

Progress report on the Sea Ice Information Product Specification S-411 and its practical application

Submitted by:	BSH (German Ice Service)
Executive Summary:	This paper provides information about current status and future plans of development of S-100 based ice information product specification S-411 and its practical application in data production and use.
Related Documents:	S-411 Ice Information Product Specification
Organizations:	BSH, ETSI, IICWG

1 Introduction / Background

As a follow up of the information given at HSSC6 about the first official version of S-411, which main purpose is to deliver ice information onto the bridge of ships, this paper gives an overview of the on-going work to establish the use of this standard and its further development. It includes also a short overview about the previous work up to the official acceptance of S-411 in 2014.

2. Analysis / Discussion

Previous work leading to S-411

The International Ice Charting Working Group (IICWG), along with the JCOMM Expert Team on Sea Ice (ETSI), have been active over many years in developing mechanisms to display ice information in Electronic Navigational Charts (ENCs) and formal Electronic Chart Display and Information Systems (ECDIS). As the S-411 standardisation did not start from scratch, most of the development tasks were based on previous standards within JCOMM, the work could proceed relatively smoothly. But the development was often also slowed up by delays in developing the S-100 standard.

In a first step the ice objects were defined based on the WMO sea ice nomenclature. A positive side effect of this task was a thorough review of the existing nomenclature, although this had the effect that more time was needed to accomplish the task.

The second step was to define the data format and presentation library that ultimately lead to the JCOMM S-411 standard. A defined exchange format for ice charts (Sigrid-3) already existed, but because of its age and development over the years was also seen in need of an overhaul. Although working fine for the exchange between ice services and the ice chart data archive it was a niche definition. For both

reason a new format was sought for the S-411 standard, based on actual OGC (Open Geospatial Consortium) recommendations. The GML format was finally chosen. Continuity between the older Sigrid-3 and the new S-411 format was accomplished by the development of translation programs and a strict linkage between both ice object libraries. The presentation library just took the WMO standards (colour schemes and symbols) and defined these in an OGC compliant form. A new presentation scheme was also added reflecting the discussion going on at that time within the IMO and the development of the Polar Code defining go and no-go areas based on the ice situation and the ships ice capabilities (ice class dependent traffic light representation of ice conditions). The second step was finished by the acceptance of version 1.1 of the S-411 standard by the JCOMM ETSI in March 2014.

Fomenting the use of S-411

An ongoing step is dedicated to make S-411 charts available operationally. Fully operational S-411 chart production is done at the BSH since winter 2014/15 onwards. Those charts covering the German Coast (Baltic and North Sea) will be used in near future by EMSA to incorporate the ice information in their integrated maritime data environment. Most Canadian ice charts are already publicly available in S-411 format in parallel to the established ice chart products and for many others (e.g. Polish and Norwegian charts) the software to make them available is at hand. Their operational availability is a topic at the next meeting of the IICWG in October 2015 and the goal is to have the charts from all major ice services available in S-411 format by the end of 2015.

As S-411 uses a standard OGC format it is possible to load and represent S-411 data in many GIS programs (e.g. QGIS), but as far as known no marketed ECDIS device can do so yet. Several ECDIS OEMs were contacted to promote the inclusion of ice information into existing ECDIS hard- and software and some of them are already working at the moment on upgrades to S-411 capabilities.

Ongoing development of the S-411 specification

Up till now the focus was to bring available ice information in form of ice charts (on paper or as PDF) onto the ECDIS on the ship bridge to help the mariners in transiting safely and easily through ice infested waters. Now concept work is targeting better use of new possibilities offered by ECDIS, and more generally by other GIS, over the traditional paper chart representation.

One challenge is to develop presentation schemes for other ice parameters, also for day and night views, and to see how they interact and possibly interfere with presentation schemes of other layers (the most important being the navigational charts). Actually most of the work in this respect is done in the area of

icebergs, with ideas including also changes in the underlying ice objects as well as the basic feature classes (moving from point primitives to polygons).

Another issue is a scale dependent representation, showing the available information differently at different scales. ENCs are produced at different scale bands and the ECDIS chooses between these different bands according to the representation scale. This approach is not feasible for ice charts, as some of them are produced daily and also have to be transferred to ships over sometimes small bandwidth connections (e.g. north of 75°N using Iridium). The production of different representations for different scales therefore has to be done on board based on certain rules for generalisation “on the fly”. So rules have to be defined to:

- unify nearby/overlapping symbols of the same category (e.g. instead of portraying several single icebergs use only one symbol of many icebergs)
- join nearby/overlapping symbols of different categories into a new one (e.g. join overlapping symbols of rafted and ridged ice into a newly defined symbol for “heavy” ice)
- do not represent some symbols in small scale maps or join them into a polygon area
- incorporate smaller polygon areas into larger areas
- change the polygon representation on small scale maps (e.g. ignore concentration differences and display just one area where sea ice is present).

Further tasks are the continuous review, error correction, clarification and update of the existing ice objects and the S-411 specification. An update of the traffic light representation to highlight different levels of potential ice threats is also needed so that the latest discussions and changes in the context of the IMO Polar Code are reflected within the S-411 specification.

As there is still considerable work to be done in incorporating all these ideas into a new version of S-411 an official version 2.0 of the specification is not expected until 2017.

3. Conclusions

The major task in the development of version 2 of S-411 is to include more interactive functionalities in the representation of ice charts as compared to the more static display of the current version 1.1. The IICWG recommends that HSSC endorses the proposal for the further development of S-411 and encourages parties with similar work programmes to consider collaboration with the IICWG in further developing such interactive elements.

4. Action required of HSSC

The HSSC is invited to:

- a. Note this report;
- b. Endorse the development of a new edition of S-411;
- c. Encourage relevant stakeholders to cooperate with the ICCWG;
- d. Take any other actions considered necessary.

5. Additional information

Links

The official S-411 product specification (accepted by the JCOMM ETSI at their fifth session, 25-28 March 2014) can be found in different places:

http://www.jcomm.info/index.php?option=com_oe&task=viewDocumentRecord&docID=14168 (JCOMM)

http://www.ioc-unesco.org/index.php?option=com_oe&task=viewDocumentRecord&docID=14168 (IOC)

http://www.iho.int/iho_pubs/standard/S-100_Index.htm (IHO)

Further WMO-IOC sea-ice regulatory documents can be found at

http://www.ioc-unesco.org/index.php?option=com_oe&task=viewDoclistRecord&doclistID=160

The latest working version of S-411 can be found at <ftp://ftp.bsh.de/outgoing/Eisbericht> in the directory S-411_Specification and the latest operational charts in S-411 can be found also there in the directory S-411.

Abbreviations:

BSH Bundesamt für Seeschifffahrt und Hydrographie
ECDIS Electronic Chart Display and Information System
EMSA European Maritime Safety Agency
ENC Electronic Navigational Chart
ETSI Expert Team on Sea-Ice
GIS Geographic Information Systems
IHO International Hydrographic Organization
IICWG International Ice Charting Working Group
IMO International Maritime Organization
IOC Intergovernmental Oceanographic Commission
JCOMM Joint Commission for Oceanography and Marine Meteorology
OEM Original Equipment Manufacturer
WMO World Meteorological Organization