

**6<sup>TH</sup> MEETING OF THE HYDROGRAPHIC SERVICES AND STANDARDS COMMITTEE**  
**Hotel Marina Del Rey, Viña del Mar, Chile, 11-14 November 2014**

**Paper for Consideration by HSSC**

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**“Ice Objects Catalogue”/S-411 progressive report by JCOMM Expert Team on Sea Ice**  
Dr Vasily Smolyanitsky, JCOMM ETSI chair

*Principal activities and achievements*

In the polar and sub-polar seas, ice is a major hazard to safe navigation and a ‘media’ for ice navigation. Integration of real time or near real-time ice information into ENC’s is an important and natural step, in particular in view of the increasing E-Navigation and a way to deliver binary products.

In 2007, the WMO-IOC JCOMM Expert Team on Sea Ice (ETSI) approved the “Ice Object Catalogue” ver. 4.0 (ETSI-3) as a basement for sea ice information support in IHO S-57 format; from the same year by agreement with IHO TSMAD, ETSI became responsible for the Catalogue management and its registration in IHO Registry of Registries. In 2008 the Canadian Ice Service (CIS) undertook a pilot project to produce S-57 format files containing ice information suitable for display on ENC’s, while in 2009, the Arctic and Antarctic Research Institute (AARI), St. Petersburg, Russia started working with TRANSAS, Russia to develop an end-to-end capability to display ice charts on TRANSAS ECDIS. In 2012 the next rationalized and harmonized (based on Canadian/Russian expertise) ver.5.1 of the Catalogue” was completed and registered in IHO Registry of Registries with a formal report to TSMAD-24 and JCOMM-IV session.

Discussion on a place for the Catalogue and ice presentation libraries in the IHO S-100 family of formats held during the TSMAD-24 (May 2012), marked a starting point for ice S-1xx specification development. In November 2013 IHO HSSC-5 assigned the JCOMM/ETSI with the specification of S-100 based product. During 2012-2013 the German Ice Service, BSH, on behalf of ETSI developed and finalized now the S-411 specification in consultation with IHO-TSMAD with progressive reports presented to the 13<sup>th</sup> and 14<sup>th</sup> sessions of International Ice Charting Working Group in October 2012 and October 2013. Finally, in March 2014 the ETSI (ETSI-5) approved the JCOMM/IHO S-411 “Ice Information Product Specification” ver. 1.0 along with a ver. 5.2 of the “Ice Objects Catalogue”, both documents electronically available at JCOMM (<http://jcomm.info>) TD section. From August 2014 the ETSI is in contact with the ECDIS manufactures for implementation of the S-411 specification with first results anticipated in late 2015.

*“Ice objects Catalogue” summary*

The Catalogue is the basic building block of S-411 describing ice objects and attributes equivalent to codes of the ice charting transport format SIGRID-3 (WMO/TD No-1214) and defining *what* ice information can be used in S-411. The latest version 5.2 includes 3 polygon, 9 linear, 16 point Ice Objects Classes and 57 Ice features attributes for sea and fresh-water ice.

*“S-411 Ice Information Product Specification” summary*

Development of the specifications led by the BSH as a part of JCOMM/ETSI was completed as version 1.0 in March 2014 with the latest version 1.1.0 introduced in June 2014. The S-411 is fully based on the IHO S-100 framework specification, Geography Markup Language (GML), Encoding Standard and the ISO 19100 series of standards. It is a vector product specification that is primarily intended for encoding the extent and nature of sea and fresh water ice for navigational purpose. The application schema of ice information product contains 28 feature

types with their attributes, enumerations, is based on the Ice Objects Catalogue, can be found in the ICE domain of the IHO Registry and is included in Annex B – Data Product format (encoding) as XML Schema File. Ice information datasets use S-100 Level 3a geometry which supports 0-, 1-, and 2-dimensional objects (points, line strings, polygons). The portrayal specification is based on the Styled Layer Descriptors (SLD), follows OGC standards and supports 3 polygon portrayals: first one according to the vessels ice capabilities, the second and third one being the WMO ice concentration/stages of development colour codes. Portrayals for the line and point objects follow the WMO symbology (WMO No.259 Sea Ice Nomenclature, vol. 3) and are implemented using SVG-graphics. Besides the future ECDIS SDKs, the S-411 data can be read and presented using the open source GIS software (e.g. QGIS) with python scripts from the national ice services available to convert shapefiles, specially SIGRID-3 files, into the S-411 format.

#### *Future work programme*

Future work is a part of JCOMM Services and Forecasting Program Area (SFSPA) intersessional project “Support and enhance ENC/ECDIS for ice navigation” and includes:

- Formal management of Ice Objects Catalogue and S-411
- Interaction with ENCs manufacturers and OGC to develop software to accept ice data
- Support of/to national ice Services to develop capability and to begin production of S-4xx data files
- Support implementation of MetOcean Catalogue by JCOMM ETMSS as S-412

#### *Action requested of HSSC*

- Note S-411 ver. 1.1.0
- Support JCOMM ETSI activities