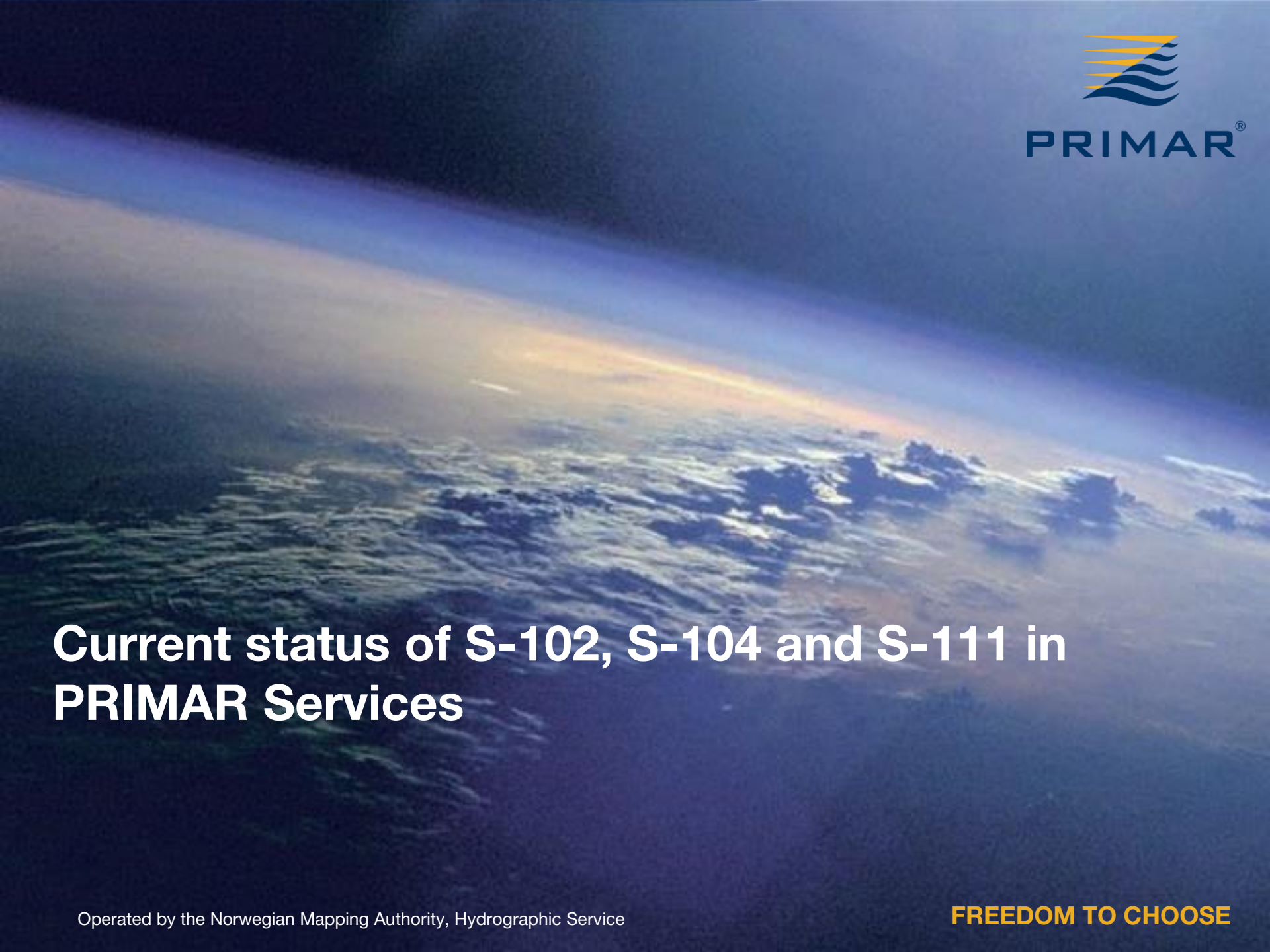
WENDWG14
PRIMAR S-100 Implementation Status

Hans Chr. Lauritzen, Director PRIMAR

Content

- PRIMAR S-100 Service Status.
- PRIMAR S-101 Service and Dual Fuel Service.
- Data protection – multi-signature functionality.
- PRIMAR Dual Fuel Validation and Coverage Viewer.
- PRIMAR S-100 Support til IHO
- PRIMAR S-128 Project
- PRIMAR S-100 Product Catalogue
- PRIMAR S-100 Explorer
- PRIMAR S-100 Training Portal
- PRIMAR Conversion Task Force Project
- Other PRIMAR topics



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Current status of S-102, S-104 and S-111 in PRIMAR Services

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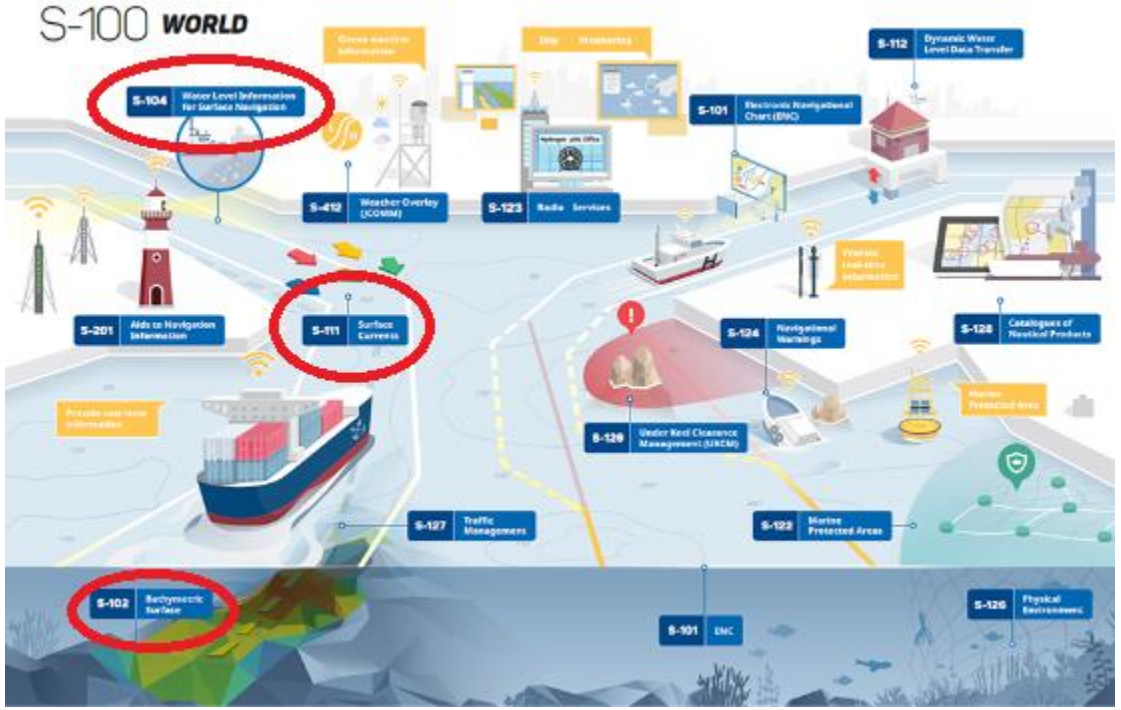
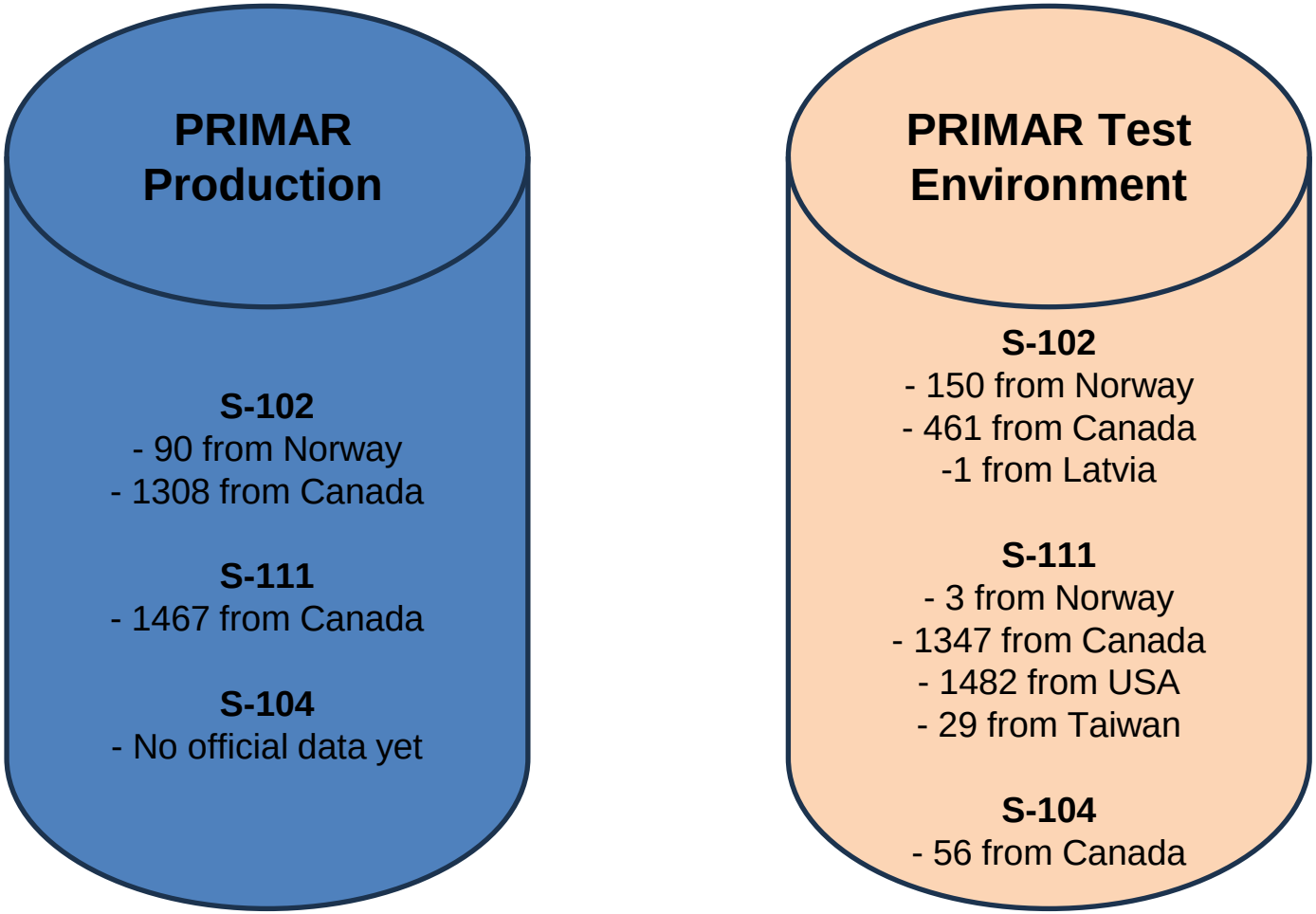
FREEDOM TO CHOOSE

PRIMAR S-100 service status

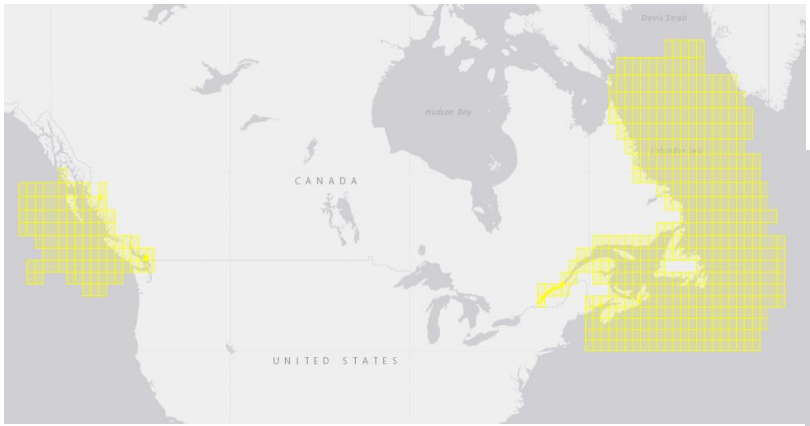
- **S-102 & S-111** services launched in June 2020.
- The **S-104** service became ready for receiving data in October 2022.



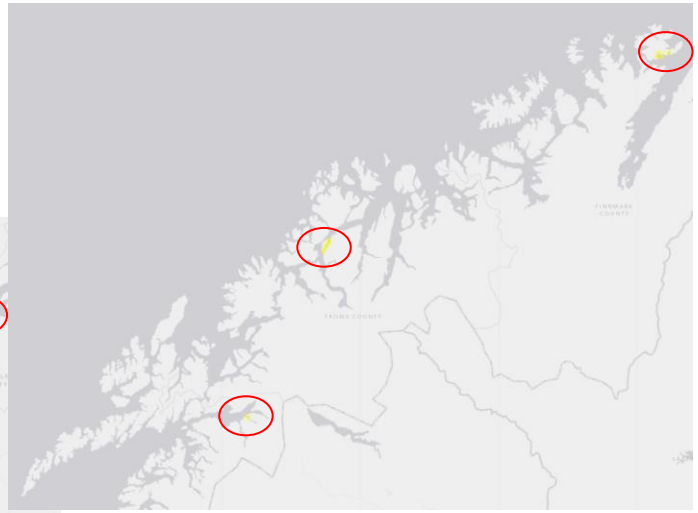
PRIMAR S-100 service status



S-102 coverage as shown in the PRIMAR Product Catalogue



Canada

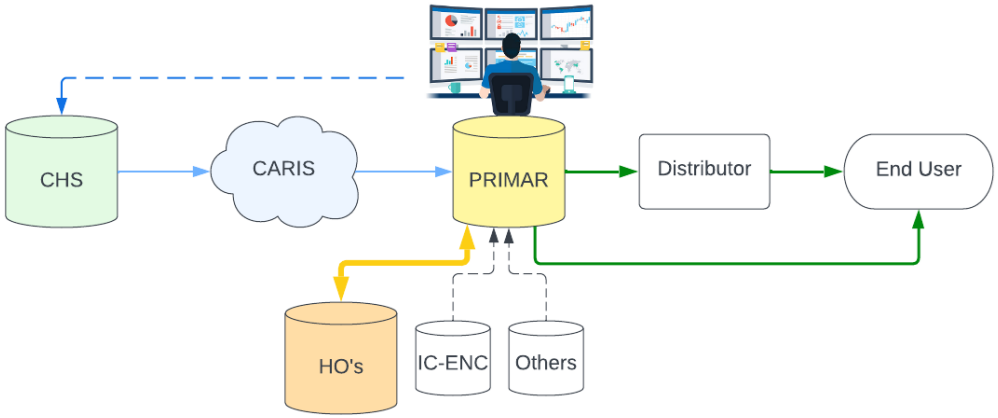


Norway

S-100 Data supply - Production

Canada S-102/S-111 & S-104 harvested from the Teledyne CARIS Cloud Service via a REST API integration

Norway use the PRIMAR VPN Service for Upload of S-102.



S-100 Data Validation

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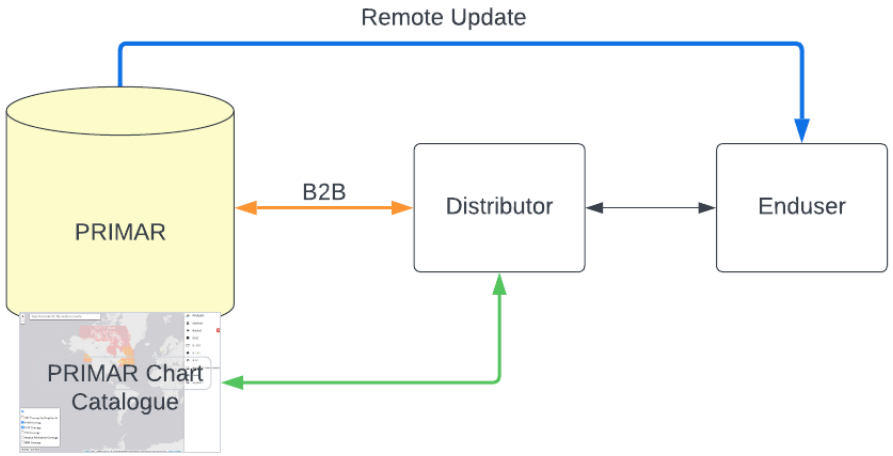
- Automatic validation tests carried out during upload.
  - Errors and warnings distributed either as reports in VPN interface or as a Service for those using API integration.

- Only a handful of checks are implemented at this stage. Mainly due to maturity of the individual product standard.
  - Example: Filenames. Mandatory positions, maximum filename length etc.
  - More checks will be carried out as we continue to grow and learn from our experiences.
  - New S-102 Validation Report Checker Project approved by PAC.

S-100 Data Distribution

- S-100 Part 15 encryption
- Userpermit registration
- Catalogue service
- Licensing:
  - 3, 6, 9, 12 month, Trail, Demo, R&D
- Multi product purchase
- Multi product delivery



CellDownloadService *(Remote Update Protocol/B2B Protocol)*

S-100 developments in progress

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- ENC
- S-102
- S-111
- S-101
- S-104
- RTZ
- Publications
- WMS

S-1xx Ed x.x.x support

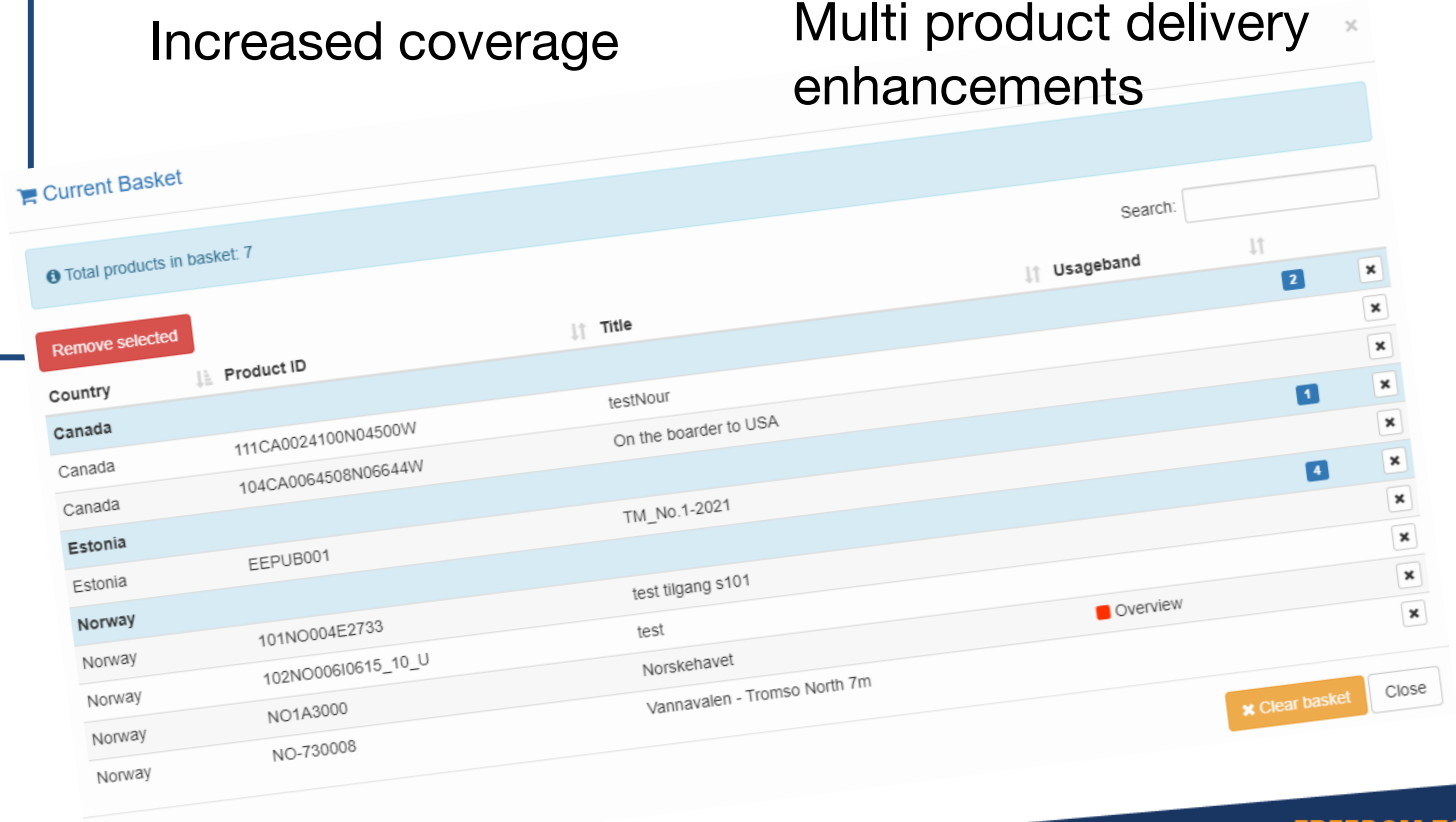
S-102 Ed 3.0.0 S-104 Ed 2.0.0

S-111 Ed 2.0.0

Increased coverage

More upload checks

Multi product delivery enhancements



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PRIMAR S-101 Service and Dual Fuel Service

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FREEDOM TO CHOOSE

S-100e4 to S-100e5 Upgrade Project

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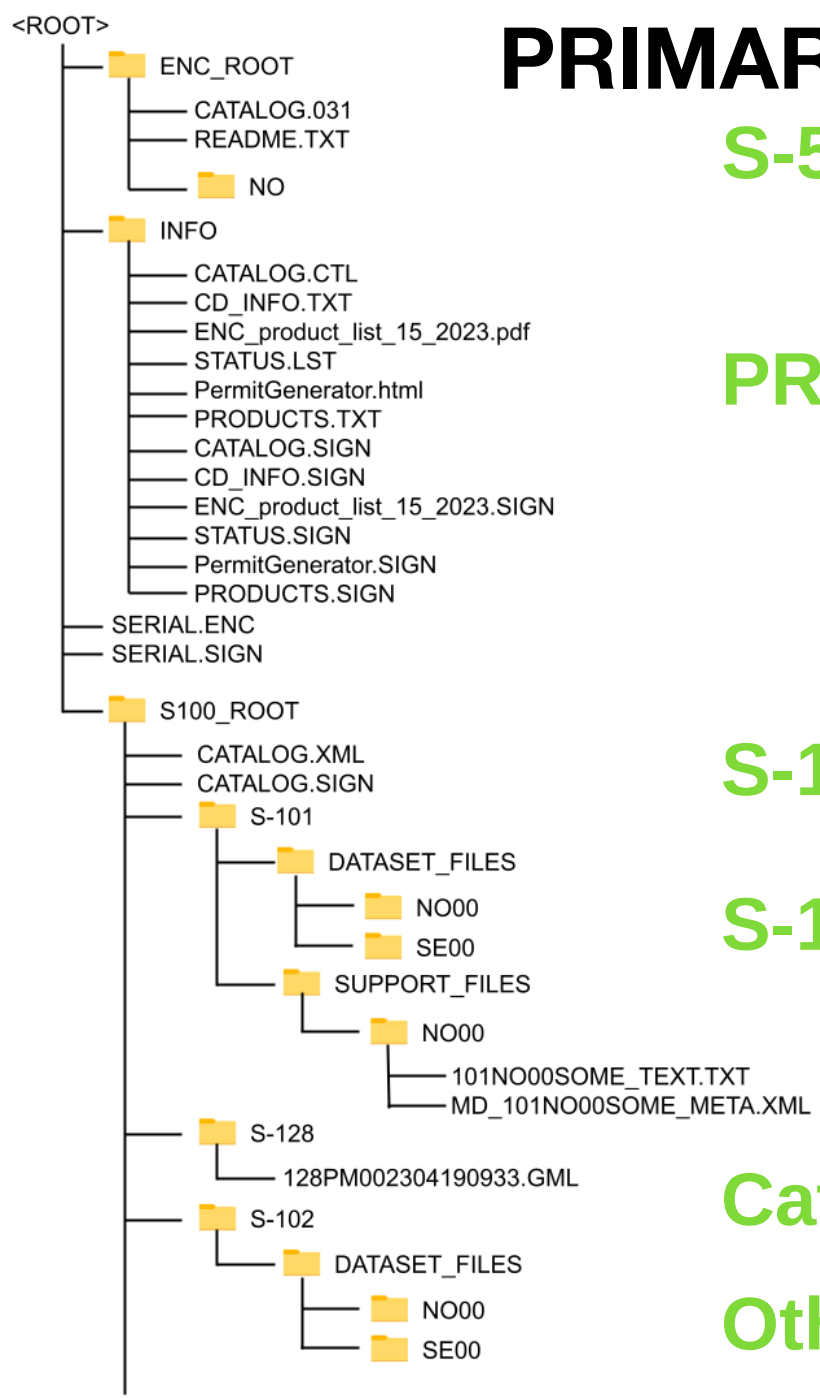
- PRIMAR currently provides S-100 services based on S-100e4 with extensions.
- Focus is now on S-100e5, and moving stakeholders from S-100e4 to S-100e5.
- Developments must complete in 2024 for PRIMAR to receive S-100e5 data in 2024/25.
- Consistent use of S-100e5 in ALL PRIMAR projects (S-102/104/111/128).
- Supports creation S-100e5 based testdata (S-164: IHO ECDIS test data).
- S-100e5 functionality prerequisite to support the Baltic Sea E-Nav project.
- Harmonize and support PRIMAR member states in transition to S-100e5/S-101e2.

Content and deliverables

- Support for S-100e5 exchange sets on data upload and export (product independent).
  - Dual S-100e4 and S-100e5 dataset upload, but only S-100e5 export.
- Automated XML file validation based on IHO published XSD files.
  - XSD (XML Schema Definition) defines structure and field content of XML file.
- Data protection (signature and encryption) in compliance with S-100e5 part 15.
- Creation of S-164 and other testdata.
- Functionality for Support Files product management (edition/update numbers).
  - Continued amendments/validation S-101 datasets.
- New functionality for automated quality control and visualisation of S-101 data (From S-101 Conversion Task Force Project).
  - Dual-management and operation on S-57 and S-101 datasets.
  - Overlay and quality control S-57 and S-101 datasets.
  - Review of conversion results.

PRIMAR service structure



S-57

PRIMAR Service files

S-100e5.2

S-101e1.x/2.0

Catalogue Nautical Products

Other S-100 products

FREEDOM TO CHOOSE

Encryption and Digital Signatures

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- All datasets encrypted.
  - No encryption for S-128 Catalogue of Nautical Products.
- **ALL** files in exchange set and service files digitally signed.
  - All signatures compliant with S-100e5.2.
  - ENC S-101e1.x will be digitally signed using S-100e5.2.
  - S-57 datasets will be signed/encrypted using S-63.
- Separate project for signature service established.
  - Trace authenticity of dataset all the way back to producer.

S-100e5 Implementation Plan

Activity	Q1-24	Q2-24	Q3-24	Q4-24	Q1-25
General S-101 update support					
Release S-100e5.2.0 and S-101e2.0.0		◆			
Develop generic support for S-100e5					
- Support Data Protection S-100e5 part 15					
XSD-XML exchange set file validator					
Adjusting S-100e5 fucntionality for S-101e2					
Support file edition management					
CTF validation functionality					

PRIMAR Data protection - multi signature functionality

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FREEDOM TO CHOOSE

Project background

- Requirement that all datasets and service files must be digitally signed.
  - Methods and encoding defined in IHO S-100e5 part 15.

- PRIMAR currently signs all datasets for S-57 ENC deliveries (using S-63).
  - S-100 will support double signatures (HO+PRIMAR) on distribution.

- Signatures should be applied as close to the source (HO) as possible.

Project scope

- PRIMAR will provide functionality to digitally sign all S-100 datasets on upload.
  - Every HO and PRIMAR will have a unique digital certificate for signing purposes.
  - Automatic and switchable if HO provides digital signatures.
  - Configuration will require approval from every HO.

- PRIMAR re-signs all datasets and encodes certificate information into CATALOG.XML.

- HO can always use VPN to download its own signed datasets.

- Possible extension
  - Operate signature service independent of S-100 product uploads to allow more flexibility for HOs on files to be signed.
  - Support for HO encryption functionality.
  - Support for importing signature files directly from HOs.

Encoding of CATALOG.XML

S100_ExchangeCatalogue
- PRIMAR exchange set metadata
- productSpecification (S-100e5.1)
- ...

S100XC:certificates
- schemeAdministrator
- Certificate(s)
- ...

S100XC:datasetDiscoveryMetadata
- HO dataset metadata
- productSpecification (as defined by HO)
- digitalSignatureValue
- ...

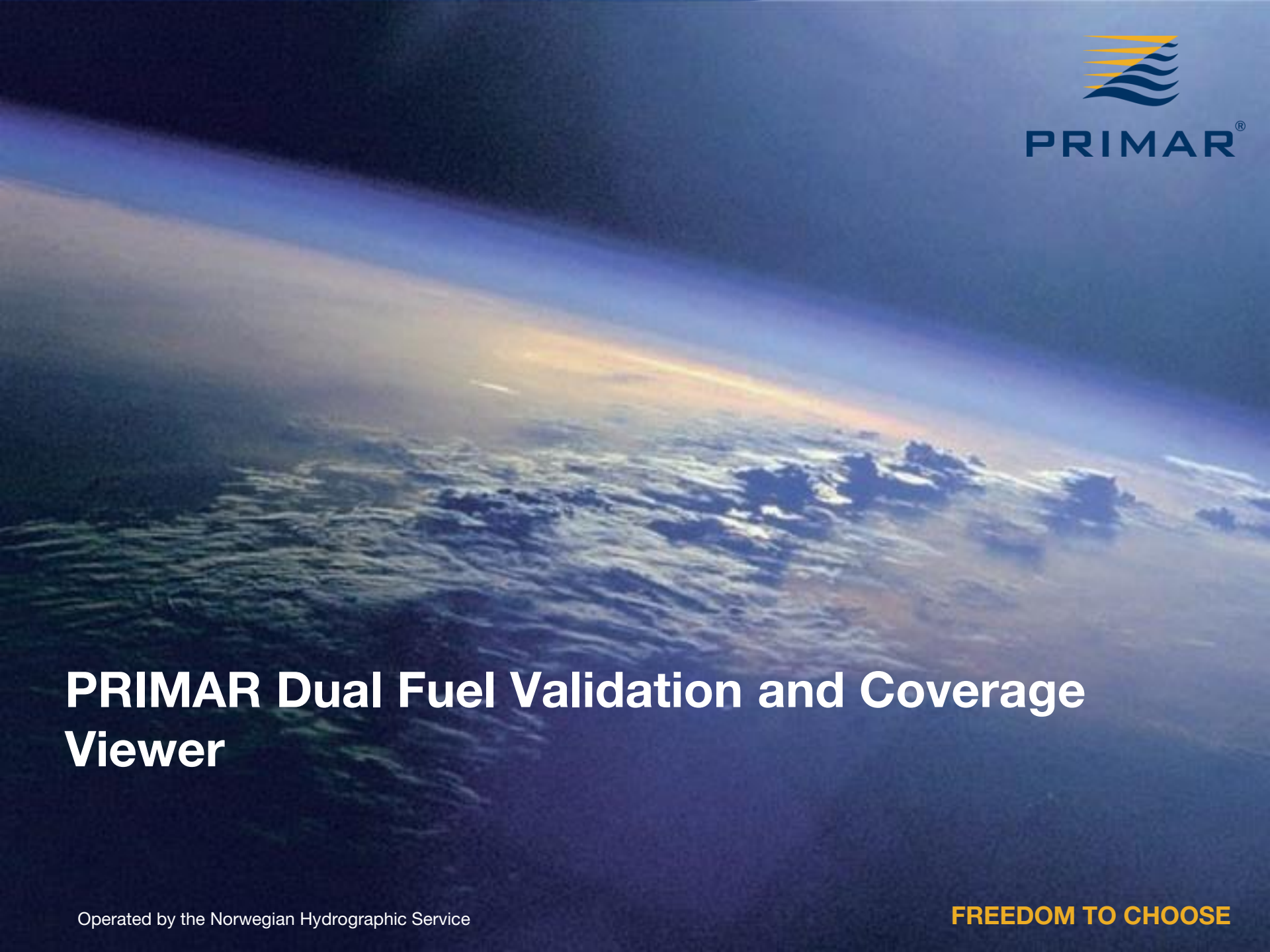
S100XC:supportFileDiscoveryMetadata
- HO supportfile metadata
- productSpecification (as defined by HO)
- digitalSignatureValue
- ...

- If dataset is not signed by producer, PRIMAR will digitally sign dataset.
- If dataset is signed by producer, PRIMAR will:
  - Re-sign dataset.
  - Create exchange set where dataset contains both HO and PRIMAR signatures.
- HO data producer certificates included in exchange set.

Project value

- Allow PRIMAR Member States to quickly support digital signatures.
  - No need to buy signature functionality.
  - No need for internal data protection training (can use primar.learnworlds.com).
- Eliminates cyber security risks further in the PRIMAR distribution.
- Ability for stakeholders and value chain to securely trace data back to producer.
- Harmonised consistency in HO and PRIMAR dataset deliveries.

Note: PAC has decided that PRIMAR will not support SENC/System Database distribution of S-100/S-101 data. Loss of signature file through SENC/System Database distribution regarded as critical by PAC.



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PRIMAR Dual Fuel Validation and Coverage Viewer

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FREEDOM TO CHOOSE

PRIMAR Validation Functionality

- Ambition to automate as much as possible at HO/PRIMAR.
- Conversion Task Force has identified additional tests to check for:
  - Standards compliance.
  - Dataset consistency.
  - PRIMAR ENC database consistency.
  - Gradual implementation of checks.

- PRIMAR expanding its online HO validation functionality.
  - Individual S-101 dataset validation and analysis.
  - Simultaneous review and view of S-57 and S-101 datasets.
  - Update of ENC quality records in QMS.

PRIMAR S-101 Data Management and Validation

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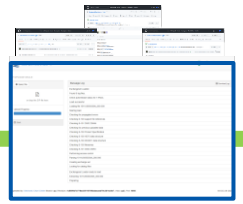
S-101 data Production

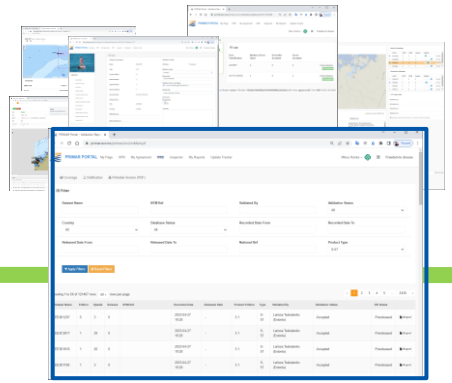
Hydrographic Offices

VPN upload checks



- PRIMAR defined Checks
- IHO WG Checks

VRC validation

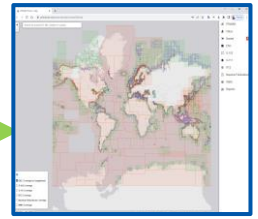


- S-57/S-101 Validation History
- Check of S-101 Validation logs from 7Cs Analyzer
- Visual compare of S-57/S-101
- Data coverage overview of S-57/S-101 data
- S-101 Overlap Checker?

Data Release

Database

PRIMAR Product Catalogue



S-57 & S-100 Coverage Viewer

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New tool for HOs that shows the data coverage of S-57 ENCs and S-101 datasets simultaneously.

- Shows data coverage for S-57 ENC and S-101 datasets.
- Show data that are released and available in PRIMAR Chart Catalogue.
- Shows data that are in pre-released validation status.
- Shows combination of released datasets and pre-released datasets.
- Pick individual datasets and only show them.
- Swich on/off the dataset IDs.
- Shows S-57 ENCs and S-101 datasets in combination with S-102 and S-111 datasets.
- To be made available in Beta-version in VRC for HOs during spring 2024.

S-57 ENCs in released DB

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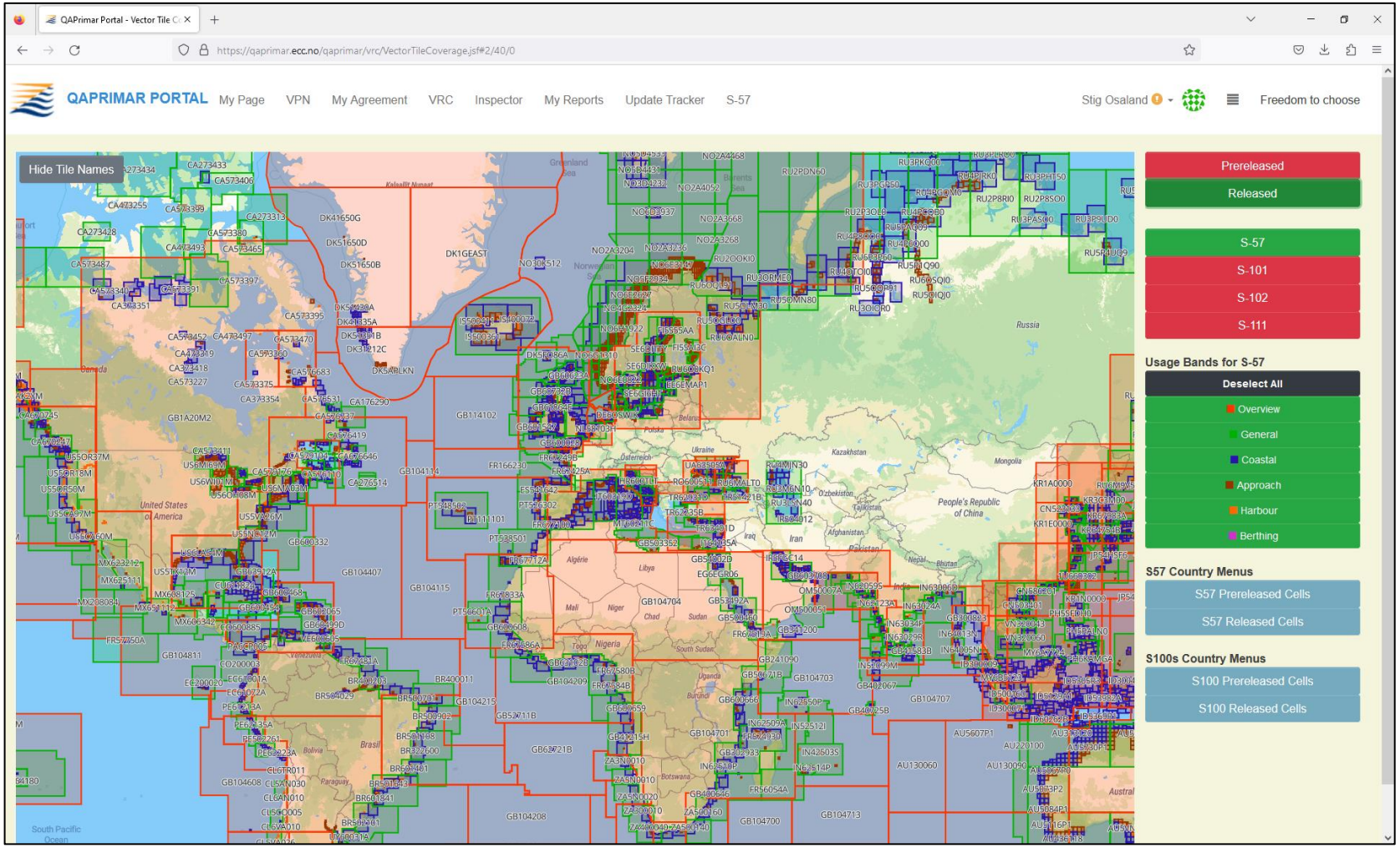
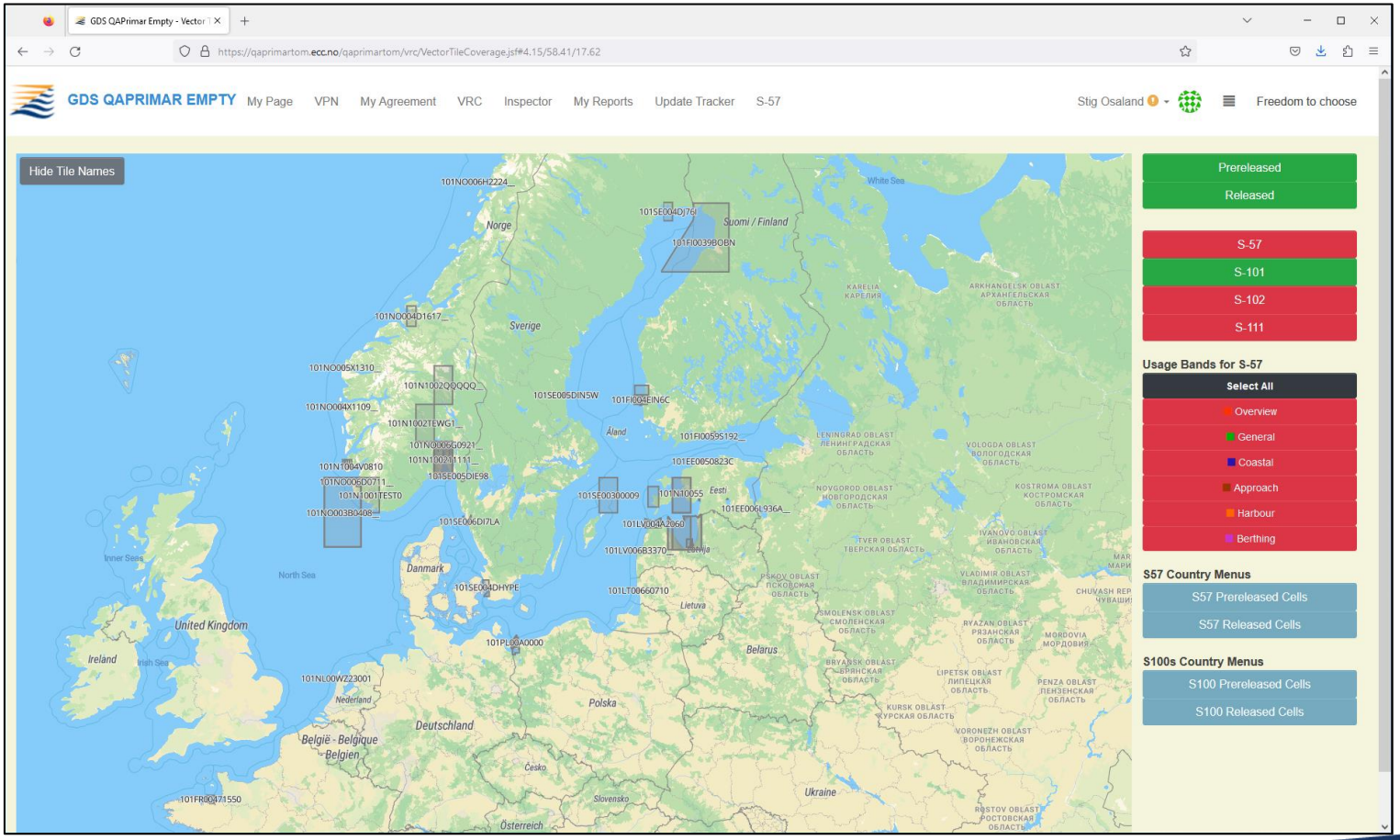


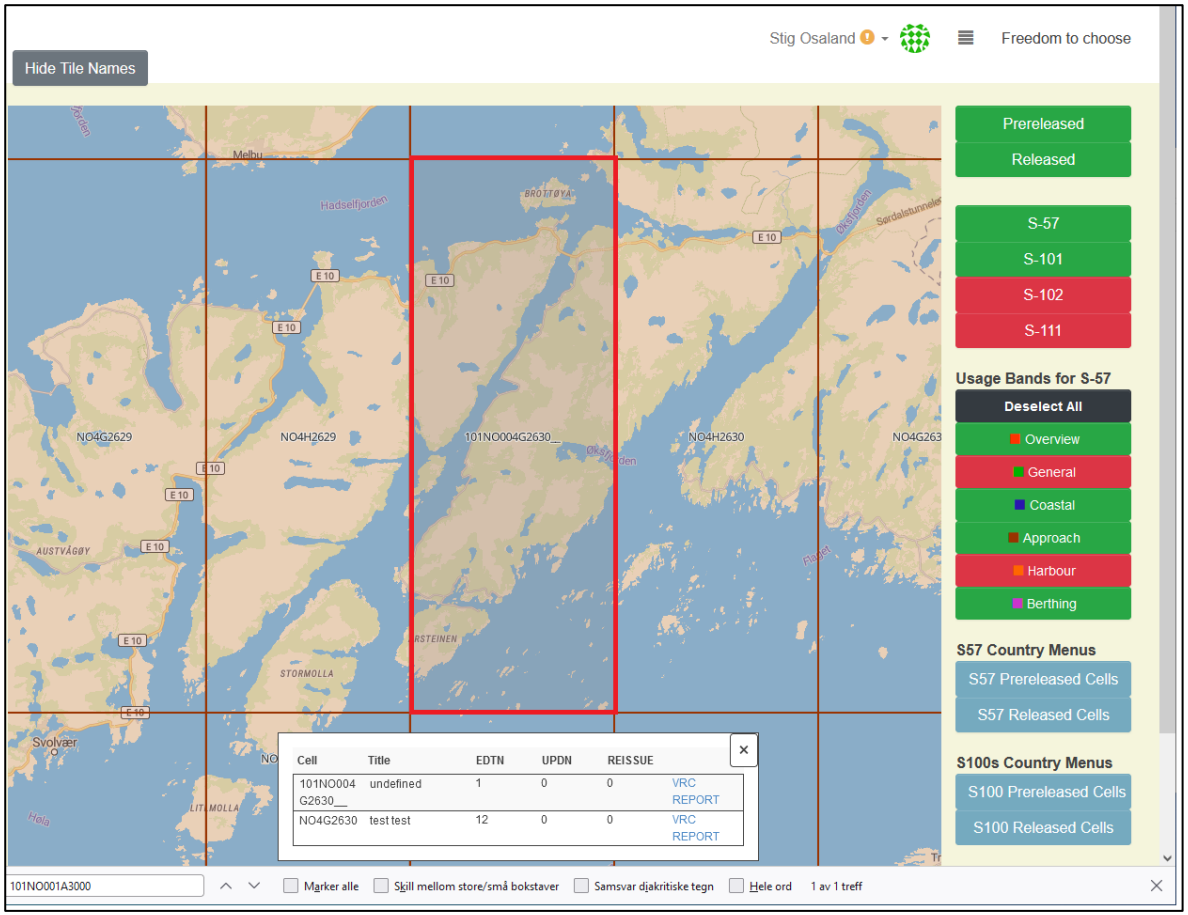
S-101 Test data

Example:
- Combination of S-101 pre-release and released data.
- Dataset ID switched on.



Dual Fuel Validation

Example:
- S-57 and S-101 dataset shown in same area.
- Click in the area and info about both datasets are shown.



Dual Fuel Validation

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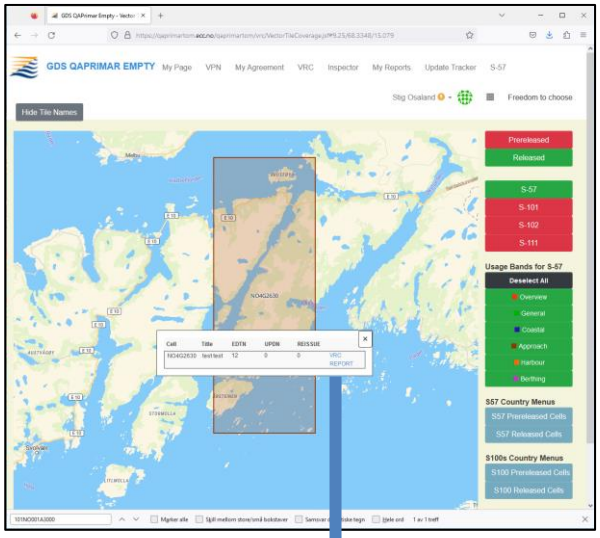
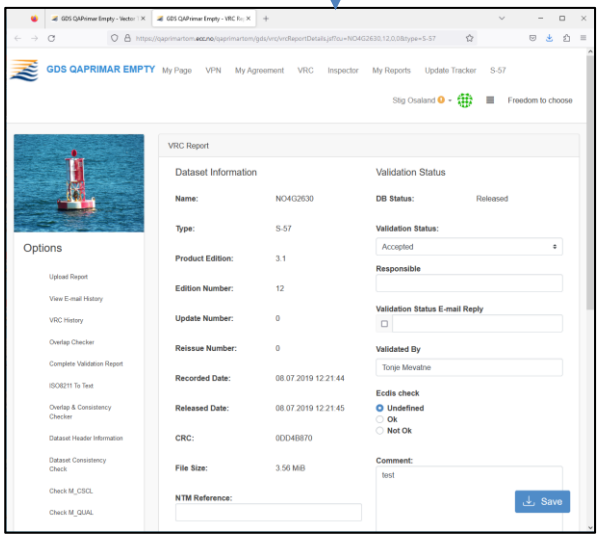
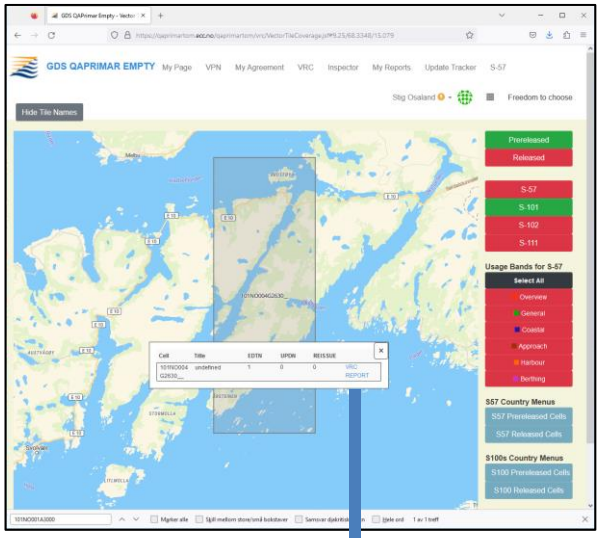
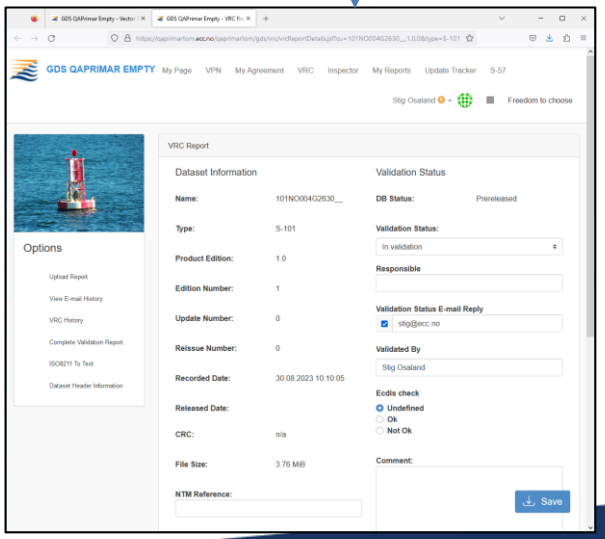
S-57 ENC Validation





S-101 Validation





FREEDOM TO CHOOSE

Validation of S-101 datasets in VRC

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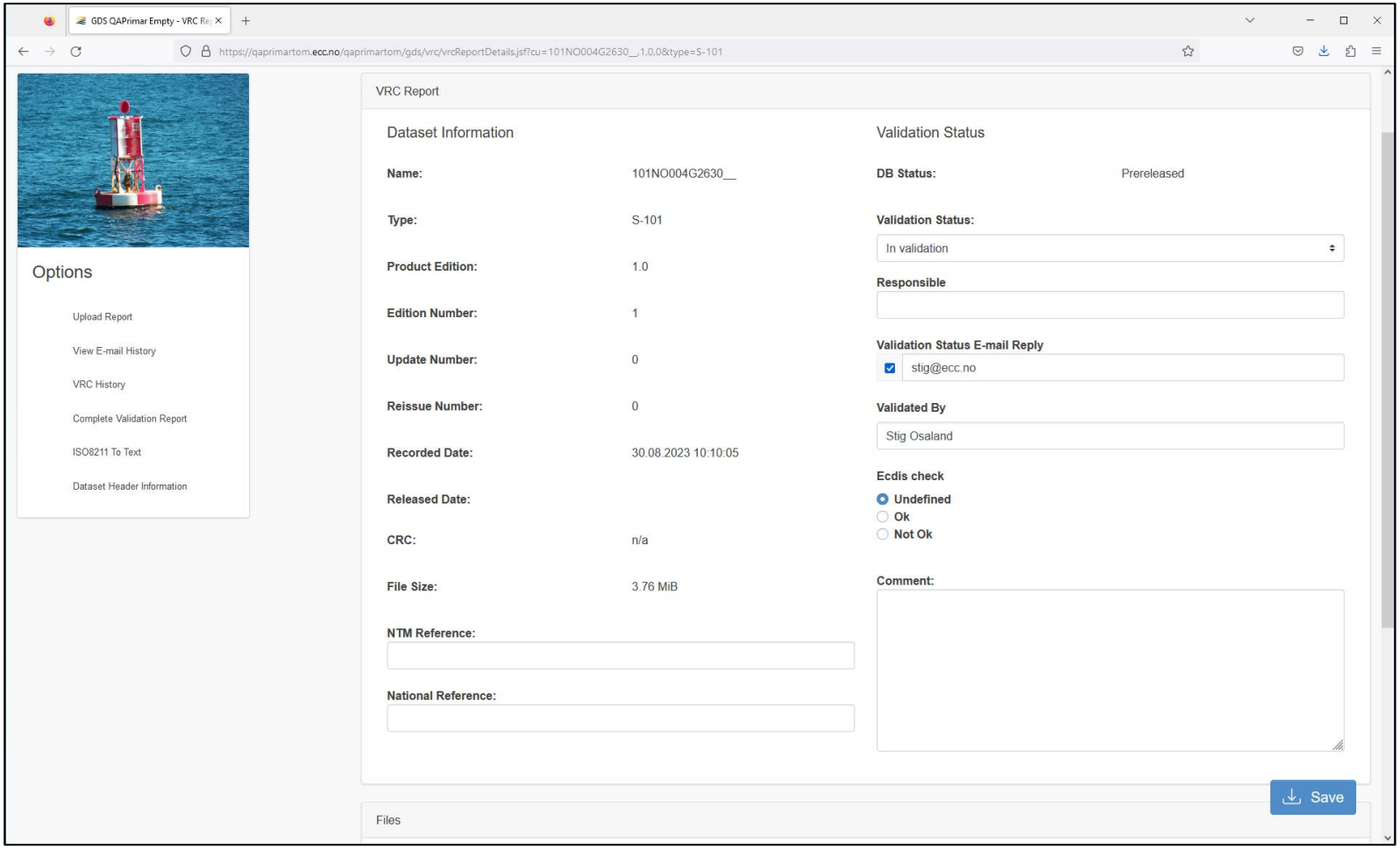
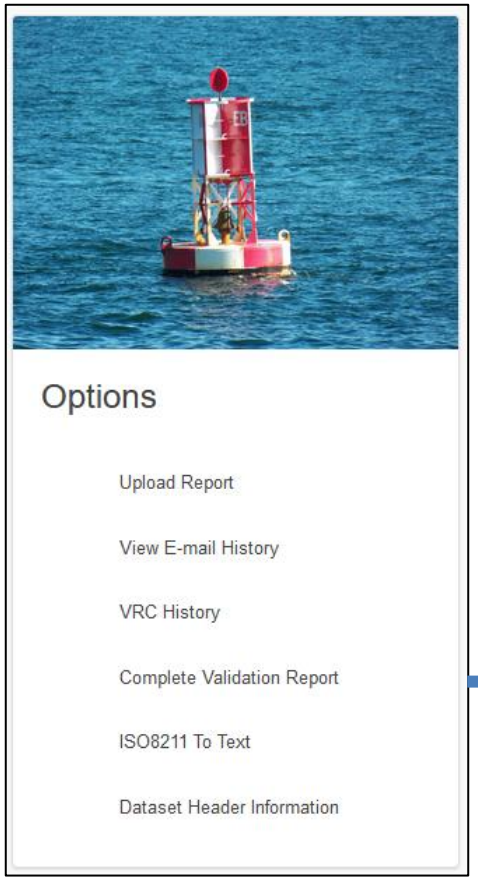
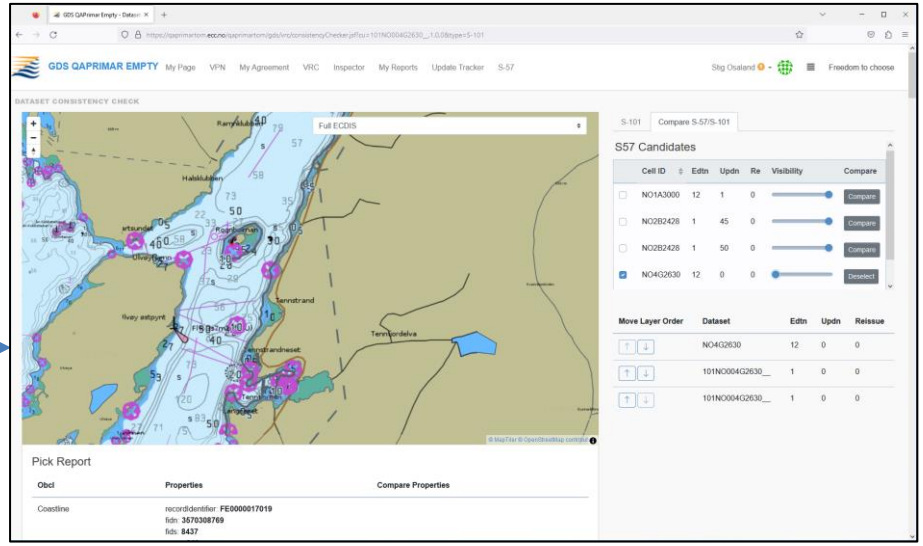
Current view, S-101 VRC Report:



Validation of S-101 datasets in VRC



Planned new functionality:
- Compare S-57 content versus S-101 content.
- Add visibility bar.
- Add Pick Report.



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PRIMAR S-100 Support to IHO

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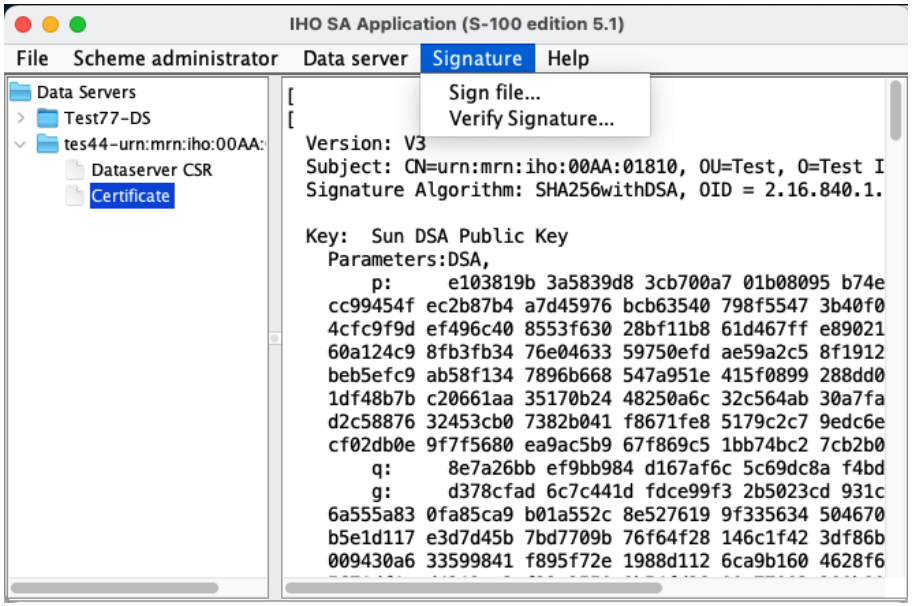
FREEDOM TO CHOOSE

Main Activities & Achievements

- IHO Scheme Administrator application
  - One application at IHO supports all: S63/S100e4/S100e5
  - Functionality:
    - Create Data Server Certificates
    - IHO to digitally sign FC/PC/IC catalogues S-100e5.1
  - IHO digital certificates:
    - Root certificate for Data Server Certificates
    - Data Server certificate for catalogue signing
- Training of IHO Protection Scheme Administrator staff
- Training in IHO Scheme Administrator Work Procedures



Way Forward

- IHO Protection Scheme Administrator
  - Provide general data protection training to IHO staff and newly appointed staff (Spring 2024).
  - Upgrade IHO Scheme Administrator application when IHO WG security experts agree on correct encoding (S-164 testdata to be completed November 2023)
  - Continued support to IHO.
  - Letter of Intent between PRIMAR and IHO signed.

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PRIMAR S-128 Project

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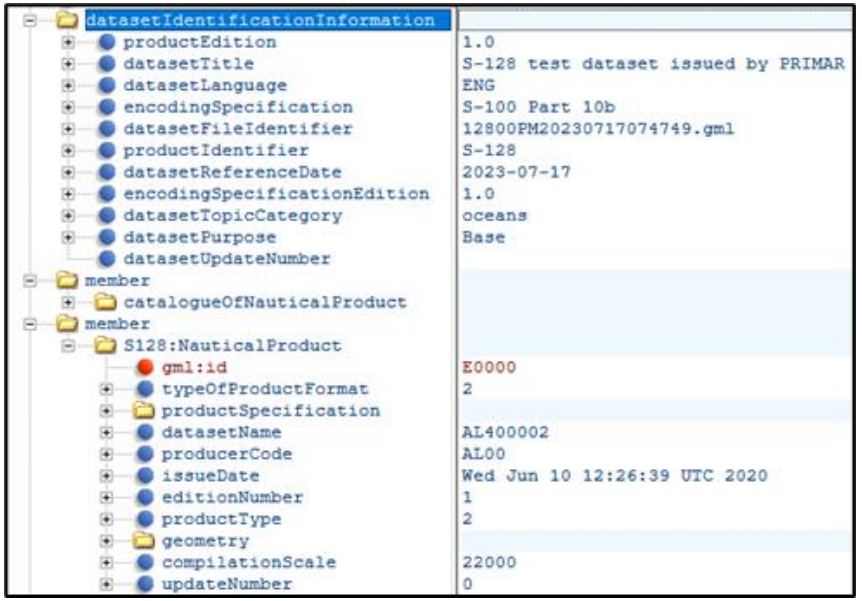
FREEDOM TO CHOOSE

PRIMAR S-128 Project

- Scope
  - Develop support for S-128 dataset generation.
  - Competence building on S-128.

- Milestones and status
  - Data model analysis S-128 1.0.0.
  - Extract S-128 datasets.
  - Identify and engage with distributor/OEM.
  - Phase 2 preparations.
  - IHO and PAC reporting.



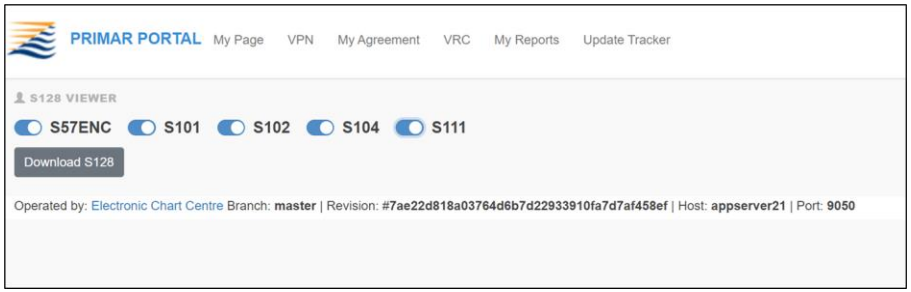
Main Activities & Achievements

- Data model analysis S-128 1.0.0.
  - Mandatory Information.
  - Non-mandatory Information.
  - Metadata profile.
  - S-98 Annex C analysis.

Elements	Unregistered
Features	6
Simple Attributes	60
Complex Attributes	13
Information Types	2

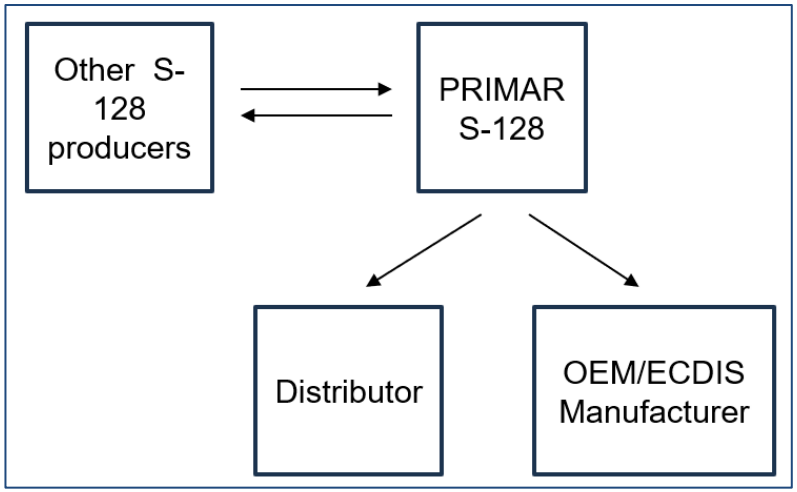
Feedback to S-128 PT:
- Missing in IHO GI Registry.
- Textual inconsistencies.
- Data model considerations.

- Extract S-128 datasets.
  - Solution for complete dataset.
    - S-57, S-101, S-102, S-104, S-111.
  - Solution for product specific dataset.
    - E.g., S-101 only, S-102 only.
  - Solution for combination of products dataset.
    - E.g., S-57 + S-102 + S-104
  - API considerations.



Main Activities & Achievements

- Identify and engage with distributor/OEM.
  - Other S-128 producers.
    - Support iterative approach.
    - IC-ENC, KHOA, BSH, NGA, UKHO
  - Distributors.
    - Understanding their role.
    - Test our products.
    - Initial contact Navtor
  - OEMs.
    - Understanding their role.
    - Test our products.
    - Initial contact Furuno, Kongsberg, Navtor.



S-128 Way Forward

- **Content and deliverables (Phase 2)**

  a. Data Model Development Adjustment.
     - Edition 1.1.0/2.0.0
     - Potential S-57/S-101 dual fuel capability

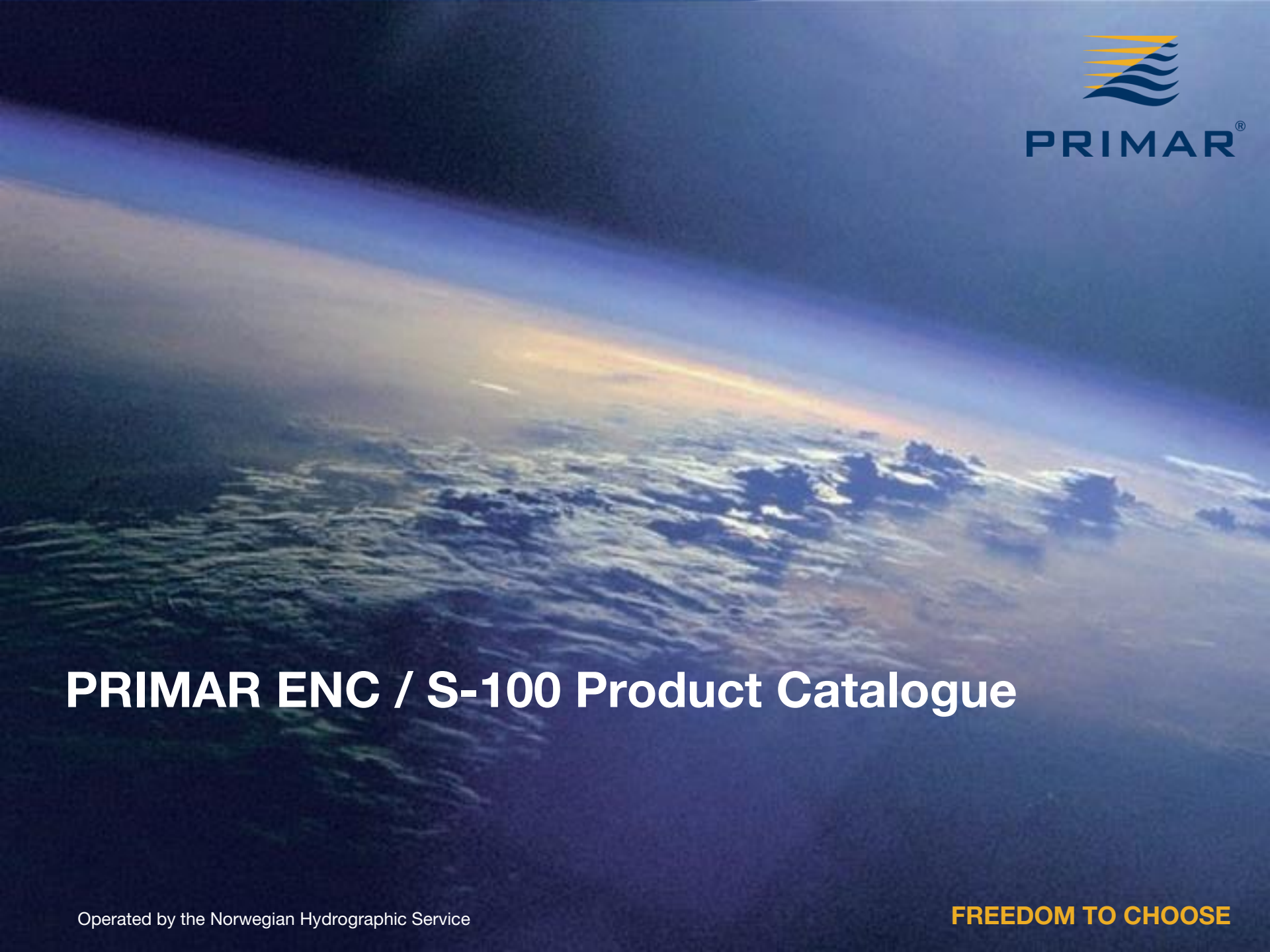
  b. Services and Interphase.
     - API provision Complete
     - Exchange Set specific content
     - CD Service consideration

  c. Data Flow Structure.
     - Distributor engagement
     - OEM/ECDIS engagement

  d. IHO Activity
     - Reporting and Meeting Activity

  e. Phase 3 Planning
     - Further implementation and testing

  f. PAC Reporting.



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PRIMAR ENC / S-100 Product Catalogue

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FREEDOM TO CHOOSE

PRIMAR ENC / S-100 Product Catalogue

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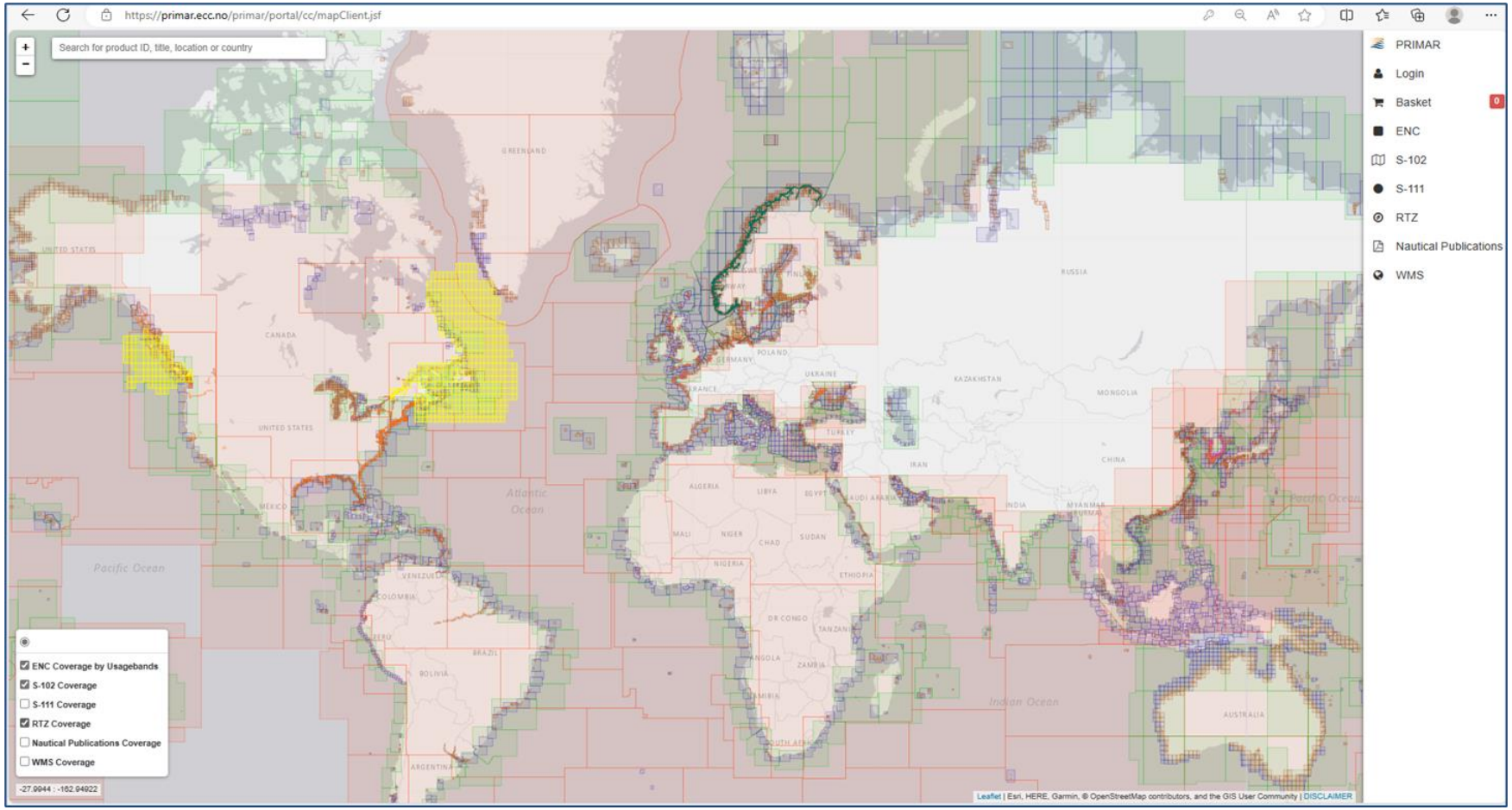
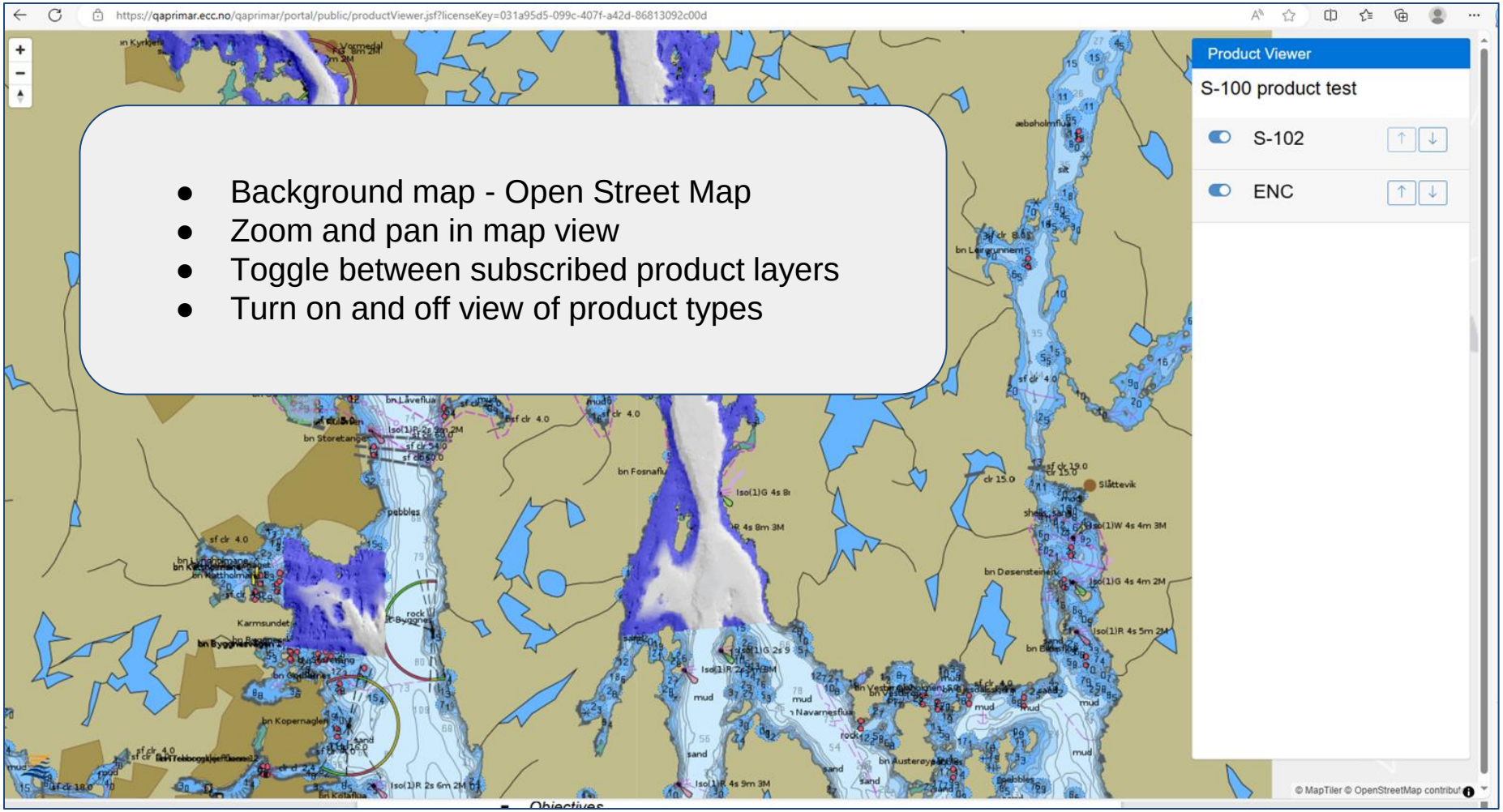
Current Products: S-57, S-102, S-111, RTZ, Nautical Publications, WMS.

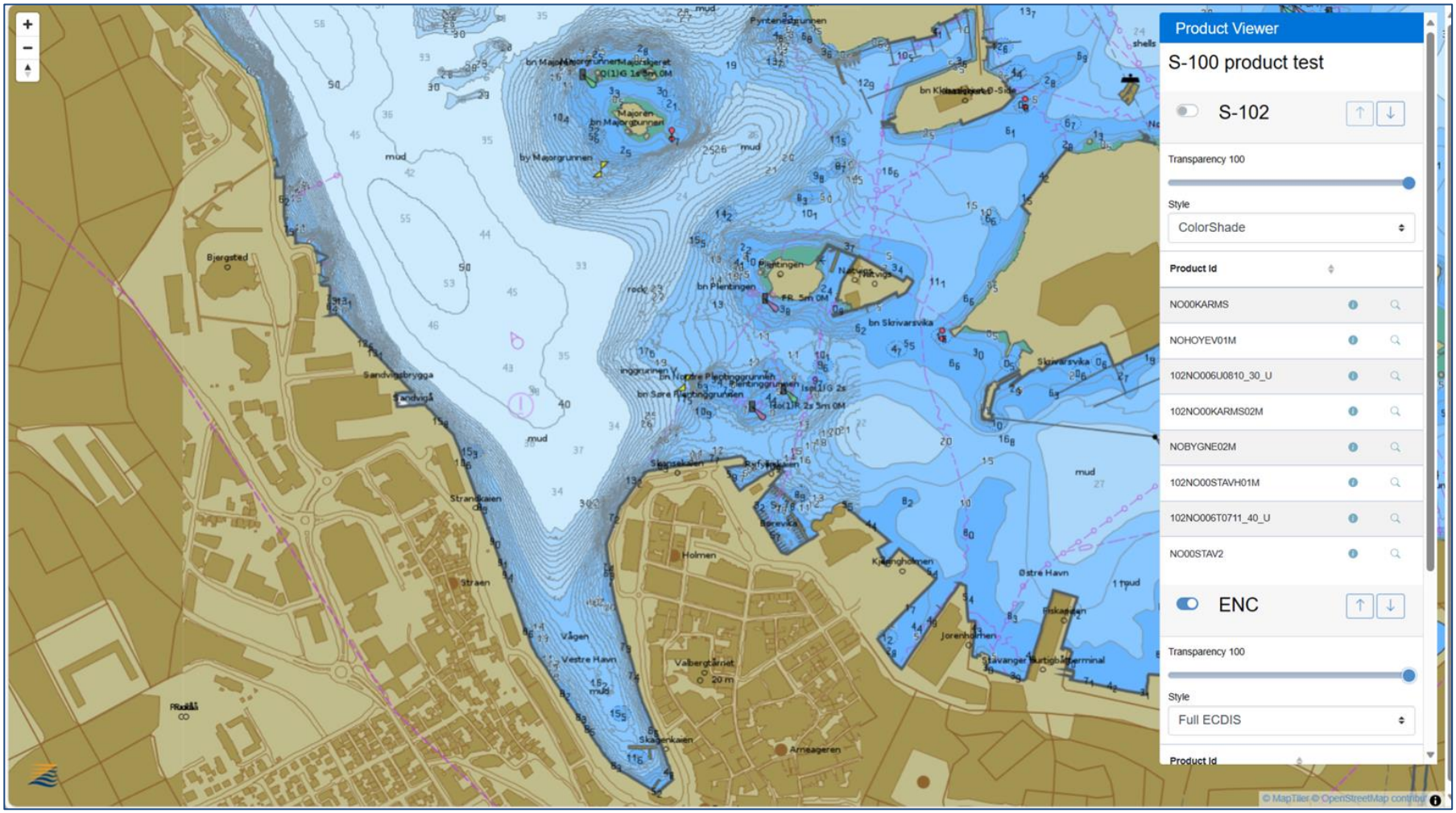


Product Viewer Features

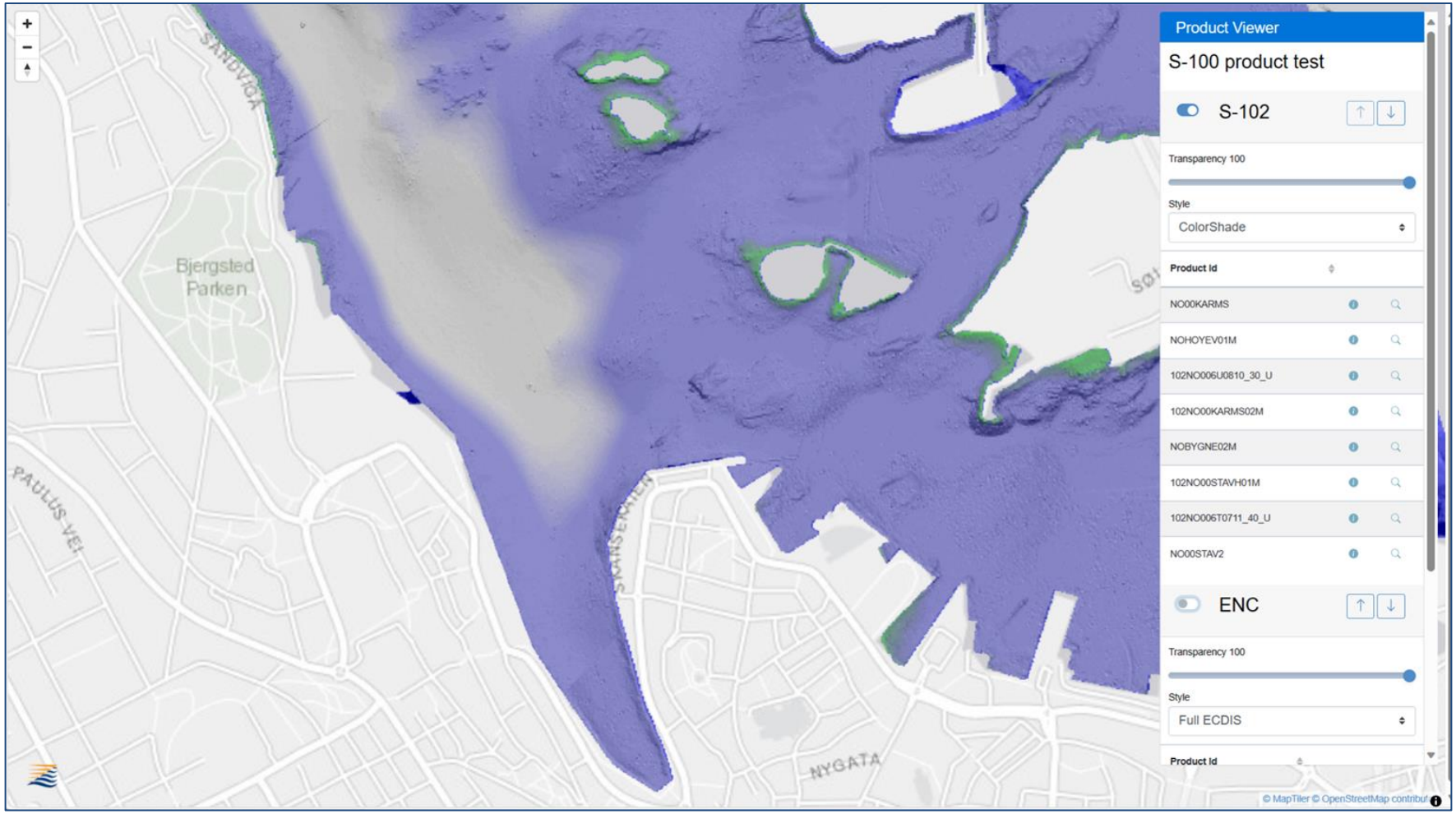


- Background map - Open Street Map
- Zoom and pan in map view
- Toggle between subscribed product layers
- Turn on and off view of product types

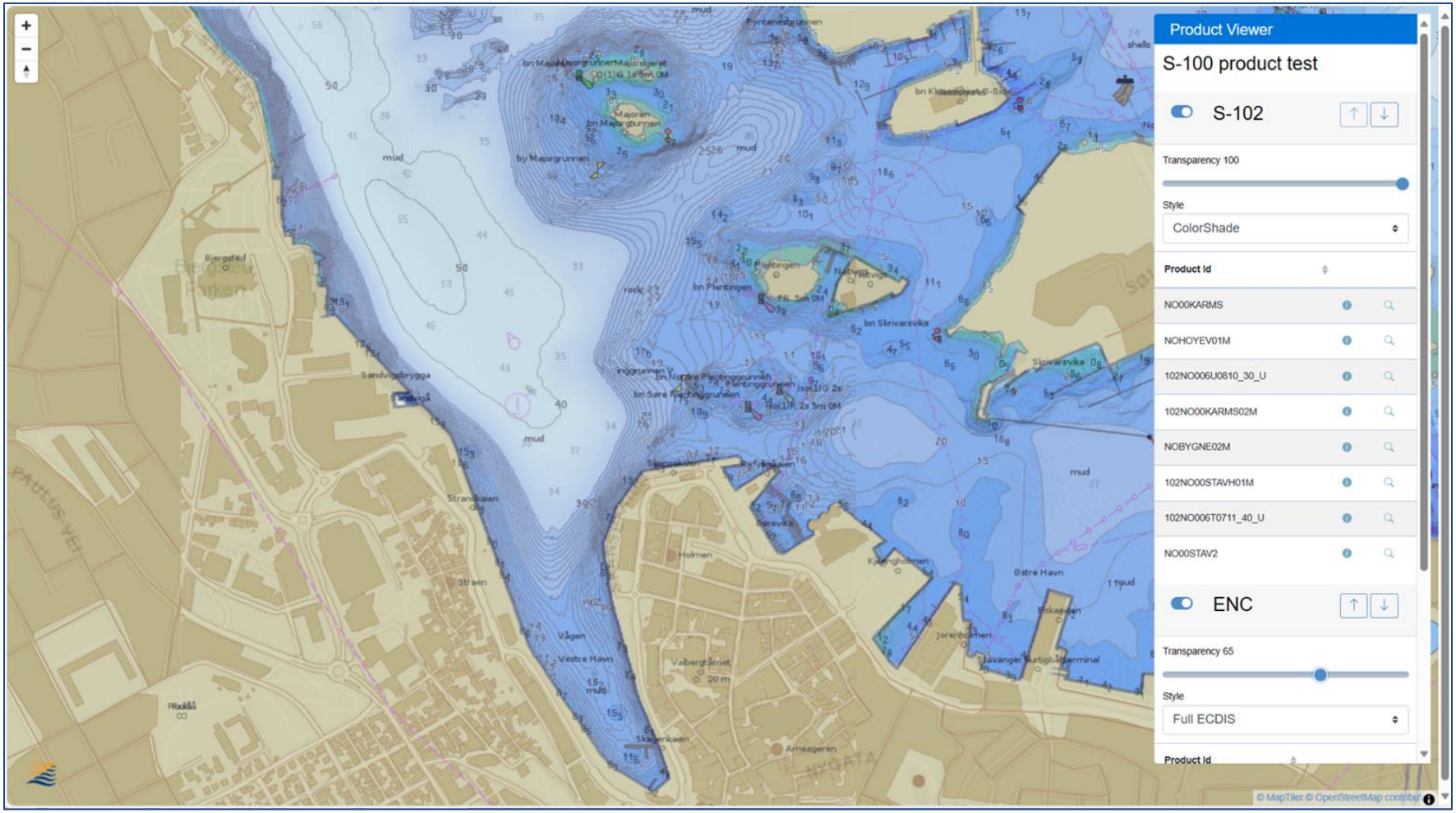
PRIMAR S-100 Product Viewer



PRIMAR S-100 Product Viewer



PRIMAR S-100 Product Viewer



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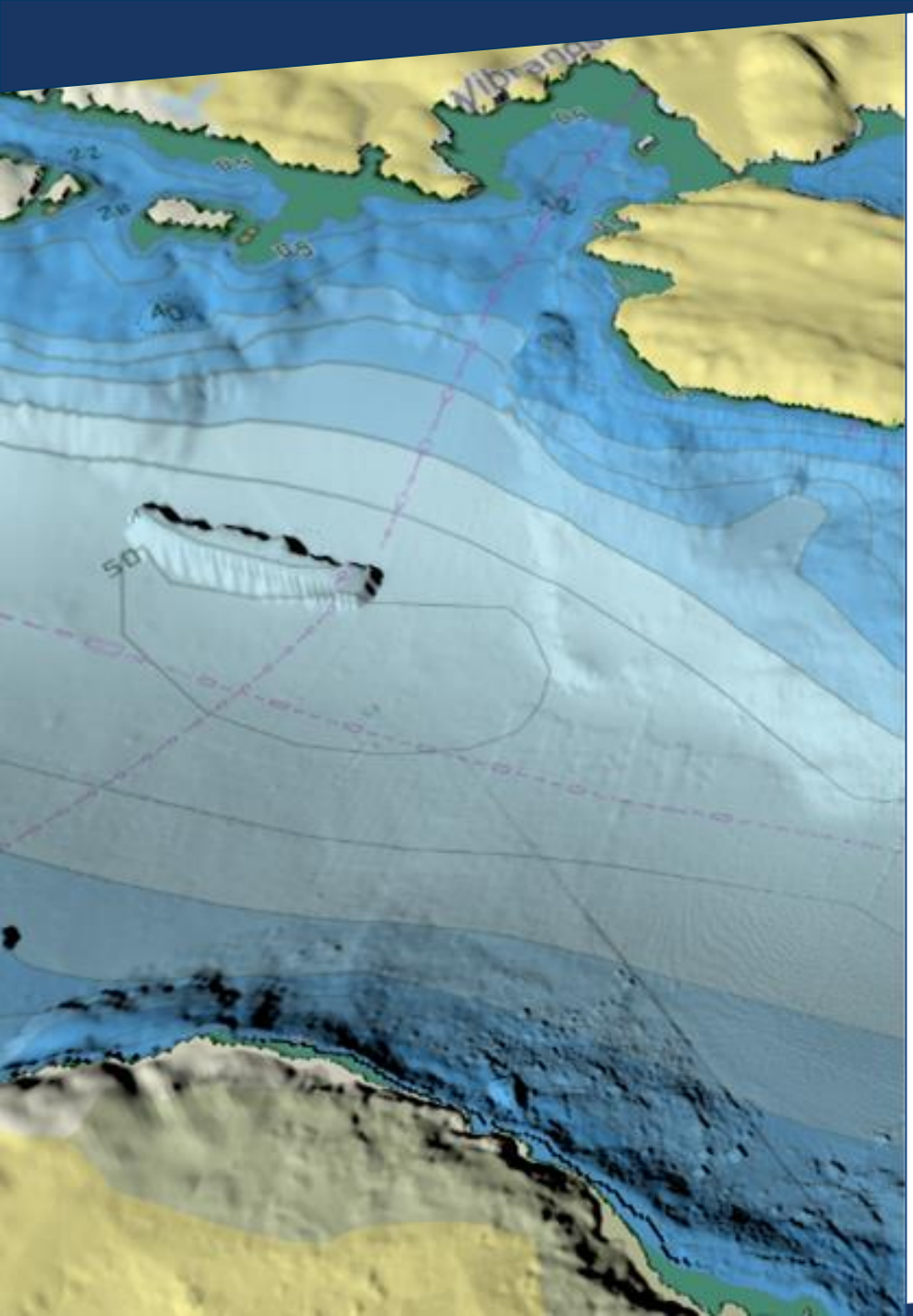
PRIMAR S-100 Explorer Project
Operated by the Norwegian Hydrographic Service
FREEDOM TO CHOOSE



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Value by Viewing

Why develop an explorer service?

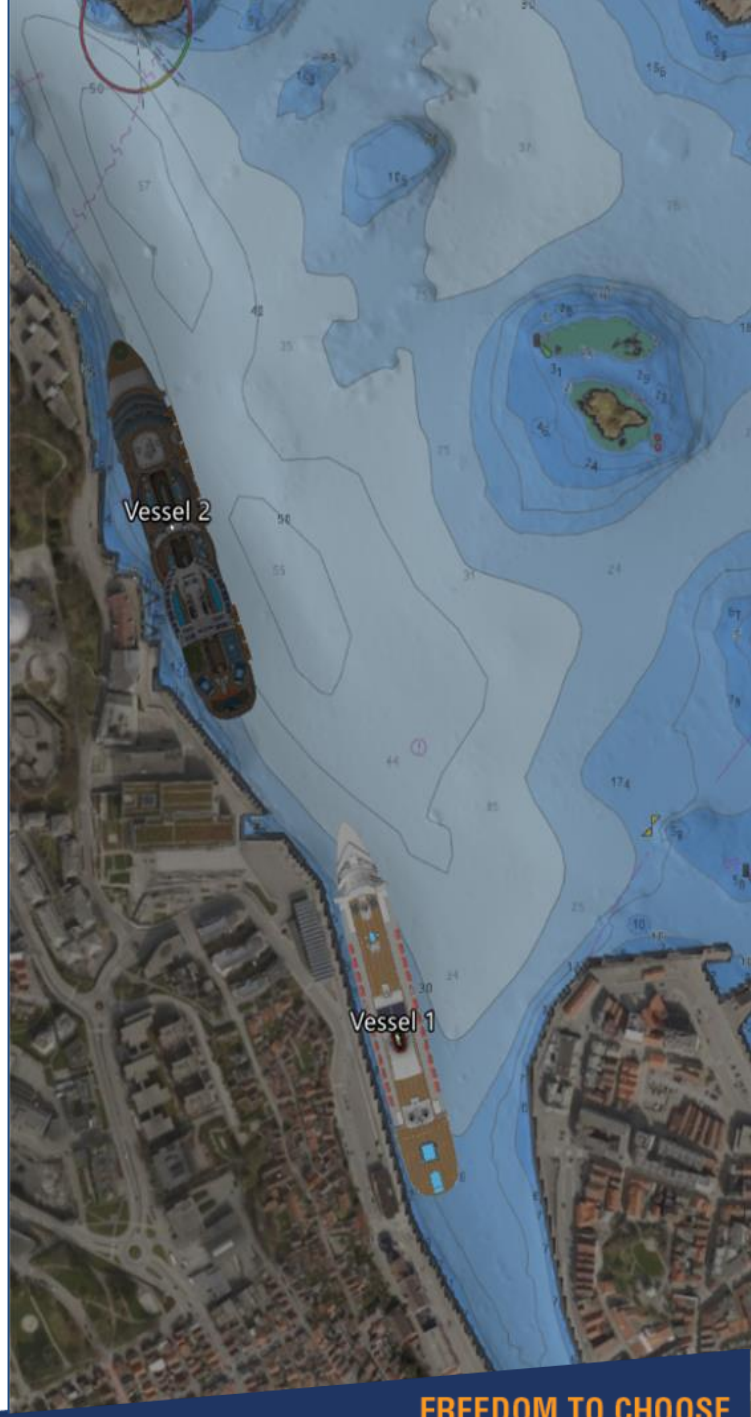
- The PRIMAR product portfolio is increasing!
- Available WEB based systems to view and show value of the new products are lacking.

There is a requirement to present S-100 products together, in a way everyone can relate to!

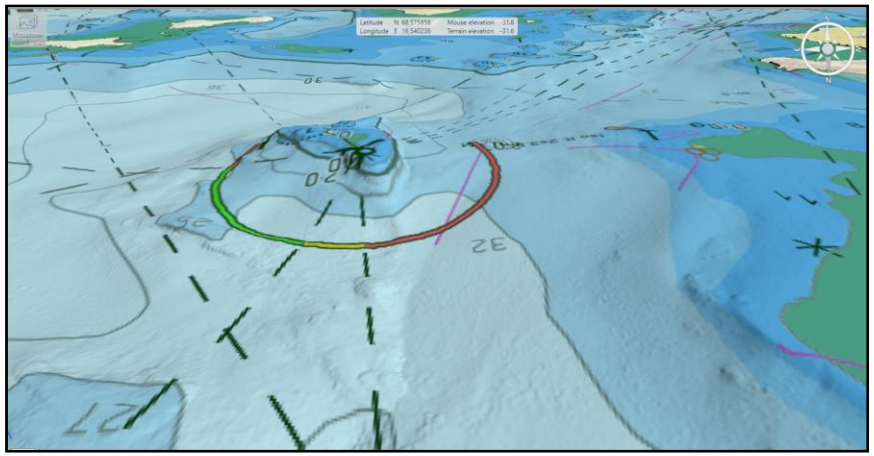
- The presentation of conducted S-100 tests have received a great deal of attention worldwide.
- Hydrographic Offices, and others, continuously request ECC/PRIMAR to present the S-100 Demonstrator tool with S-100 datasets.

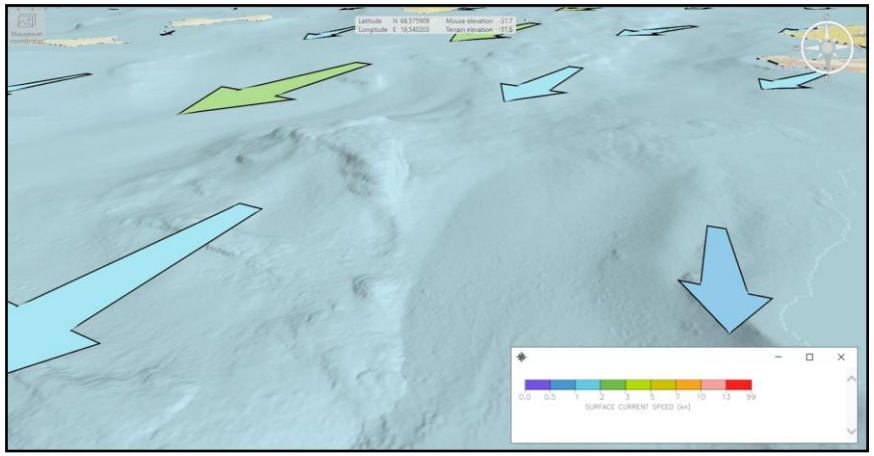
Value for several parties

- The PRIMAR Explorer service can be used:
  - as a visualisation tool to review and assess coordination efforts by regional hydrographic commissions.
  - to ease collaboration between different national services e.g. HO, Navy, Coastal administration and Meteorological / Oceanographic institutes. It will enable them to have a common understanding of available datasets and how they appear for an area.
  - for immediate demonstration of S-100 datasets, without the use of ECDIS or any other dedicated hardware, software or data protection handling, as it will be a web based service generated by PRIMAR.
  - for marketing purposes by Distributors to promote (and sell) the new S-100 products.

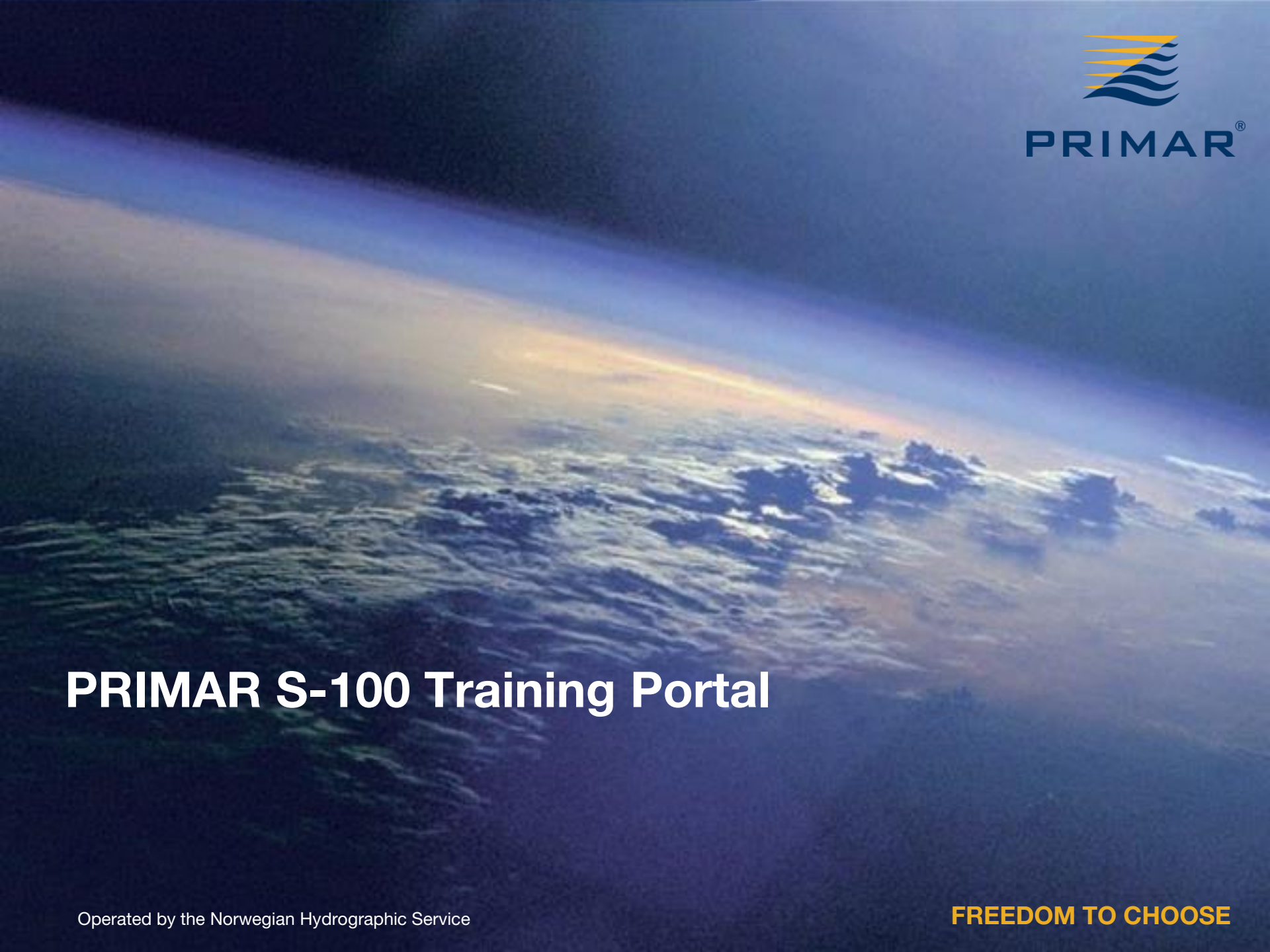


Scope Q2 2024->Q1 2025





- Provide a Web based prototype of the S-100 Explorer.
- The prototype will cover visualisation of the following (also combined):
  - **S-57**
  - **S-101**
  - **S-102**
  - **S-104** (dynamic/timestamp)
  - **S-111** (dynamic/timestamp)
- S-100 Explorer will show data for multiple S-100 product specification variants from PRIMAR. For effective and standard based display, a combination of OGC 3D tiles, OGC WMS and APIs will be used.



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PRIMAR S-100 Training Portal

Operated by the Norwegian Hydrographic Service

FREEDOM TO CHOOSE

PRIMAR S-100 Training Portal

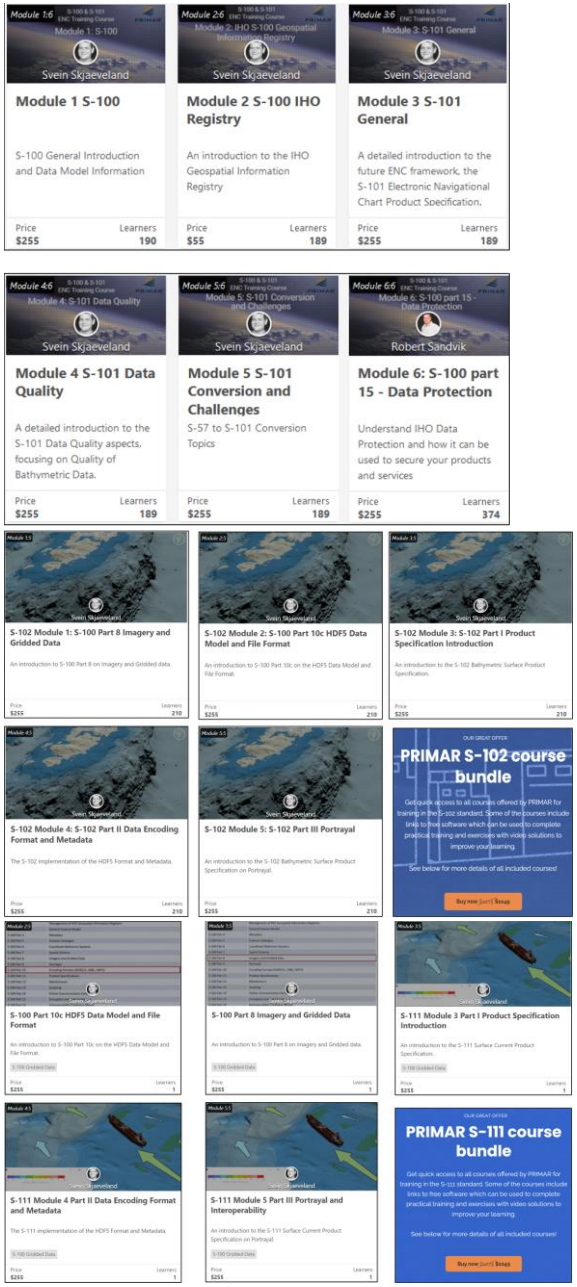
- Capacity building content for Member States.
- Exchange & knowledge sharing.
- Reputation as a knowledge center.

- 2021: Training portal launched.
  - S-100
  - S-101 and conversion
- 2022 Continued development.
  - S-102
  - S-111
- 2023 Continued development.
  - S-104 (Ongoing)
  - S-100 upgraded (5.0.0)
  - S-101 upgraded (1.1.0)

Launch of PRIMAR Learnworlds training portal June 2021
https://primar.learnworlds.com

Status

- Flexibility
  - Always available
  - Discussion forum
  - Unlimited replays
  - Full slide access
  - Training software available
  - Testdata available
- Content details
  - 17 training modules
  - ~20 hours video
  - ~265 Quiz questions
  - ~50 practical exercises
- High usage rate
  - 409 Students
  - 313 certificates



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PRIMAR Training Portal Certificate

PRIMAR offer to CBSC

- Access to the PRIMAR Training Portal for 5 nations annually - 5 users each (25 altogether).
- Non-RENC nations.
- Apply to the CBSC for access.
- Annual monetary value: USD 80.000

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PRIMAR Conversion Task Force Project

Operated by the Norwegian Mapping Authority, Hydrographic Service

FREEDOM TO CHOOSE

PRIMAR Conversion Task Force Project

- Scope
  - Approached by HOs requesting feedback on guidance on data conversion (conversion strategies, sharing of experiences, transition to S-10x, dual-fuel production).
  - Conversion Task Force Project agreed by PRIMAR Advisory Committee (PAC) in November 2020.
  - Possibility for PRIMAR Member States to actively participate in other PRIMAR or other S-101 projects with HO's own S-101 ENC test data.
  - All Member States equal participation rights.
  - Tools provided by Teledyne Caris, Teledyne SevenCs, Lloyd's Register, PRIMAR.

PRIMAR Conversion Task Force Activities

- Project information platform:
  - **GitHub** - https://github.com/PRIMAR-RENC
    - 5 repositories, 88 issues, 331 comments
  - Emails – invitations, project updates and other communication
    - 64 various info email conversations
  - Weekly Reception time – open VTC hour with PRIMAR consultant available for questions and answers to all project participants
    - 31 VTC open online hours
  - Dedicated VTC meetings for activity start, closure and other
    - 15 VTC meetings (to 6 all participants invited)
- 11 Countries defined 55 Test Datasets for conversion activities
- End of 2023 - 95% of test datasets are S-100 ready (PRIMAR VPN upload success rate)
  - 3% of datasets indicate conversion software geometry conversion technical issues (pending conversion software updating)
  - 2% of datasets indicate PRIMAR upload check issues (pending PRIMAR upload checks upgrade)

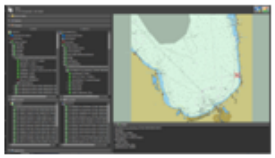
S-101 Conversion Testing/Testbed

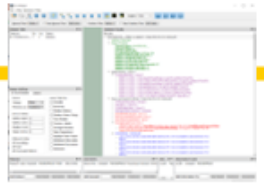
PRIMAR RENC MEMBER NATIONS Testing:

Albania
Croatia
Estonia
Finland
France
Georgia
Iran
Latvia
Lithuania
Norway
Poland
Sweden
Russia
Ukraine
Vietnam
+
Taiwan

7Cs Analyzer

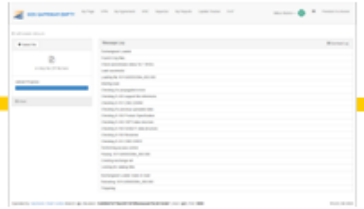
7Cs Analyzer logs





dKart Converter
SevenCs Converter
Caris Converter

VPN upload Checks
(Your S-100 Readiness check!)



DUAL FUEL DB

S-101 test datasets

+

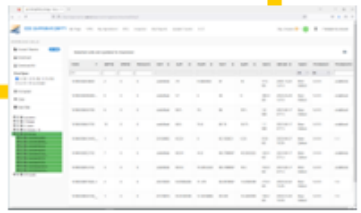
S-57 datasets

Errors DB

VRC Validation

Dual Fuel
VPN Release Test

VPN Download



S- 100 Exchange sets

+ NIWC Testbead tools
for viewing results

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PRIMAR – Other topics

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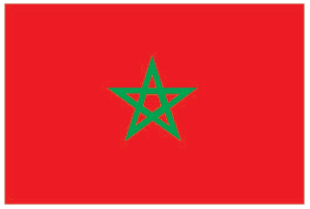
Other PRIMAR News

- Travel fund established for PRIMAR member nations – for participation in PRIMAR meetings.
- New PRIMAR Strategic Plan approved by PAC.
    - Updated goals, SWOT-analysis, Action Plan and Risk Analysis
- PRIMAR associated member of CIRM.
    - PRIMAR visibility and networking in an important industry forum.
    - Participate and influence technical and regulatory bodies (IMO, ITU, IEC, IALA, IHO).
    - Participate in the development of international regulations and standards affecting PRIMAR products and services.
    - Working groups on important topics (Cyber security, ECDIS, e-navigation, MASS).
- Morocco new member of PRIMAR.

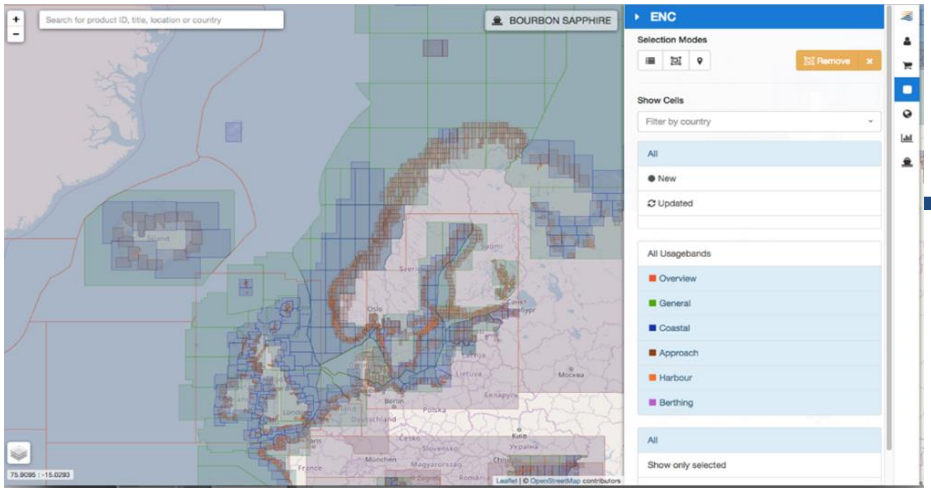


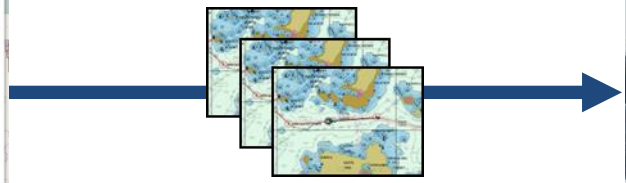
PRIMAR Navy / Governmental Supplier Services

- Supply S-100 data and ENCs to your Navy / Governmental users - with discount.

- Access to the PRIMAR global ENC and S-100 database.

- Easy operation from the PRIMAR Product Catalogue. Register and add users, Create ENC and S-100 portfolios, Activate area of interest, View orders/reports, View licensee status, Download updates and permit files etc.

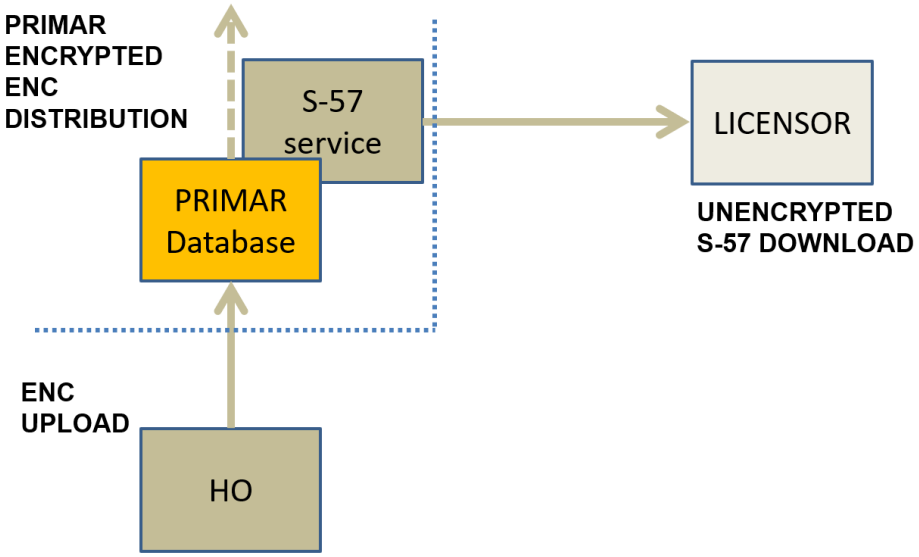




Navy users

PRIMAR S-57 non-ECDIS Service

- Service description:
  - Allows PRIMAR members to have an easy and efficient method to distribute own S-57 data to customers/3rd parties.
  - Reusing established technology for the ENC distribution operation.
  - PRIMAR operates as custodian for S-57 distribution.



PRIMAR support to IHO

Formalized through an IHO – PRIMAR Letter of Intent

- PRIMAR supports IHO in maintaining and developing data protection standards.
- PRIMAR supports IHO in its operation as data protection Scheme Administrator for S-100.
- PRIMAR operates a catalogue polling service for IHO to provide metadata information about all chart datasets available in the PRIMAR services.
- PRIMAR supports IHO in the promotion and operationalization of the S-100 family of standards among stakeholders.
- PRIMAR to provide the IHO staff members access to the PRIMAR Training Portal.
- PRIMAR to provide IHO members states access to the PRIMAR Training Portal, based on applications through the CBSC.

PRIMAR®
Thank you for your attention
Questions?
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