-Sadama 19 -13, 10120 Tallinn Estonia	Lembit Mötlik +370 5068033 +370 6205746 lembit@laevaljk.ee
Finnish Maritime Administration, Traffic Department Post Box 171, 00181 Helsinki Finland	Björn Sjöman +358 204484216 +358 204484431 bjorn.sjoman@fma.fi
Finnish Institute of Maritime Research Post Box 33, 00931 Helsinki Finland	Hannu Grönvall +358 9613941 +358 961394494 gronvall@fimr.fi
Finnish Maritime Administration, Traffic Department Post Box 171, 00181 Helsinki Finland	Markku Mylly +358 204484205 +358 204484431 markku.mylly@fma.fi
Wasser- und Schifffarthsamt Kiel-Holtenau Schleuseninsel 2, 24159 Kiel Germany	Fred Volbert +49 431 3603450 +49 431 3603454 vkz.nok-ii@t-online.de

Wasser- und Schifffarhtsamt
Kiel-Holtenau

Schleuseninsel 2, 24159 Kiel

Germany

Uwe Bellmann

+49 431 3603450

+49 431 3603454

vkz.nok-ii@t-online.de

Maritime office. Gdynia

Harbour Master's office, Port of Gdynia,
Polska 2 str
Poland

Piotr Zenni

+48 586274930

+48 586616051

zenni@hmgdy.gov.pl

Northern Sea Route Administration

Rozhdestvenka 1/4, 103759 Moscow

Russia

Anatoly Gorshkovsky

+7 0959261762

+7 0959284556

gorshkovskyaa@morflot.ru

Port Authority of St. Petersburg

10 Gapsalskaya Street, 198035 St.
Petersburg
Russia

Oleg Mikhailovich Koudriavtsev

+7 8123274050/4166

+7 8123274020

gaf@mail.pasp.ru

Sjöfartsverket, Isbrytningsavdelingen

601 78 Norrköbing

Sweden

Roy Jaan

+46 11191211

+46 11103100

roy.jaan@sjöfartsverket.seA 2

SOK OP1 Xnr.: IB
046.2
9713297-009 15 SEP 2000

Annex B

Agenda

September 12th

13:00	Meeting opens: Welcome by Head of Department/Branch Chief. Adminstrative remarks
16:30	Meeting Ajourned
17:30	Get together arrangement hosted by Port of Aarhus

September 13th

09:00	Meeting continues: According to appoved agenda
12:00	Lunch
13:00	Meeting continues
15:15	Meeting ajourned
15:45	Briefing on ADMIRALDANFLEET organisation and tasks
18:00	Dinner hosted by ADMIRALDANFLEET

September 14th

09:00	Meeting continues: Drafting of the minutes:
11:30	Meeting close

LAEVALIIKLUSE JUHTIMISE KESKUS
VESSEL TRAFFIC SERVICES

Summary of the icebreaking activities in the Estonian waters during winter 1999 – 2000

The ice conditions of the winter can be described as easy.

We have two regions for icebreaking.

The most important for us – Tallinn ports in the Gulf of Finland and ports in the Gulf of Riga.

This winter in the Gulf of Finland the ice did not cause any problems for navigation.

Our icebreakers "Tarmo" and "Karu" were ready for sea on 8 hours notice in period from January 15. until March 31.

In the Gulf of Riga between islands we have ferries with iceclass and have not any iceproblems.
For Pärnu port we rent from Finnish tugcompany Alfons Hakans tug with icebreaking bow. The icebreaking period valid from January 10. to March 29. 265 vessels was assisted. In this region we have problems with shallow waters, river – sea vessels, which have not iceclass and tug caravans.

Lembit Mõtlik
Deputy director

Uus-Sadama 19
10120 Tallinn
ESTONIA

Tel (372) 620 57 40
Faks (372) 620 57 46
E-mail: ljk@laevaljk.ee

Reg.nr. 70000817
a/a 10002023244006
Eesti Ühispank, kood 401

Aarhus, 12.09.2000

Poland.

Polish coast has been divided into two regions for the purpose of icebreaking action.
Region East,which covers the territories of Gdansk and Slupsk Maritime Offices(but excluding Port of Kolobrzeg) and Region West which covers the territory of Szczecin Maritime Office.
Commanding Officer for the Region East is Harbour Master of the Port of Gdynia
Commanding Officer for the Region West is Harbour Master of the Port of Szczecin.

These two Officers are responsible for getting ready for icebreaking and for carrying the icebreaking action.Commanding officers cooperate with:Hydro-Meteo Service, the Navy and various services of merchant ports.

By 15th of October each year a list of icebreakers is agreed with owners or operators for approaching winter season.
By 10th of November the owners or operators are obliged to have their icebreakers in all respect ready for action.
Also by 10th of November Commanding Officers declare,in cooperation with Harbour Masters of other ports,which smaller,fishing ports will not be protected.Vessels from the smaller ports may be shifted to the protected ports in due time.

Icebreaking on approaches,roads,channels and anchorages of the ports where State Maritime Administration is responsible for keeping these accessible,is performed on account of the State.
Icebreaking inside the ports is performed on account of the Port Authority.

Procedure:
Harbour Masters are to inform the proper Commanding Officer on the actual situation in their ports and on approaches,roads,anchorages and channels- every day.
Commanding Officer gives the order to start icebreaking action in respective port(ports), when necessary.

The icebreakers are port tugs .Generally the thickness of ice,that may be breaken by the tugs is 25 cm maximum.

When a vessel needs the service of icebreaking outside the aquatorium for which the Commanding Officer is responsible,this can be done on request and on account of the Owner.

P. Zenin

P. ZENIN
DEPUTY HARBOUR MASTER
PORT OF GDYNIA

WASSER- UND SCHIFFFAHRTSVERWALTUNG DES BUNDES
Wasser- und Schifffahrtsamt Kiel-Holtenau
Verkehrszentrale NOK II

Wasser- und Schifffahrtsamt Kiel-Holtenau
Schleuseninsel 2 • 24159 Kiel

The Ice-winter 1999/2000 at the German Baltic Coast

The winter 1999/2000 at the German Baltic coast differs not much from the ice-winters of the last three years. In comparison with the winters of the last 100 years it will take a place at the end of the row.

Details:

At the beginning of the third decade of December new ice formed in the inner shallow waters in the eastern region of Germany but during the days of Christmas the ice vanished as on the northern side of an extensive depression mild maritime air flow over the northern part of Germany. The same happened in the last decade of January. After that ice could not more be observed in the coastal waters.

As a summary we can say it was an ice free winter.

Icebreakers:

There are no changes in the German icebreaker-fleet.

Karl-Uwe Bellmann

Dienstgebäude
Schleuseninsel 2
24159 Kiel

Telefax
(0431) 3603
Amt - 414
Verkehrszentrale - 454

Internet:
//www.wsa-ki.wsd-nord.de

E-Mail:

Kasse
Bundeskasse Kiel
Adolfstraße 14/28
Postfach 11 42

Konten
Landeszentralbank Kiel
Postbank Hamburg

210 010 09
(BLZ 210 000 00)
63 04-202

Summing up
for winter navigation 1999-2000
in the Eastern part of the Gulf of Finland
and in the Port of St. Petersburg

The first new ice in the coastal part of the Gulf of Finland began appearing in the end of November 1999.

Since 23-d of November 1999 Port ice breakers "SEMEN DEZHNEV", "IVAN KRUZENSTERN" and "CAPTAIN IZMAILOV" started operating.

The quantity of ice started increasing intensively in early January 2000.

By middle of January the ice-breakers "CAPTAIN SOROKIN" and "MUDIUG" started ice-breaker assistance.

In the last decade of January the air temperature fell to minus 12,17 degress C and the cold weather was kept till early February. The thickness of ice reached 15-30 cm. As a result of constant western winds, the edge of fast ice was on the meridian of the island Sommers. The length of route for ice-breaker assistance was 55-60 miles.

The most expansion of ice could be seen in March when as a result of low temperatures and north-western winds, the ice began drifting towards the West and new ice began forming.

The ice -breakers were operating under difficult conditions with constant drifting and compressing ice.

During the period of winter navigation 1999-2000 the number of in\out ships were increased. Their quantity was increased from 2967 in1998-99 to 3641 during the previous navigation.

In general quantity of ships the share of huge ballast ships without ice class was increased. It should be noted that in most cases these ships were old and the Captains were not experienced in navigating in ice. For ice-breaker assistance, the captains of which had no experience in navigation in ice, one could offer a pilote from the edge of the ice.

Like the previous years it was noticed a great number of ships (type river-sea) with low ice class and weak engines. In order to reduce the risks of damages of such vessels, from 26-th of January till 17-th of April limits were introduced for ice-breaker assistance for the ice-breakers with ice-class less than L3 and engine capacity less than 2000 horse powers.

During the period of introduced limitations ice- breakers assisted the ships with low ice class and weak capacity. For this purpose, it was used a special port ice-breaker in the convoy of arctic ice-breaker. Within this period 397 ships were assisted by the ice-breakers "IVAN KRUZENSTERN" and "CAPTAIN PLAKHIN".

The southern route of traffic the ships through the Island pass this year was not used because the lack of consolidated ice.

In the framework of the united Headquarter of ice-breaker operations the efforts for ensuring traffic of the ships to the ports of Vyborg and Vysotsk were coordinaded by the ice-breakers belonging to the Port Authority of St. Petersburg and the ice-breaker "YURI LISYANSKIY". Altogether 400 ships were assisted.

During the previous navigation for the first time in the water area of the Gulf of Finland helicopter MI-2 was used which was located on the ice-breaker "CAPTAIN SOROKIN". The usage of the helicopter for ice investigations gave a positive result. We intend to use it further.

We feel lacking ice-breakers during the period of winter navigations and during the severe winters this matter will be more acute.

Even now we are preparing for the next navigation which in accordance with our specialists will be colder than the previous winter.

Next year the Port of Vysotsk is planning to use the ice-breaker "TOR" for ice-breaker assistance. Earlier the ice ice-breaker belonged to Sweden.

The ice -breaker "ERMAK" was transfered to Port Authority of St. Petersburg. Earlier, this ice-breaker belonged to J\S "Far East Shipping Company". Now the ice-breaker "Ermak" is sailing from the Port of Vladivostok to the Port of ~~Murmansk~~ St. Petersburg by the Northern Sea Route.

The ice-breaker "Ermak" has capacity of 36000 horse powers. It was built in 1974 in Finland. It was operating in the Northern Sea Route before 1996.

Traffic and ice-breaking manager

Oleg M. Kudryavtsev

n-97

Port Authority of St. Petersburg

№	*Position*	*Name*	*Phone*	*Fax*	*E - mail*
1.	Head	*Batalin* Gennadi A.	(812)118-89-50 (812)118-89-51	(812)327-40-20	
2.	Harbour Master	*Mitenev* Gennadi A.	(812)118-89-64 (812)118-89-74	(812)118-89-21	gaf@mail.pasp.ru.
3.	Deputy Harbour Master	*Glukhov* Aleksandr F.	(812)118-89-64 (812)118-89-74	(812)118-89-21	gaf@mail.pasp.ru.
4.	Traffic ice-breaking Manager	*Kudryavsev* Oleg M.	(812)118-89-34	(812)118-89-21	gaf@mail.pasp.ru.
5.	Traffic IT Manager	*Vladimirov* Mikhail G.	(812)327-41-48	(812)327-41-48	vmg@mail.pasp.ru.

Correspondence to the signs of type for ice strength Russian Maritime Register of shipping

Rules edited in 1999	*Rules edited in 1995*	*Rules edited in 1999*	*Rules edited in 1995*
Ships for ice navigation		*Ice-breakers*	
ЛУ1	Л4	ЛЛ6	ЛЛ4
ЛУ2	Л3	ЛЛ7	ЛЛ3
ЛУ3	Л2	ЛЛ8	ЛЛ2
ЛУ4	Л1	ЛЛ9	ЛЛ1
ЛУ5	УЛ		
ЛУ6			
ЛУ7	УЛА		
ЛУ8			
ЛУ9			

The Swedish Ice-breaking report

The winter 1999-2000

Ice-Breaking Activities

The decade's last ice winter season 1999-2000 was a mild winter in Sweden, with fairly easy ice-conditions for navigation. It was only in the waters furthest to the north that ice extension and ice-breaker operations were of normal proportions.
In the waters of southern Sweden and in Lake Vänern there was ice formation in the archipelagos only.

During the winter, five Swedish ice-breakers were in operation off the Norrland coast. On Lake Vänern, it was never necessary to use the ice-breaker Ale.
The ice-breaker Njord performed her last ice-breaking mission under the management of the Swedish Maritime Administration. Both the Njord and the Tor were sold to Canada in the spring of 2000. As the first vessel in a series of three new ice-breaking/supply vessels, the Tor Viking was delivered from the Norwegian shipyard in mid-March, 2000.

The Ymer

The first Swedish ice-breaker to start the season was the Ymer leaving Stockholm for the Bay of Bothnia on November 30. The usual naval cadet cruise of the year's ice-breaker officers' academy course took place along the Norrland coast. The Ymer's area of operations was the northern waters of the Bay of Bothnia, though due to west winds heavy ice mostly occurred on the Finnish side. This year's operations started with traffic supervision. Ice escort duties commenced at the end of January, but there were no towing assignments for the Ymer throughout the season. Starting from week no. 4, the Ymer operated mostly at sea with escort missions and supervision of shipping to and from Luleå as well as the cross traffic between Luleå and Brahestad. The Ymer finished her ice-breaking expedition on May 7.

The Oden

The ice-breaker Oden began her ice-breaking expedition on December 1. A planned helicopter marine survey with the Oden serving as base vessel had to be postponed due to technical problems with the helicopter's surveying equipment. To begin with the Oden was lying still on standby at Skelleftehamn. Her first escort mission was to Haraholmen at the end of December. The mild winter resulted in a fairly low frequency of assistance activities, and the Oden mainly assisted in the Skellefteå and Piteå districts. It can be mentioned that outside normal operation activities the Oden served as base vessel for ice tests performed by the Tor Viking, and the Oden was also used for bunkering of other ice-breakers.

The Njord

The ice-breaker Njord commenced her ice-breaking expedition on January 21. Transit toward Northern Kvarken took place in rough weather conditions. The Njord was assigned responsibility for the harbours of Holmsund, Rundvik, Husum and Örnsköldsvik, in addition to the Northern Kvarken district. Due to mild weather, the Njord had to lie still in Holmsund, apart from breaking an ice channel in the Ångermanälven river on February 8. Due to growing ice cover late in February, the Njord carried out escort missions in Northern Kvarken and the northern part of the Sea of Bothnia up to March 13, when she finished the season's ice-breaking expedition by opening a base channel on the Ångermanälven river. The Njord's very last ice-breaking assignment under the management of the Swedish Maritime Administration was accomplished in Karlskrona on March 16. The Njord was later sold to a Canadian navigation company.

The Atle

The ice-breaker Atle left on ice-breaking expedition on February 22. The northward transit was via the Gävle Bight, where new ice formation was in rapid progress. The Atle did not stay in the Gävle district but went on northward along the Swedish coast. After a detour to the Ångermanälven river the Atle reached the Bay of Bothnia where machine tests were performed in heavy ice. During March and the first half of April, the Atle chiefly assisted north-southbound shipping past Bjuröklubb, and to and from Skelleftehamn and Haraholmen. The ice situation in the Bay of Bothnia was fairly easy on the Swedish side, while on the Finnish coast the ice was heavily compacted and ice-conditions in the fairway to and from Brahestad were periodically very difficult. On a number of occasions the Atle assisted the ore traffic plying between Luleå and Brahestad. During the latter part of April and well into May, the Atle was responsible for traffic assistance to and from Luleå och Karlsborg. Karlsborg was opened for shipping on May 2. The Atle finished her ice-breaking expedition on May 23.

The Tor Viking

Owned by the Swedish-Norwegian shipping company B&N Viking Icebreaker and Offshore A/S, the new ice-breaker & supply vessel Tor Viking conducted ice trials in the northern part of the Sea of Bothnia during March. The ship's performance thoroughly meets the specified ice-breaking capability requirements. The Tor Viking left the Bay of Bothnia on March 31. During the passage to the North Sea, the Tor Viking visited the ports of Norrköping, Copenhagen, Landskrona, and finally Gothenburg where the ship was demonstrated.

The mild winter meant that there was no need to use the work ships of the Swedish Maritime Administration for ice-breaking purposes, and ice-breaking tugs assisted on Lake Mälaren only on very rare occasions.

As usual, co-operation with the Finnish Icebreaking Service Executives went on in a very fine atmosphere for the benefit of all parties concerned.

Necessary ice-class requirements and tonnage restrictions were imposed according to the degree of difficulty of the ice-conditions during the winter.

This season the Swedish state ice-breakers carried out a total of 353 escort missions, including 13 tows. These figures can be compared with those of last season, when 1043 escort assignments including 156 tows were done. Of the ships and vessels assisted during the season, 8 % were registered in Sweden.

Finnish Maritime Administration
TRAFFIC DEPARTMENT

7.9.2000

THE ICEBREAKING SEASON 1999-2000

The ice winter 1999-2000 was mild. The freezing process in the northern part of the Bay of Bothnia started in late November, more than a week later than usual. The first icebreaker Fennica was sent to north Finland on December 8th. The second part of December was mild and windy and ice was packed against the fast ice edge along the Finnish coast in the northern part of the Bay of Bothnia.

In early January new ice was forming in the eastern part of Gulf of Finland two weeks later than normal. In the middle of January we got little more ice both in the Gulf of Finland and in the Bay of Bothnia. The second and third icebreakers Nordica and Otso were put in duty in north Finland in January the 20th and 26th. The same day January 26th icebreaker Kontio was sent to the eastern part of the Gulf of Finland for about two weeks. At he end of January strong westerly winds broke up the ice field in Bay of Bothnia and the ice was packed against the Finnish coast forminga heavily ridged ice belt along the fast ice edge.

This winter we had hard westerly and south westerly winds and the ice difficulties were on the Finnish side of Bay of Bothnia. Former winter (1998-1999) the situation was different with hard easterly winds and our Swedish collegues had great difficulties in assisting the traffic along the Swedish coast.

In the beginning of February the icebreaker Botnica was sent to the southern part of Bay of Bothnia and assisted the traffic to Kokkola, Pietarsaari and Vaasa. In mid February a new cold spell set in and ice was formed in all sea areas.
During this period, i.e. on February 24th, the ice cover reached its largest extent, 95 000 km2, comprising the whole of Bay of Bothnia, the Quark and the Sea of Archipelago. In the Sea of Bothnia there was a 5-15 miles wide belt of thick drift ice off the Finnish coast. In the Gulf of Finland the ice edge ran form Hanko via Kalbådagrund to Vaindlo and further to the Estonias coast. In March, April and May hard westerly winds kept a heavily ridged icefield off the Finnish coast obstructing the assistance of the merchant ships.

The Sea of Archipelago and the western part of the Gulf of Finland were the first areas to become ice-free. As usual, this happened in the second part of April. The Sea of Bothnia became ice-free at the end of April and the Quark on early May, at the average time. The eastern part of the Gulf of Finland became ice-free late in April. The melting process in Bay of Bothnia was very slow and the last icebreaker Otso arrived to Helsinki at May 30th. The last ice floes, situated off the island of Hailuoto in the Bay of Bothnia melted on June 11th, two weeks later than usual.

Street Address
Porkkalankatu 5
00180 Helsinki

Postal Address
P.O. Box 171
FIN-00181 Helsinki
Finland

Telephone
+358 204 48 40

Fax
+358 204 48 4355

Telex
121471 mkh

As usual we had a good co-operation with the Swedish icebreakers. We had even a lot of problems with assisting old and bad ice going ships, a problem we are discussing with our Swedish collegues during our meeting in Kemi 19.-20.9. this year.
An other problem for us is that ship owners have made so called barge shaped ships (draft 4,5 m dwt 4250, beam 16,5 m and engine output 2880 kw). These barges (for example ms Geuldiep) appeared last winter in north Finland. They are new ships built in iceclass IA. This mild winter we had only 7 icebreakers in duty during the ice-season, and two, Urho and Voima stayed in Helsinki the whole winter.

Traffic Manager Björn Sjöman

BS/EA

SWEDISH MARITIME ADMINISTRATION
Ice Breaking Department

Jan Stenberg, 011-191213

Date
10 May 1999

Our reference

Your date

Your reference

Special problems during severe winters, when ice occurs in the southern Baltic, the Baltic approaches, Kattegatt and Skagerack

During the last 25 years, 6 winters have been severe with iceproblems and needs for icebreaker assistances in the southern Baltic, the Baltic approaches, Kattegatt and Skagerack, i.e. 1979, 1982, 1985, 1986, 1987 and 1996.

When ice problems occur in the southern and western fairways, this not only affects sea traffic to the Swedish ports, but also the Danish and German ports in the area. All of the Baltic states who rely on sea transport through the Baltic approaches are also subjected to increased marine safety risks and delayed transports. It is not the responsibility of Denmark that all sea traffic to all of the Baltic states is assisted through Store Belt and into the Baltic. Neither is it the responsibility of Denmark/Germany that this traffic is assisted between the Kiel Canal and the Baltic, nor the equivalent responsibility of Sweden/Denmark in the Öresund, Kattegatt and Skagerack. Each Baltic state must contribute icebreaking resources in proportion to its own volume of sea traffic in the area.

Between Sweden, Finland, Denmark and Norway, there is a government agreement from 1966 which regulates co-operation in

this respect. As far as Norway is concerned the agreement has little practical importance because ice problems seldom occur in the northern Skagerack.

The German authorities have declared and also demonstrated in practice that they intend to cooperate in accordance with the above-mentioned agreement.

Any such agreement however, where the other states around the Baltic are involved, doesn´t exist, and that will probably cause problems when the next severe winter occurs.

In the protocol from the annual meeting between the icebreaker authorities in Helsinki Nov 16-20 1985 the following paragraph is agreed upon:

7. The meeting also decided on the following practical arrangements in icebreaking cooperation between the USSR, Finland, Sweden and Denmark:

   In the southern Baltic Sweden and Denmark coordinate winter navigation in the Skagerack, the Kattegatt, Öresund and the Danish Straits. During very severe winters, however, Danish and Swedish icebreaking resources may prove inadequate for the proper handling of transit traffic, even in the case when Finnish-Swedish cross-traffic arrangements make it possible for Sweden to send additional resources to the area. When such a situation arises, the soviet delegation agreed to send, on request an icebreaker to the southern Baltic area east of a line between the islands Fehmarn and Lolland to assist winter navigation in close cooperation with the Swedish and Danish icebreakers. In order to promote the handling and directing of winter navigation under those circumstances, the meeting recommended an exchange of bridge officers between the icebreakers in the area. The head of

each delegation to the meeting is, within his own country, responsible for the agreed cooperation between the respecitve icebreaking services.

The protocol is signed by the Heads of the delegations from Denmark, Finland, Soviet and Sweden.

This agreement is not valid today, because the Soviet Union does not exist today. One of the most important subjects to discuss in these annual meetings is how the icebreaking services can handle this problems when the next severe winter occurs. Hopefully the authorities will came to en agreement, where Russia, Estonia, Latvia, Lithuania and Poland are involved.

SOK OP1 Xnr.: IB
046.2
9713297-009 15 SEP 2000

LETTER OF AGREEMENT

Subject: Icebreaker co-operation in southern and western Baltic

During the last 25 years, 6 winters have been severe with ice problems and needs for icebreaker assistance in the southern Baltic, the Baltic approaches, Kattegatt and Skagerrack, i.e. 1979, 1982, 1985, 1986, 1987 and 1996.

When ice problems occur in the southern and western fairways in The Belts, The Sound and approaches to The Kiel Canal this affects all ports in the Baltic area.

Between Finland, Sweden, Denmark and Norway, there is a governmental agreement from 1966 which regulates co-operation in this respect.

The German authorities have declared and also demonstrated in practice that they intend to co-operate. They have built a new icebreaker (I/B NEUWERK) designed to operate in the western Baltic.

The other Baltic countries, Russia, Estonia, Latvia, Lithuania and Poland have today no agreement about how they should contribute to the icebreaking services in the above mentioned areas in severe winters.

During the Baltic icebreaking meeting in Århus, 12th - 14th September 2000 the participants agreed to discuss this matter in respective countries with responsible authorities. The delegates report in the next meeting in Poland what actions have been taken to solve this problem.

Kim Møller Petersen
Denmark

Lembit Møtlik
Estonia

Markku Mylly
Finland

Anatoly Gorshkovsky
Russia

Piotr Zenni
Poland

Oleg Koudriavtsev
Port of St. Petersburg

Roy Jaan
Sweden

Uwe Bellmann
Germany

RULES FOR WINTER NAVIGATION
1.1.1999

Introduction

The First Rules

The first rules for winter navigation in Finnish waters were adopted in 1994. During a series of mild winters the shipping community had grown used to the idea that winter navigation did not cause any particular problems. The problems encountered in the winter of 1993/1994, which was a normal ice winter, came as a surprise to many parties. In consequence, the Finnish Maritime Administration decided to arrange a meeting with representatives of the industry and shipowners.

A working group was set up with the task to elaborate Rules for winter navigation. The rules, adopted on 17 June 1994, were followed during the following winters. At the annual winter navigation seminar held on 1 November 1998, it was decided to update these rules.

Information Systems

An automated information system called IBNet has been used since 1998 in conjunction with the icebreaker operations. The system provides the Finnish and Swedish icebreakers and the Icebreaker managements with identical information on the movements of ships and icebreakers. The system has been developed in co-operation with the management of the Swedish icebreaker fleet.

Rules

Average Regional Restrictions

The Gulf of Bothnia North (Bay of Bothnia)

The first traffic restrictions have normally been issued around mid-December (±30 days). The restrictions have been I, II 2000 dwt. During cold or normal winters the strictest restriction, IA 4000 dwt, has been issued around 20 February (±15 days). The maximum restriction of mild winters has been IA 2000 dwt or 3000 dwt and it has normally been applied from the beginning of February (±20 days).

The Gulf of Bothnia South (Sea of Bothnia)

During cold and normal winters the restrictions have been I A 2000 dwt or 3000 dwt. These restrictions have been applied from the end of February.

The Archipelago Sea and the western Gulf of Finland

The strictest restrictions have been IA and IB 2000 dwt or IC and II 3000 dwt, normally applied from the end of February.

The eastern Gulf of Finland

Earlier the strictest restrictions were IA and IB 2000 dwt. In early March 1994, a restriction of IA 2000 dwt was for the first time ever set for traffic east of Porvoo.

Maximum Restrictions

The maximum restriction for the northern Gulf of Bothnia has been IA 4000 dwt. It has been accompanied by an additional requirement restricting the amount of cargo per harbour to a minimum of 2000 tons.

In the southern Gulf of Bothnia, the maximum restriction can be considered as IA 3000 dwt, which nonetheless is issued rarely.

In the Archipelago Sea, where the ice situation, except for the high sea off Utö, normally is easier than elsewhere, larger ships without reinforcements are assisted, i.e. the maximum restrictions are somewhere in the region of IA, IB 2000 dwt and IC, II 3000 dwt.

The same goes for the western Gulf of Finland but depending on the ice conditions, local restrictions for vessels of the classes IC and II are issued.

In the area Porkkalanniemi - Hamina, the ice conditions may require restrictions of up to IA 2000 dwt. Such a situation occurred in the winter 1995/1996, which was a normal winter.

When transport agreements are made, attention should be paid to the restrictions under which the traffic runs fluently. The restrictions will be altered depending on the ice condition on a five-day notice.

1. Ship Suitability for Winter Operations

The Finnish Maritime Administration requires that the Finnish industry takes on its share of the responsibility for winter navigation and arranges both export and import shipments using modern ships equipped with sufficiently effective machinery. There have been too many examples of the opposite in recent times. The FMA disapproves of arrangements where the responsibility is transferred by the shipper to a foreign broker totally unaware of the conditions prevailing in Finland. The receiver of the goods always has the moral responsibility for prompt delivery of the goods, even in winter conditions. Every shipper must arrange his winter transport logistics according to this principle.

This actually means that the ideal means of transport are ships with sufficient engine power and built especially for winter navigation. If any Finnish shipper uses a broker who is unfamiliar with winter conditions he should make sure that the vessel to be used is suitable for the task. A mere ice class does not reveal everything. This is the reason why the FMA keeps a list, created by the masters of the icebreakers operating in the Gulf of Bothnia, of such ships the operational qualities of which are insufficient and the assistance of which have caused delays to other ships.

2. Ship Types Unsuitable for Winter Navigation

During traffic restrictions, the following ships and ship types (sister ships) will not be assisted after a date announced five days in advance.

- Volgo-Balt
- Sormovskiy
- Sibirskiy
- Ladoga
- Baltiskiy
- Amur
- STK
- Volga
- Volgo-Neft
- Weak-engined coaster type ships like Jan Meeder (1,920 dwt and 646 kW), Pöseldorf (1,766 dwt and 600 kW), Pax (1,750 dwt and 645 kW).

The present ice class regulations exclude all tug/barge combinations. They should not be used in winter time.

Among the pusher/barge combinations the following are unsuitable:

- Hermes and Para-Uno in traffic to Finnish ports
- Ben and Para-Duo in traffic to Finnish ports
- The tug boats Aulis and Kari of Neste Oy and their barges Bitpro I and Bitpro II in the northern Gulf of Bothnia
- The pusher/barge combination Mega-Motti of Lumi-Shipping during the most difficult winter time.

There are difficulties in defining barge type vessels. After the collapse of the Soviet Union a great number of their vessels have been transferred under flags of other countries. The names of these vessels have been changed so rapidly that identifying these ships as barge type vessels has become difficult. The industry and the brokers

have a great responsibility in this context. There is every reason to dig into the origin of these ships to avoid unpleasant surprises.
The FMA Traffic Unit will be glad to inform you about the suitability of a combination for winter navigation. It also answers any other questions concerning icebreaker assistance.

3. *The Start of Icebreaker Operations and the Operational Regions*

The planned areas of operation are:

- The Gulf of Bothnia: Urho, Sisu, Kontio, Otso, Nordica and Fennica
- The Northern Baltic and the Gulf of Finland: Apu, Botnica and Voima

During cold winters when ice conditions are difficult, the number of icebreakers in the Bay of Bothnia will be reduced to two, whereas there are three icebreakers in normal and light conditions. The Traffic Unit orders an icebreaker to the operational region concerned five days before traffic restrictions enter into force. Restrictions are announced five days before entry into force.

4. *Icebreaker Port Calls*

The icebreakers refuel and change crews at intervals of about 10 days. The Traffic Unit and the masters do their best to ensure that these activities disturb assistance as little as possible.
The exchange dates are published on the web site of the Finnish Maritime Administration: . You can also make inquiries at the Traffic Unit.

5. *Reports on Icebreaker Assistance*

Ice reports are transmitted several times a day by the Finnish Broadcasting Company and Turku Radio. The ice reports contain the following information:

- Ice conditions
- Positions of icebreakers
- Icebreaker port calls
- Ship reporting instructions
- Traffic restrictions, whenever they are altered

Additional information on traffic and traffic restrictions is given by:
Traffic Manager Björn Sjöman tel. 020 448 4216
Inspector Åke Tötterström tel. 020 448 4416
Inspector Claes Tigerstedt tel. 020 448 4416
at the Traffic Unit of the Finnish Maritime Administration.
Information is also provided by the icebreakers.
Information on the icebreakers, watchkeeping frequencies and telephone numbers is published in the leaflet "Management of Icebreaker Operations" which is published annually in December. The text is available in English, Finnish and Swedish on the FMA web site:
Information on ice conditions can be obtained from the FIMR Ice Service, tel. 020 448 4488 and (09) 685 7659.
Ice charts are obtainable from the FIMR Ice Service, fax /tel. 0200 - 2668. A new ice chart is completed daily at about 1400 hours. A general review, which is updated once a week, is published on the Internet

6. *Set Terms for Preliminary Reports by Ships*

Seabound ships:
The agents, shipowners or masters shall make a preliminary report to the icebreaker and pilot (or VTS) station when the ship is bound to leave. The report should be as final as possible and changes in the departure time must be notified immediately.
Ships arriving in Finland:

Preliminary reports are sent through agents and ports. The ships shall report to the icebreaker mentioned in the ice report and, if the destination is in the Gulf of Bothnia, to Stockholm Pilot.

If ice conditions change, the icebreaker as well as the reporting area may change.

7. *Assistance at the Discretion of the Management*

The Traffic Manager may decide that a specific ship is not suitable for winter navigation and refuse icebreaker support to the ship concerned.

The Traffic Manager may also grant ships dispensations, if there are good grounds to do so. Dispensations are granted rarely, mostly in cases where a ship is already destined for a port when the restrictions change. **From the winter 1999/2000 on, ships more than 20 years of age will not be granted any dispensations.**

8. *Transit Traffic*

The transit traffic increases the need for icebreaker support. **This traffic is not granted any dispensations.**

9. *Passenger Ship Traffic*

Passenger ships must not count on icebreaker support to maintain their schedules. In difficult ice conditions, passenger ships must be prepared for delays.

Björn Sjöman
Traffic Manager

International Ice Charting Working Group:

Terms of Reference and Action Items of the IICWW Standing Committees

INTERNATIONAL ICE CHARTING WORKING GROUP STANDING COMMITTEE

DATA, INFORMATION AND CUSTOMER SUPPORT

Applicable Terms of Reference:

- *Data and Product Exchange*
- *Terminology, Data and Mapping Standards*
- *Operations and Customer Support*

Action Items:

1. *Action*: Identify training opportunities, both on-site (icebreakers, over flights, etc.) and classroom training, for operational analysts and scientists.
   Coordinator: Mr. David Benner, United States, National Ice Center, *dbenner@natice.noaa.gov*

2. *Action*: Identify national center requirements for future spaceborne SAR data orders.
   Coordinator: Mr. Henrik Anderson, Denmark, Danish Meteorological Institute, hsa@dmi.dk

3. *Action*: Harmonize ice charting formats to enable the exchange of operational ice products.
   Coordinator: Mr. Klaus Struebing, Germany, Bundesamt fur Seeschiffahrt und Hydrographie, *klaus.struebing@m1.hamburg.bsh.d400.de*

4. *Action*: Identify a subset of ice climate product statistics (i.e. digital ice extent products) to share among the centers and their customers.
   Coordinator: Ms. Florence Fetterer, United States, National Snow and Ice Data Center, *fetterer@kryos.colorado.edu*

5. *Action*: Develop an IICWG web page with appropriate links to participating centers. Implement links to each center's home page for enhanced customer access. Each center will list customers, regional and global specialties.
   Coordinator: Mr. David Benner, United States, National Ice Center, *dbenner@natice.noaa.gov*

6. *Action*: Standardize color coding for ice charts as part of a longer-term strategy to place ice information in electronic navigation charts. The IICWG should consult with IMO and IHO so that revisions of the S57 standard (in 2003) will support ice information.
   Coordinator: Mr. John Falkingham, Canada, Canadian Ice Center, *john.falkingham@ec.gc.ca*

7. *Action*: Develop a proposal for the WMO/IOC (CMM) Subgroup on Sea Ice for standard nomenclature for ice decay and reporting processes.
   Coordinator: Mr. John Falkingham, Canada, Canadian Ice Center, *john.falkingham@ec.gc.ca*

8. *Action*: Share information and plans for improving product delivery to customers (including web-based means).
   Status: Deferred for future development.

9. *Action*: Establish a web-based workgroup to share information on operational software technology in support of each center's forecasting capabilities.
   Status: Deferred for future development.

10. *Action*: Share inventories of each country's national ice data archives under the auspices of the WMO Global Sea Ice Data Bank project. *Coordinator*: Mr. Vasily Smolyanitsky, Russia, Arctic and Antarctic Research Institute, *vms@aari.nw.ru*

11. *Action*: Post lists of each center's or country's archives on the IICWG web site (including data and climate products).
    Coordinator: Mr. Vasily Smolyanitsky, Russia, Arctic and Antarctic Research Institute, *vms@aari.nw.ru*

12. *Action*: Provide an inventory and description of each center's ice forecasting models.
    Coordinator: Mr. Frode Dinessen, Norway, Norwegian Meteorological Institute, *frode.dinessen@dnmi.no*

INTERNATIONAL ICE CHARTING WORKING GROUP STANDING COMMITTEE

ON

APPLIED SCIENCE AND RESEARCH

MEETING SUMMARY & ACTION ITEMS - COPENHAGEN, 5-7 OCTOBER, 1999

Applicable Terms of Reference:

Applied Science, Research and Development (all four points adopted).

Technology for Analysis and Forecasting {partially adopted - to be further addressed in collaboration with Data, Information, and Customer Support committee at future meeting(s)}

Co-Chairs:

Rashpal Gill, Danish Meteorological Institute, Denmark

- *Dean Flett, Canadian Ice Service, Canada*

Committee Participants/Members:

- *Cheryl Bertoia, National Ice Center, USA*
- *Leif Toudal, Danish Center for Remote Sensing, Denmark*
- *David Grimes, Environment Canada, Canada*
- *Keld Hansen, Danish Meteorological Institute, Denmark*
- *Dennis Conlon, Office of Naval Research, USA*
- *Lars-Anders Breivik, Norwegian Meteorological Institute, Norway*
- *Michael Manore, Canadian Ice Service, Canada*
- *Richard Hall, Scott Polar Research Institute, UK*
- *Thor Jakobsson, Icelandic Meteorological Office, Iceland*
- *Roger De Abreu, Canadian Ice Service, Canada*
- *Paul Seymour, National Ice Center, USA*
- *Rashpal Gill, Danish Meteorological Institute, Denmark*
- *Dean Flett, Canadian Ice Service, Canada*

Research Priority Themes Identified :

- information extraction, algorithm development
- data fusion techniques
- detection of low concentration ice (1/10) , redefine ice edge in analysis products
- linkages to models

Action Items:

1. *Action*: Attempt to establish recognition of Special User Group status (e.g. similar to PIPOR) for the operational ice community for early Envisat and RADARSAT-2 validation.
   Assigned to: Michael Manore, Canada, Canadian Ice Service, *mike.manore@ec.gc.ca*
   Leif Toudal, Denmark, Danish Center for Remote Sensing, *ltp@emi.dtu.dk*

2. *Action*: Establish the regular exchange of information on current projects and proposals in development.
   Assigned to: Dean Flett, Canada, Canadian Ice Service, *dean.flett@ec.gc.ca*

3. *Action*: Exchange and coordinate Envisat AO data acquisition and validation plans.
   Assigned to: Roger De Abreu, Canada, Canadian Ice Service, *roger.deabreu@ec.gc.ca*
   Leif Toudal, Denmark, Danish Center for Remote Sensing, *ltp@emi.dtu.dk*

4. *Action*: Organize appropriate workshops and special sessions that focus specifically on R&D in support of operations. First opportunity at WMO SGSI Workshop in Ottawa, May 2-4, 2000.
   Assigned to: Dean Flett, Canada, Canadian Ice Service, *dean.flett@ec.gc.ca*

5. *Action*: Attempt to establish additional ARKTOS (Advanced Reasoning using Knowledge for Typing of Sea ice) validation sites.
   Assigned to: Cheryl Bertoia, United States, National Ice Center, *BertoiaC@natice.noaa.gov*
   Rashpal Gill, Denmark, Danish Meteorological Institute, *rsg@dmi.dk*

6. *Action*: Attempt to establish additional EUMETSAT SAF validation sites.
   Assigned to: Lars-Anders Breivik, Norway, Norwegian Meteorological Institute, *l.a.breivik@dnmi.no*
   Roger De Abreu, Canada, Canadian Ice Service, *roger.deabreu@ec.gc.ca*

7. *Action*: Engage DMI in CIS/IIP iceberg experiments.
   Assigned to: Dean Flett, Canada, Canadian Ice Service, *dean.flett@ec.gc.ca*
   Rashpal Gill, Denmark, Danish Meteorological Institute, *rsg@dmi.dk*
   Steve Sielbeck, United States, International Ice Patrol, *ssielbeck@rdc.uscg.mil*

8. *Action*: List common requirements and concepts for development of a remote user terminal. Technology initiative which overlaps with Standing Committee on Data, Information, and Customer Support.
   Status: Deferred at present.

Additional *"High-Level"* Action Item:

1. *Action*: IICWG to attempt to influence data policies of flight agencies to better meet the requirements of the operational ice services.
   Assigned to: IICWG Co-Chairs
   Helen Wood, United States, NOAA, *hwood@nesdis.noaa.gov*
   David Grimes, Canada, Environment Canada, david.grimes@ec.gc.ca

List of Acronyms

LIST OF ACRONYMS AND OTHER ABBREVIATIONS

AARI	Arctic and Antarctic Research Institute
AVHRR	Advanced Very High Resolution Radiometer
BSH	Bundesamt für Seeschiffahrt und Hydrographie (Germany)
BSIC	Baltic Sea Ice Code
BSIM	Baltic Sea Ice Meeting
CMM	Commission for Marine Meteorology (WMO)
DCRS	Danish Center for Remote Sensing
DMI	Danish Meteorological Institute
ECDIS	Electronic Chart Display Information System
EMHI	Estonian Meteorological and Hydrological Institute
ENVISAT	Environmental Satellite (ESA)
ERS	ESA Remote Sensing Satellite
ESA	European Space Agency
FIMR	Finnish Institute of Marine Research
GDSIDB	Global Digital Sea Ice Data Bank
GIS	Geographic Information System
GTS	Global Telecommunication System (WMO)
ICEMAP	Ice charting software used at BSH, FIMR and SMHI
IICWG	International Ice Charting Working Group
INGRES	Data Bank System
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
IWICOS	Integrated Weather, Sea Ice and Ocean Service System
JCOMM	Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology
LHMA	Latvian HydroMeteorological Agency
NAVTEX	Telex system for important messages to navigation
NOAA	National Oceanographic and Atmospheric Administration (USA)
RADARSAT	Canadian Radar Satellite
RIZA	Institute for Inland Water Management and Waste Water Treatment (The Netherlands)
SAR	Synthetic Aperture Radar
SGSI	Sub Group on Sea Ice (JCOMM)
SIGRID	Format for the archival and exchange of sea-ice data in digital form
SMHI	Swedish Meteorological and Hydrological Institute
SOK	Sovernets Operative Kommando (Denmark)
SOLAS	International Convention for the Safety of Life at Sea
SSMI	Special Sensor Microwave Imager
SST	Sea Surface Temperature
TSS	Tromsø Satellite Station
WMO	World Meteorological Organization