**Expert Team on Sea Ice**

ETSI intersessional work is carried out in accordance with the SFSPA WP updated by the Team’s 5th session in March 2014 (Ottawa, Canada, JCOMM-MR-114) with tight collaboration with the International Ice Charting Working Group (IICWG, see <http://nsidc.org/noaa/iicwg>) acting as an effective advisory body to ETSI. Major themes of the Team’s work and gained progress for the period 2014-2015 are summarized below.

*(#13) Support Capacity Development workshops*

In June 2014 (FMI, Helsinki) the Team in cooperation with the IICWG successfully conducted the 4th “Ice Analysts Workshop” (IAW). Main themes of the workshop included cases studies for sea ice analysis during occurrence of dynamic processes and in transition periods (melt, freeze-up), Southern Ocean sea ice analysis and production of the GMDSS reports. For the first time procedures and software initially developed for the Arctic Ocean METAREAs were tested for the Antarctic waters. The next IAW-5 is tentatively planned for April 2016 (NIC, Washington DC) with the Southern Ocean sea ice analysis and GMDSS as prime themes. Training accomplishment includes conclusion of the development of a new COMET sea ice module by USA National Ice Centre in 2015.

*(#26) Support and enhance the Polar components of GMDSS*

Consolidated input for the new 558 edition developed by ETSI-5 was further cross-checked In October-November 2015 with corrections provided to ETMSS. Harmonization of the ice in SavetyNET bulletins is now regularly examined for the Arctic METAREAs by ETSI and IICWG. Extension of experience to the SO METAREA as well as other METAREAs with sea ice presence is from 2014 a regular agenda item for ETSI/IICWG meetings. Content of the bulletins as shape-files is available at <http://gmdss.aari.ru>. Standards for the iceberg presentation in the GMDSS bulletins are currently under development with outcome rules planned for April 2016.

From December 2014, based on ETSI and IICWG decisions and outcomes of the 4th Ice Analysts workshop (June 2014, FMI), Russia, the United States and Norway commenced cooperative production of weekly Antarctic ice charts (<http://ice.aari.aq>), which initially they had been doing separately, in an effort to standardize and ensure the continuing year-round availability of these essential ice information products. Additionally 2015, the Argentine Naval Hydrographic Service commenced regular ice chart production.

The ETSI in tight collaboration with IICWG, led by David Jackson of the Canadian Ice Service, has followed the development of the Mandatory Polar Code at the International Maritime Organization (IMO) and provided consolidated and harmonized view of the national ice services on the matter to IMO in 2014, including Polar Code requirements for ice information, Ice Navigator training and POLARIS decision making system for ice navigation.

(#27) Support and enhance ENC/Electronic Chart Display Information System (ECDIS) for ice navigation

The next version 5.2 of the “*Ice Object Catalogue*” (JCOMM-TR-080) was developed and adopted by ETSI in May 2014. The final version 1.1.0 “*S-411 Ice Information Product Specification*” (JCOMM-TR-081) produced by BSH as part of JCOMM/ETSI, was further checked and adopted by ETSI in June 2014. In accordance with the S-100 standard, the S-411 includes specifications for encoding the sea ice for navigational purpose as well as portrayal for polygon, linear and point ice classes, all fully compliant with the WMO Sea-Ice Nomenclature, Vol.III. Interactions with ENCS manufactures on S-411 support in corresponding SDKs were initiated in August 2014, including Canada, Germany and Russia. ETSI progressive reports on S-411 and Ice Objects Catalogue were submitted to IHO HSSC in Nov 2014 and Nov 2015. Based on IICWG discussions further extensions to S-411 are anticipated late 2015 – early 2016 including universal colour portrayal for ice classes and additional symbology to icebergs related iced features. The BSH is managing software for converting ice charting material in SIGRID-3 exchange format from the national ice services to S-411. As a recommendation for further work consolidation of activities on catalogues and S-41x and reporting to IHO is recommended.

(#28) Maintain and update sea ice technical documentation

The WMO-No.259 Sea-Ice Nomenclature Vol. I was updated by ETSI-V in March 2014 with 27 new terms, 2 terms amended. The new terms include definitions for lake ice thus answering request from the Cryonet for a comprehensive ice format. The next version 3 of the SIGRID-3 exchange format was developed and adopted by the ETSI in May 2014. The SIGRID-3.3 format now states for “*Sea-Ice Georeferenced Information and Data*”, is fully harmonized with the “*Ice Objects Catalogue*”, supports coding and exchange both the sea and fresh-water ice analysis and ice observation material, thus aiming to be more flexible and practical format for cryosphere activities. The format is presently undergoing testing for observational purposes within the IceWatch project. The next version 1.1 of the Ice Chart Color standard was developed and adopted by ETSI-V in March 2014. Further additions to SIGRID 3.3, Ice Chart Color standard and the WMO Sea-Ice Nomenclature Vol.III are anticipated in 2016 relating to new colour portrayal and additional symbology for icebergs and ice edge related ice features. Developing guides for observations and analysis is still underway, possibly some of this activity will be carried out under the GCW. A [consolidated section](http://jcomm.info/index.php?option=com_oe&task=viewDoclistRecord&doclistID=160) for sea ice regulatory documents is now maintained at JCOMM publication site and at the GCW portal.

(#29) Support for sea ice climatology and ice information systems

Global Digital Sea Ice Data Bank (GDSIDB) depositories at AARI and NSIDC are regularly updated with the routine sea ice charting material from the national ice services (5-7 days charts) and now contains material spanning period 1933-2015. The blended sea-ice climatology is now accepted by the ETSI-5 (March 2014) and further by ETMC-5 (June 2015) as a practical approach to present sea ice charting material for scientific community. Reports on the sea ice climatology were provided to ETSI, ETMC, GCW and IICWG in 2014-2015. The ETMC-5 agreed on reinforcement of the GDSIDB by integration with the Marine Climate Data System (MCDS) as a CMOC, accomplishment of that is a critical task the team for next years. Most likely availability of the historical sea ice charting material in WIS will be achieved through integrating GDSIDB and GCW portal resources.

|  | **Workplan / expected outcome, deliverables** | **How (Key Activities/Actions)** | **Lead (bold) Members** | **Timelines** | **Progress** | **Will activity be met?** | **Suggestion** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 13 | **Support Capacity Development workshops**-Publish the Guide for Ocean Forecast Systems | -support for “Ice Analysts Workshop”-support for sea-ice training documentation and courses | **Kevin Horsburgh****Boram Lee****Caryn Panowicz****Gary Brassington** | -9th and 10th JCOMM-TCP Training Workshops on Storm Surge and Wave Forecasting | The IAW-4 successfully conducted in June 2014 (FMI, Helsinki). The next IAW-5 is tentatively planned for April 2016 (NIC, Washington DC) with the Southern Ocean sea ice analysis and GMDSS as prime themes. In 2015 US NIC concluded development of the new COMET sea ice module.  |  |  |
| 25 | **Developing the MPRESS capabilities including object tracking**-A oceanic radioactive hazmat tracking system-Enhanced MPERSS capability for the Arctic Ocean-Recognition of MPERSS services outside the WMO | - Coordination with IAEA, IMO, RSMCs on an oceanic radioactive hazmat tracking framework-Establish an oceanic radioactive hazmat emergency response support system-Coordinate with Issuing and Ice services to implement the MPERSS for the Arctic Ocean | **Nick Ashton****Vasily Smolyanitsky****Henri Savina** | - IAEA, IMO consultation('12)- Implementation plan finalized and approved by MAN (Feb/Mar'13)- Oceanic radioactive hazmat EER support system plan based on RSMCs (end'13) |  |  |  |
| 26 | **Support and enhance the Polar components of GMDSS**− Ensure ice information is available for mariners around the world. − Increase the availability of graphic products.− Ensure the Polar Code has appropriate recommendations related to navigation in ice-infested waters.  | − Support for operational exchange of information within GMDSS− Harmonization of format of the bulletins, − Develop standards for provision of iceberg information. − Transit experience to all METAREAs with ice or icebergs. − Hold regular workshops to increase knowledge on topics relevant to mariners.− Develop, test and implement updates to ice in GMDSS supporting graphic presentation.− Support safe operations in ice infested waters by providing input related to Polar Code development to IMO. | **Darlene Langlois,** **all ETSI members** | − May 2014 – provide input into the Polar Code. − June 2014 - 4th "Ice Analysts Workshop" to include session on METAREA bulletin ice information for the Southern hemisphere− MMSW-2 and Fall 2014 –METAREA preparation and issuing services to meet to discuss formats and standards and report to IICWG (Chile)− March 2015 – ice information from issuing services available in shape format on ice server− June 2015 – workshop for exchange of information− Fall 2015 – provision of ice information METAREA bulletins for the southern hemisphere | ETSI-5 developed consolidated input for the new 558 edition which was further cross-checked in October-November 2015 with corrections provided to ETMSS. Harmonization of the ice in SavetyNET bulletins is regularly examined for the Arctic METAREAs by ETSI and IICWG. Extension of experience to the SO METAREA as well as other METAREAs with sea ice presence is from 2014 a regular agenda item for ETSI/IICWG meetings. Content of the bulletins as shape-files is available at <http://gmdss.aari.ru>. Standards for the iceberg presentation in the GMDSS bulletins are currently under development with outcome rules planned for April 2016. Based on ETSI and IICWG activities, results of the 4th Ice Analysts workshop (June 2014, FMI), in December 2014, Russia, the United States and Norway commenced cooperative production of weekly Antarctic ice charts (<http://ice.aari.aq>), which they had been doing separately, in an effort to standardize and ensure the continuing year-round availability of these essential ice information products. Additionally 2015, the Argentine Naval Hydrographic Service commenced regular ice chart production.The ETSI in tight collaboration with IICWG, led by David Jackson of the Canadian Ice Service, has followed the development of the Mandatory Polar Code at the International Maritime Organization (IMO) and provided consolidated and harmonized view of the national ice services on the matter to IMO in 2014, including Polar Code requirements for ice information, Ice Navigator training and POLARIS decision making system for ice navigation. | yes | Developing graphic presentation of the ice content in GMDSS is regularly examined by ETSI and IICWG; most likely it should be dropped as an activity under GMDSS as there is similar topic in ice in ECDIS.  |
| 27 | **Support and enhance ENC/Electronic Chart Display Information System (ECDIS) for ice navigation**- Wide usage on ships of ice charts - Capability at National Ice Services to produce ice in S-10x and S-57 | - Formal management of Ice Objects Catalogue and S-411- Interact with ENCS manufacturers and OGC to develop software to accept ice data- Support National ice services to develop capability and to begin production of S-411 data files- Support implementation of MetOcean Catalogue as S-412 | **Juergen Holfort (ETSI TG ENCIO and BSH), Vasily Smolyanitsky** | - Draft S-411 and presentation to IICWG (Oct’2012) - Preparation of a portrayal registry for parameters of the ice objects catalog (2013)- Formalization of documentation and reports to ETSI-V (Mar’14), IICWG (Oct 2013 and 2014) and TSMAD (Jun 2013 and further)- End 2014: increased availability of ice charts in S-411 - November 2014: report to IHO-HSSC | The next version 5.2 of the “Ice Object Catalogue” (JCOMM-TR-080) developed and adopted by ETSI in May 2014. The final version 1.1.0 “S-411 Ice Information Product Specification” (JCOMM-TR-081) produced by BSH as part of JCOMM/ETSI, further checked and adopted by ETSI in June 2014. In accordance with the S-100 standard, the S-411 includes specifications for encoding the sea ice for navigational purpose as well as portrayal for polygon, linear and point ice classes, compliant with the WMO Sea-Ice Nomenclature, Vol.III Interactions with ENCS manufactures on S-411 support in corresponding SDKs were initiated in August 2014, including Canada, Germany and Russia.ETSI progressive reports on S-411 and Ice Objects Catalogue submitted to IHO HSSC in Nov 2014 and Nov 2015.Based on IICWG discussions further extensions to S-411 are anticipated late 2015 – early 2016 including universal color portrayal for ice classes and additional symbology to icebergs related iced features. The BSH is managing software for converting ice charting material in SIGRID-3 exchange format from the national ice services to S-411. | yes | Consolidate activities on catalogues and S-41x and reporting to IHO |
| 28 | **Maintain and update sea ice technical documentation**- Harmonization and updates to WMO ice documentation following progress in ice in ECDIS standards - Updates to WMO ice standards in parts of river/lake ice/point/linear/gridded objects- Documentation on ice observations and best practices | - Updates to “Sea Ice Nomenclature” (WMO-No.259) - Updates to sea ice exchange and presentation formats;- Developing new publications for sea ice observations and analysis; - Provide harmonization across the sea ice standards arising from adopted additions | Keld Quistgaard, Darlene Langlois | - Finalize additions arising from the “Ice Objects Catalogue” version 5.1” (ETSI-5, Mar’14)- Finalize additions on ice objects arising from end-users, Cryonet and ice observations requirements (ETSI-5, Mar’14; IICWG,2014) | The WMO-No.259 Sea-Ice Nomenclature Vol. I updated by ETSI-V in March 2014 with 27 new terms, 2 terms amended. The new terms include definitions for lake ice thus answering request from the Cryonet. The next version 3 of the SIGRID-3 exchange format developed and adopted by the ETSI in May 2014. The SIGRID-3.3 format now states for “Sea-Ice Georeferenced Information and Data”, is fully harmonized with the “Ice Objects Catalogue”, supports coding and exchange both the sea and fresh-water ice analysis and ice observation material, thus aiming to be more flexible and practical format for cryosphere activities. The next version 1.1 of the Ice Chart Color standard was developed and adopted by ETSI-V in March 2014. Further additions to SIGRID 3.3, Ice Chart Color standard and the WMO Sea-Ice Nomenclature Vol.III are anticipated in 2016 relating to new color portrayal and additional symbology for icebergs and ice edge related iced features. | yes | Developing guides for observations and analysis is still underway, possibly some of this activity will be carried out under GCW. |
| 29 | **Support for sea ice climatology and ice information systems**– Updated sea ice ‘blended’ climatology and uncertainties – Availability of sea ice metadata and material in WIS, Cryonet, CMOC framework– Identification/referencing datasets by assigning DOI | - Regular input to GDSIDB ice charting archive in standard WMO formats- Annual reprocessing and update of climatology- Coordination of development of protocols and procedures for sea ice metadata/material availability in WIS, Cryonet | Vasily Smolyanitsky Caryn Panowicz | – Report to IICWG ( October 2013, 2014 / regular)– Report to Cryonet (regular)– Report to ETSI, ETMC and decision on information systems and access (ETSI-5, March 2014 / regular) | GDSIDB is weekly updated with the routine sea ice charting material from the ice services (5-7 days charts) and now contains material spanning period 1933-2015. The blended sea-ice climatology is accepted by the ETSI-5 and further by ETMC-5 as a practical approach to present sea ice charting material for scientific community. Reports on the sea ice climatology were provided to ETSI, ETMC, GCW and IICWG in 2014-2015. The ETMC-5 agreed on reinforcement of the GDSIDB by integration with the Marine Climate Data System (MCDS) as a CMOC. Most likely availability of the historical sea ice charting material in WIS will be achieved through integrating GDSIDB and GCW portal resources.  | yes | nil |