RSAHC8
18-20 Feb 2019
Islamabad, Pakistan

ENC Solutions for S-100 and beyond

SevenCs Software

Agenda

- Introduction of SevenCs
- ENC Production Life Cycle
- 7Cs Analyzer
- ENC Bathymetric Plotter

ChartWorld
ECDIS as a Service

SevenCs

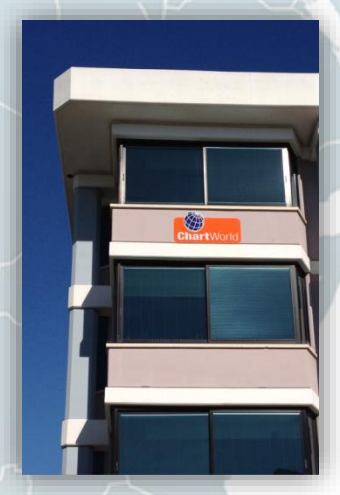
Founded in 1992

80+ Employees

4 Office locations

Hamburg

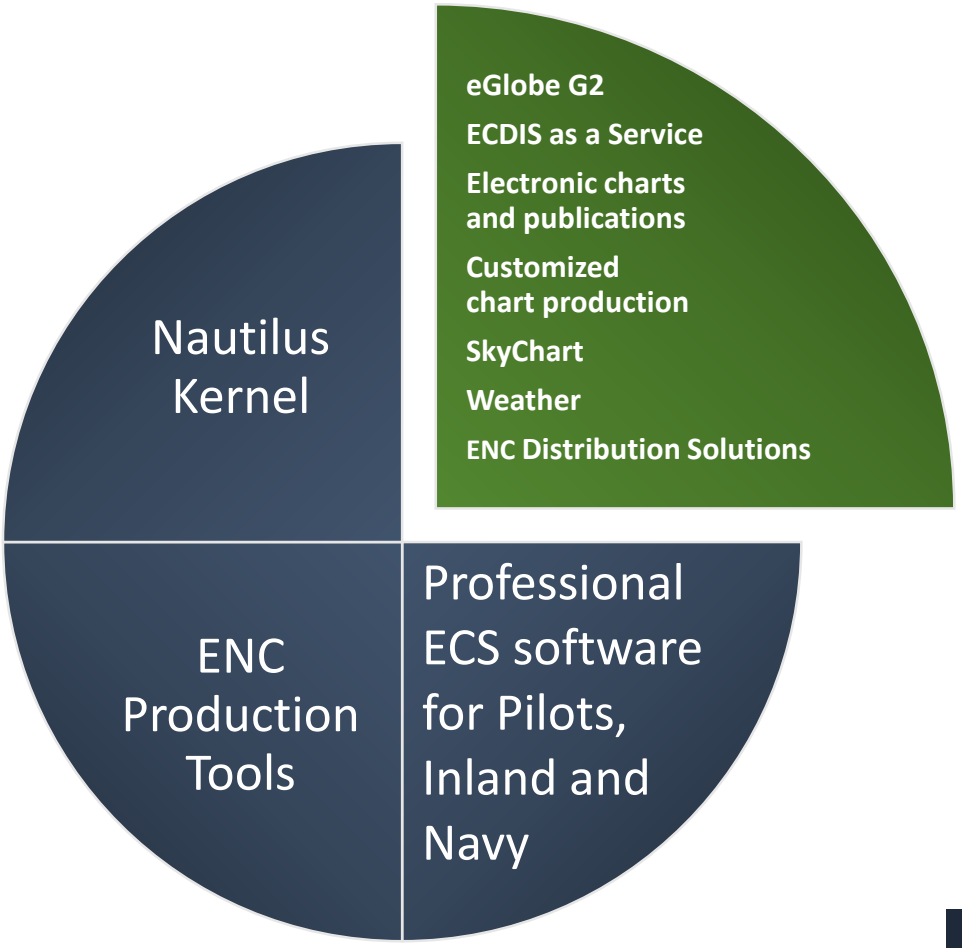
Limassol



Tokyo

Singapore

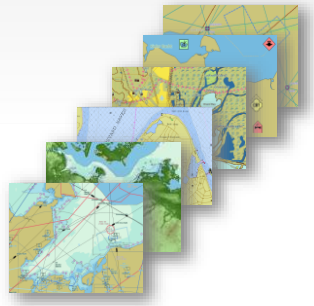
CORE ACTIVITIES

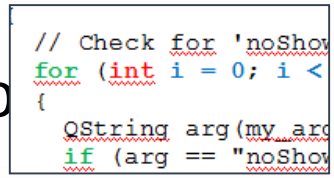


We provide 24/7 emergency support to all of our customers.

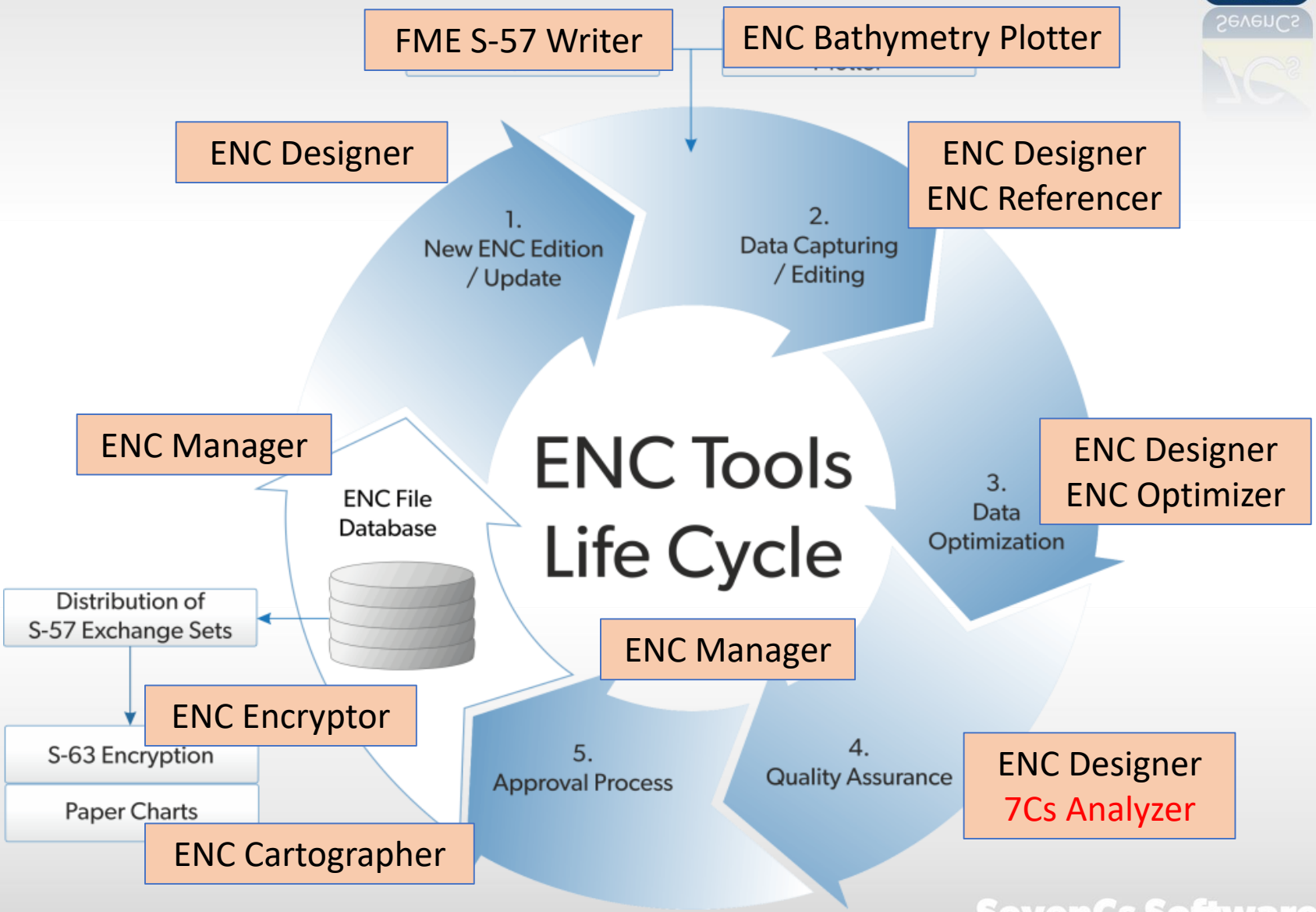
SevenCs - Products and Services

- ECDIS Kernel software
- Web based solutions for electronic charts
- Chart Production/Validation Software
- Navigation Software (ECS, PPU)
- Software Development (e.g. ECDIS for ChartWo
- Training and Consulting





ENC Life Cycle



SevenCs Software

Current S-100/S-101 activities

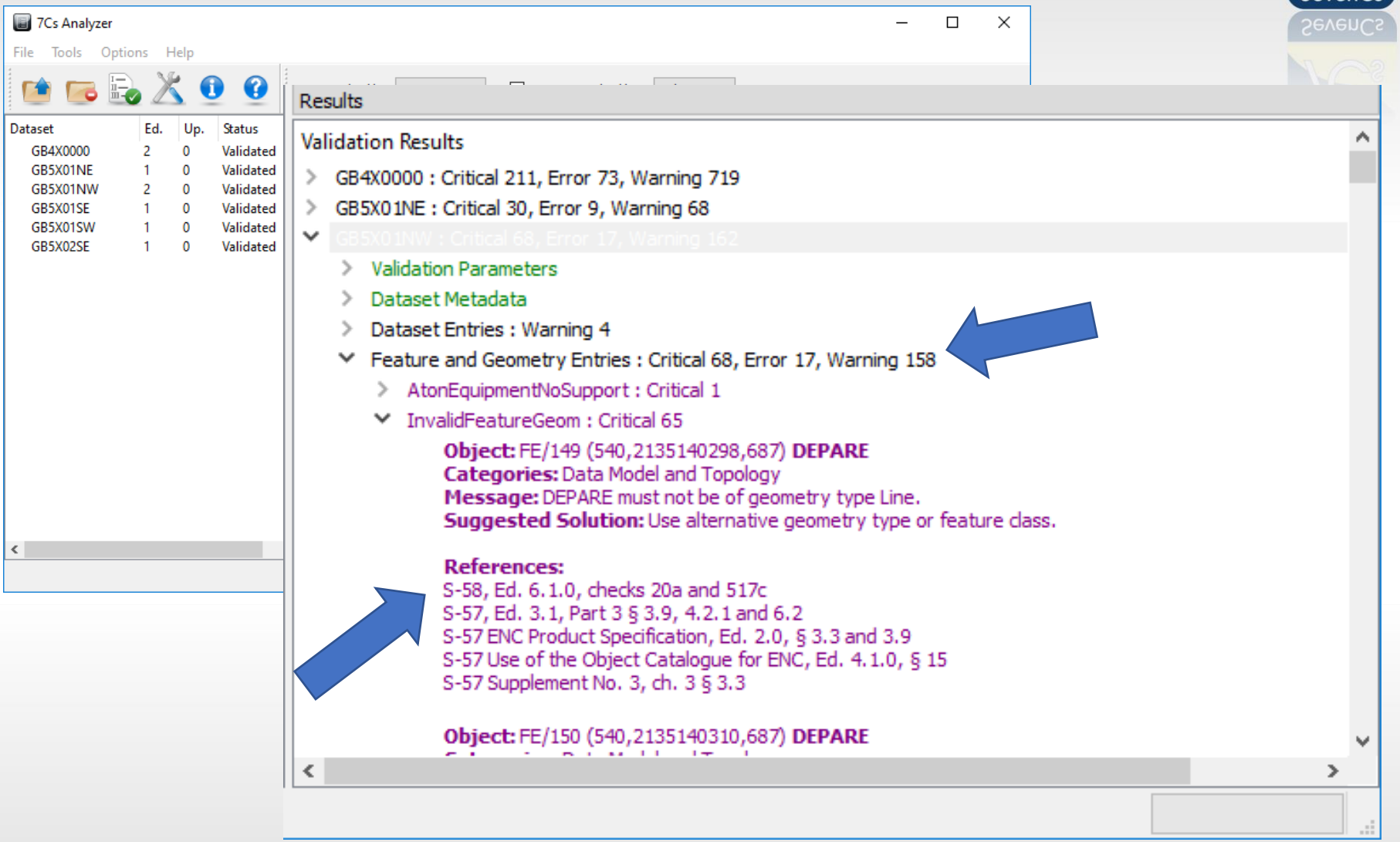
- Member of IHO **S-100 working group** and of S-100 technical **expert team**
- SevenCs **S-100 ECDIS Kernel** Nautilus
  - basis for large variety of S-100 applications (S-101,S-102, ...)
- **S-101 Validation** Software
  - provided to S-100/S-101 IHO expert groups to assist in development and testing of S-101 validation checks
- **S-101 Reader** Plugin for FME
  - include S-101 data in geo-data processing procedures

New 7Cs Analyzer

7Cs Analyzer Version 4.0.0

- Based on Nautilus S-100 ECDIS Kernel
- Validates S-57 ENC, IENC, AML
- Includes **S-58 6.1.0**. and IENC Validation Checks
- Integrates into ENC Designer
- Additional module for S-101
- S-100 testbed version known as “Validator”

New Analyzer Version 4.0.0



SevenCs Software

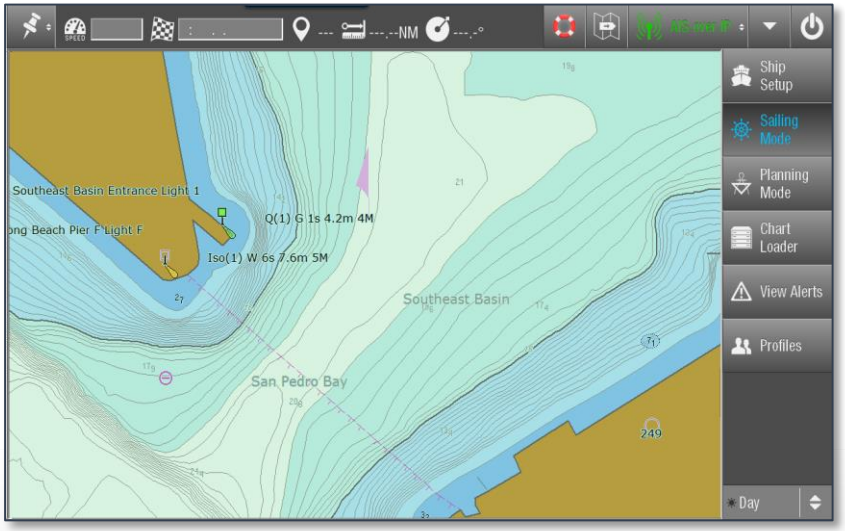
Validation Standards

- IHO S-100 Universal Hydrographic Data Model (Dec 18)
- S-101 Edition 1.0.0 (Dec 18)
- S-57 Transfer Standard for Digital Hydrographic Data Edition 3.1
- S-57 ENC Product Specification 2.0
- S-57 Appendix B.1 Annex A – Use of the Object Catalogue for ENC Edition 4.1.0
- IHO S-58 ENC Validation Checks Edition 6.1 (Sep 18) *
- Product Specifications for Inland ENCs Editions 2.1, 2.2, 2.3, 2.4
- Recommended Inland ENC Validation Checks 2.4

High Density Contours

Depth information in ENCs and ECDIS

- Hardly any Official ENCs with high density contours
- To be set by the operator of the navigation system
- Reflect the ships‘ draught plus extra safety margin
- Areas safe for navigation are shown in the display



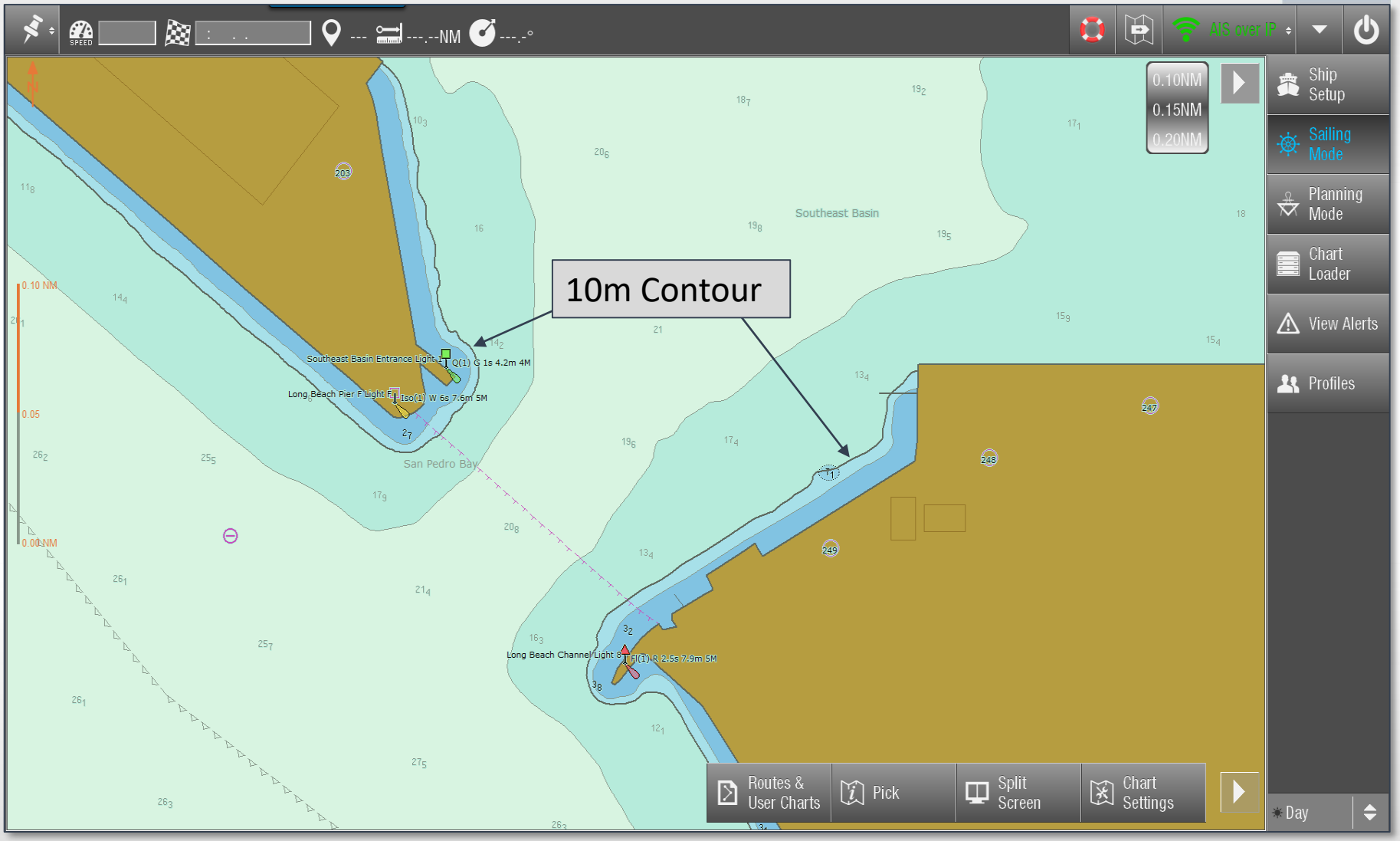
- Safe areas can be distinguished from shallow areas

Depth Contours in ENCs

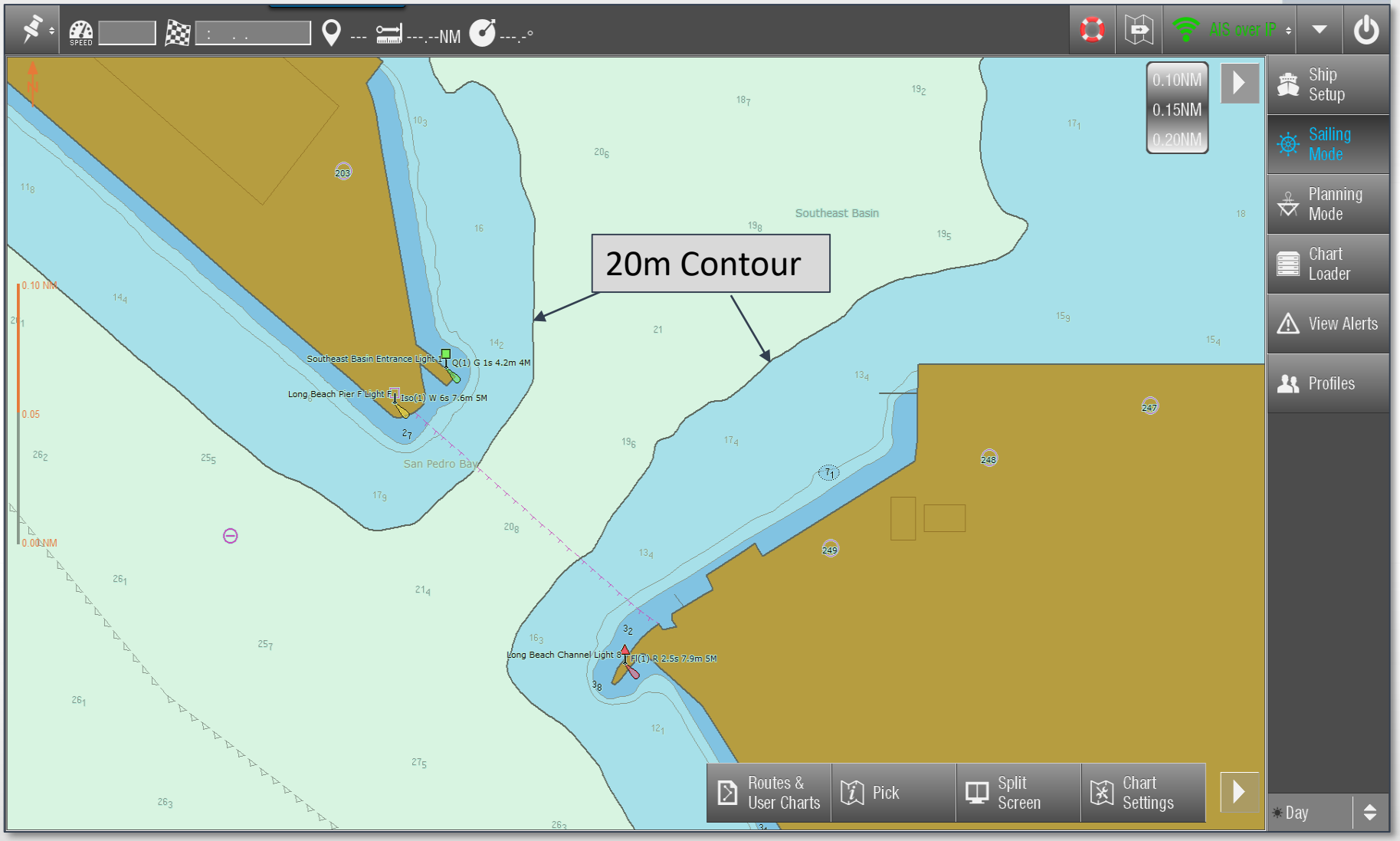
- ENCs use same contour levels as paper charts
- -2m, -1m, 0m, 2m, **5m, 10m, 20m**, 30m, 50m, …
- ECDIS safety contour display is bound to the same schema
- Hence ECDIS safety contour setting cannot always be reflected in ECDIS chart display
- This results in unused potentially navigable areas
- => ENCs should have much denser contours

Examples
Safety Depth in ECDIS

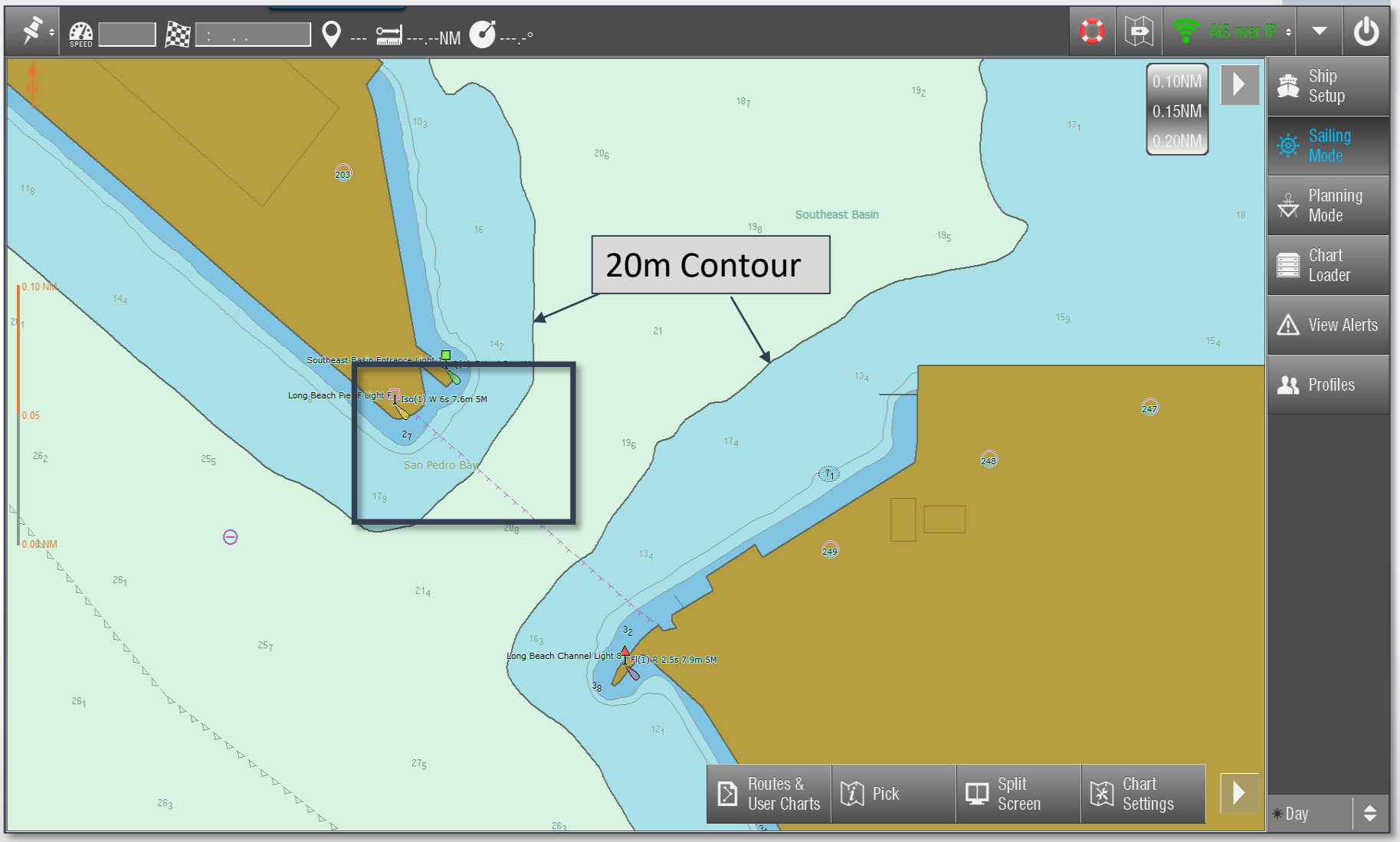
Safety Contour 10m



Safety Contour 20m

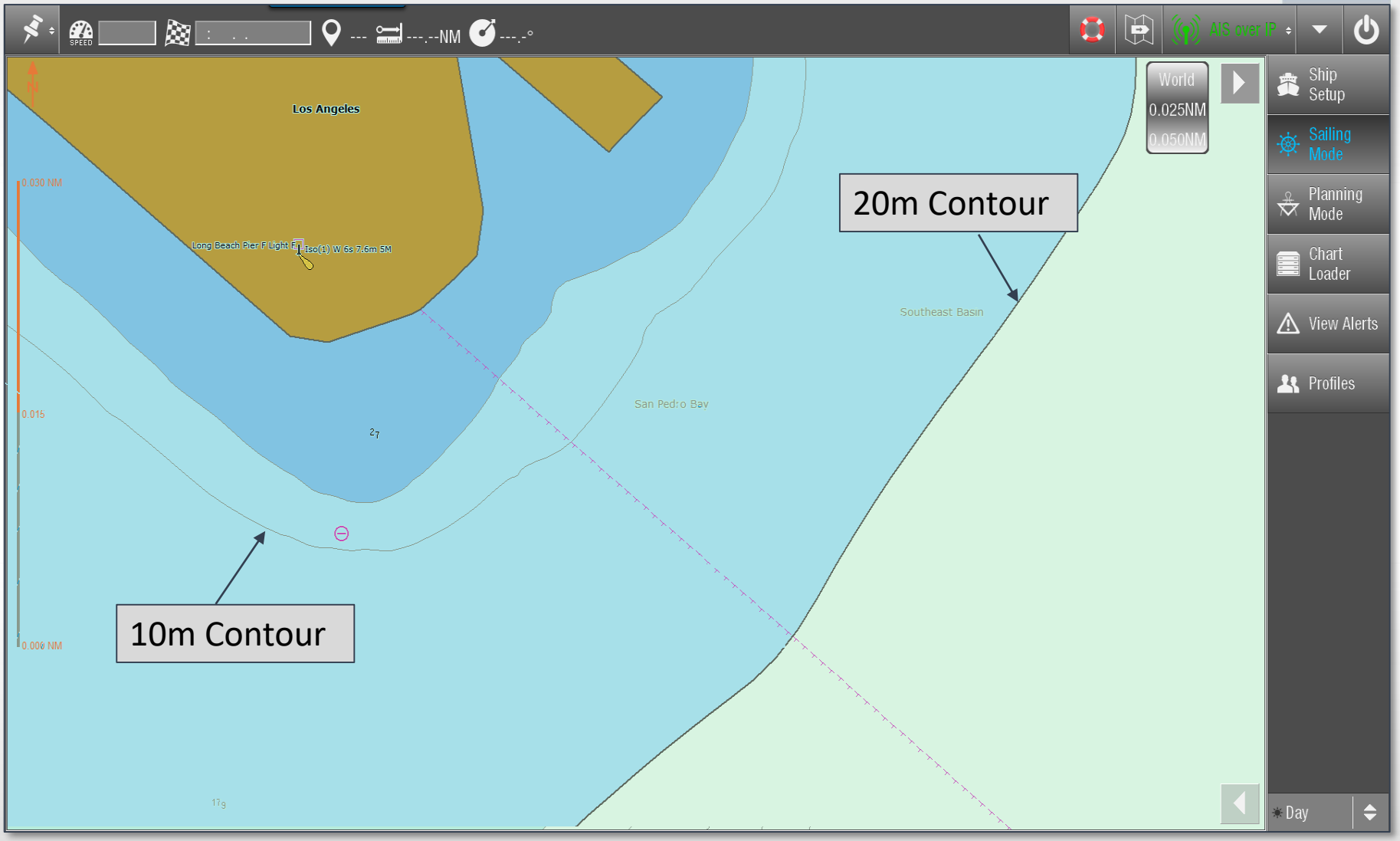


Safety Contour 11m



SevenCs Software

Safety Contour 11m



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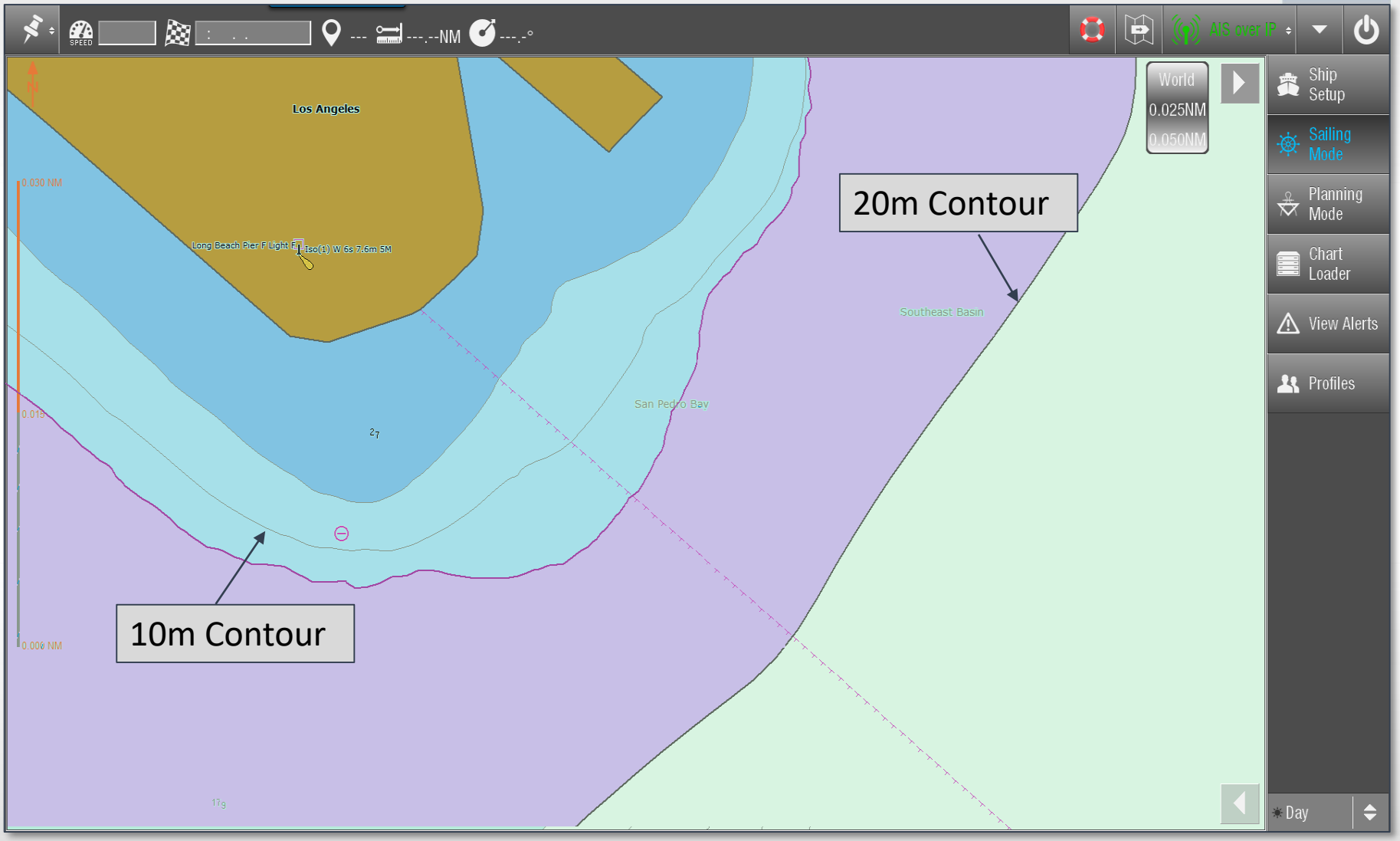
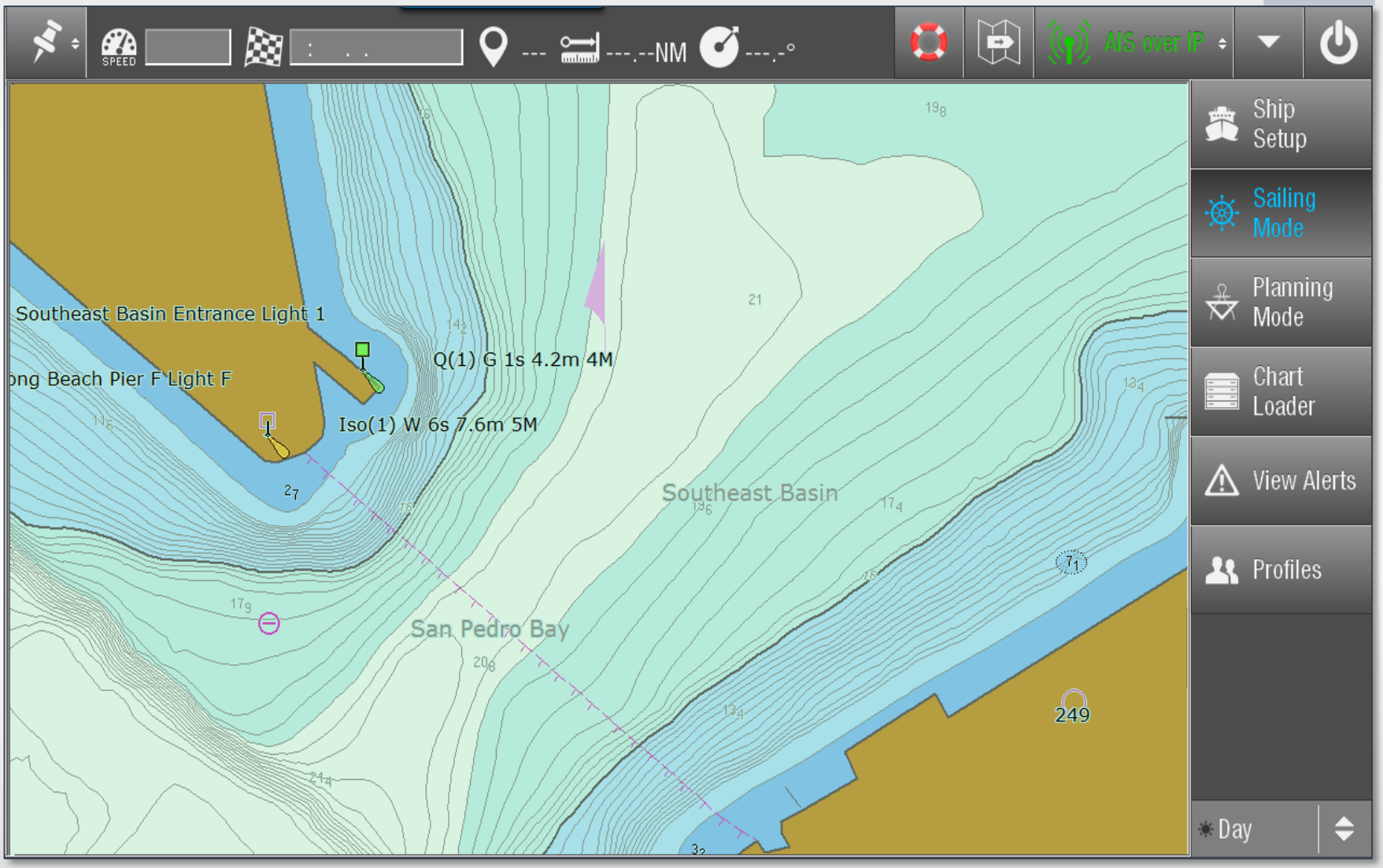
SC 11m “Lost“ Navigable Area



ENC with High Density Contours



SevenCs Software

Problems with denser contours in ENCs (?)

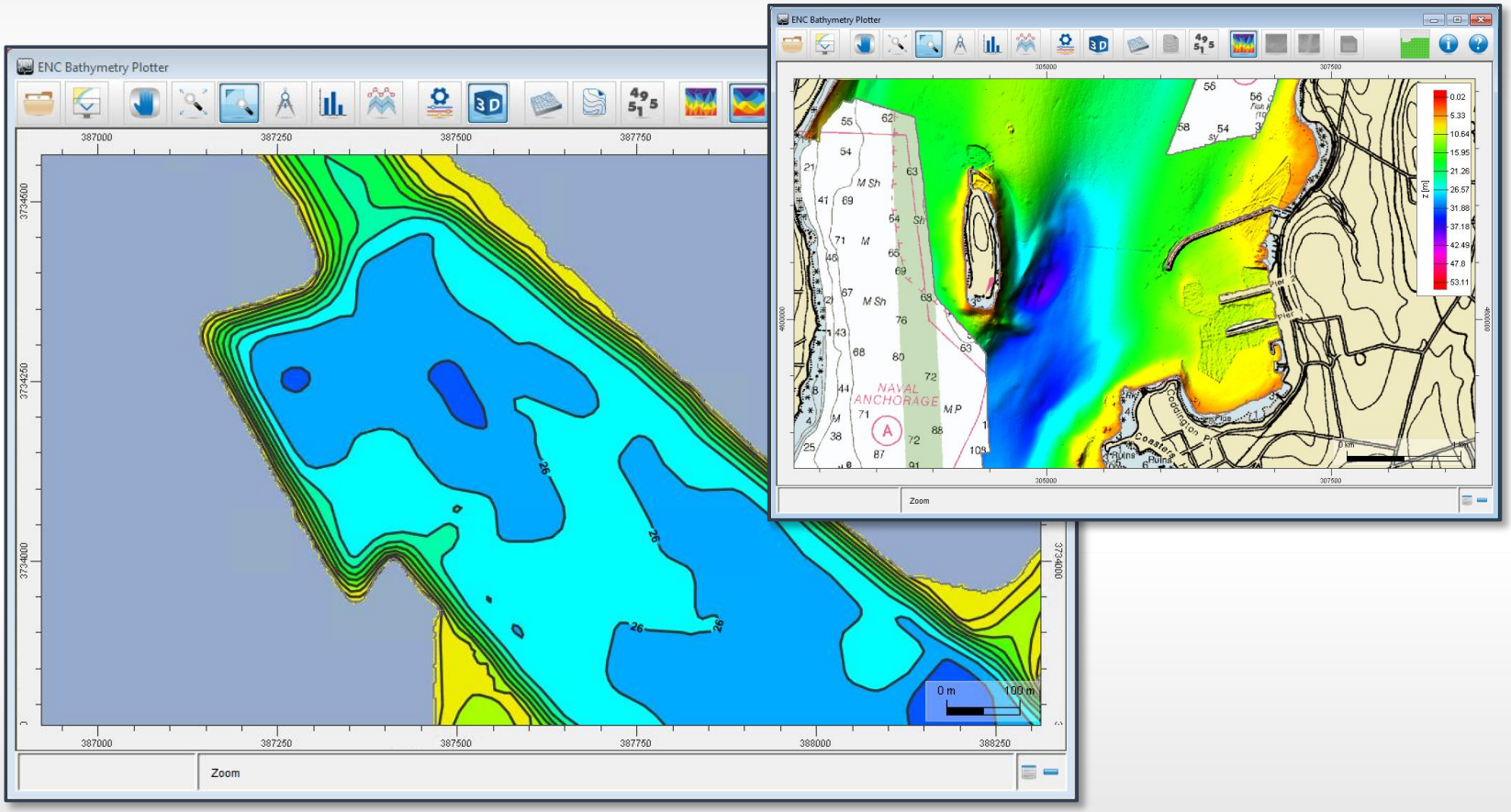
What data producers say:

- Still a lot manual work involved in contour generation
- Contour creation at small intervals can result in topological issues (line overlaps, degenerated edges)
- Potential issue with 5MB cell size limit

What SevenCs thinks:

- If issues can be solved navigation with ECDIS will become **significantly** more effective than today
- Ready solution – ENC Bathymetry Plotter

ENC Bathymetry Plotter



SevenCs Software

ENC Bathymetry Plotter

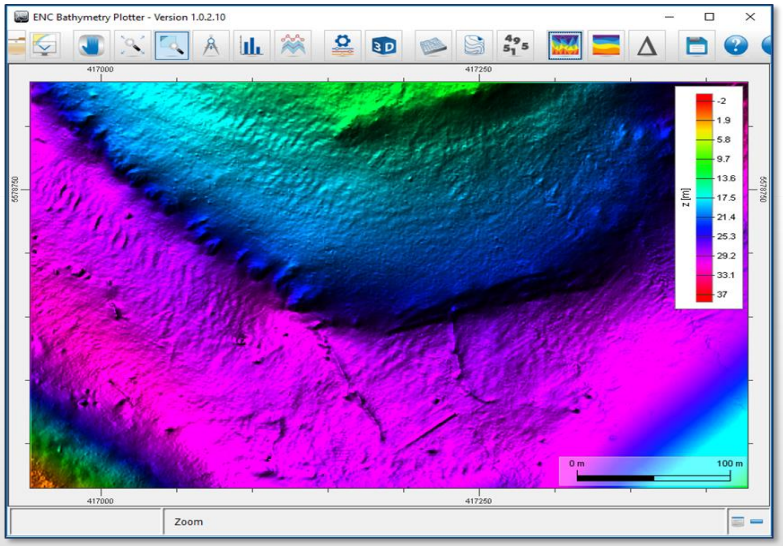
- Create contour lines and selected soundings
- for incorporation into nautical chart products
- Reads gridded bathymetry files (e.g. BAG, S-102) or xyz point clouds
- S-57 export
- First version released in July 2016

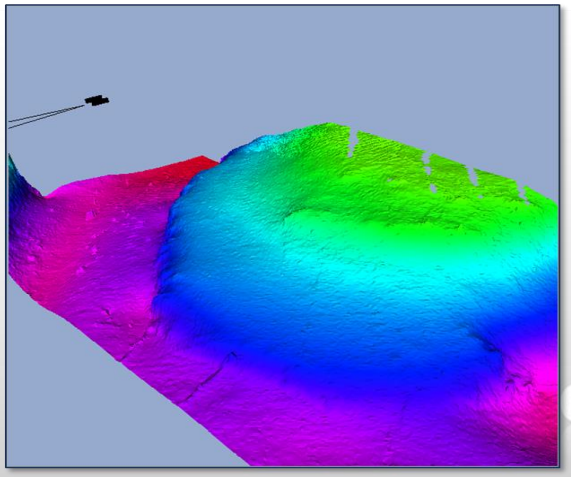
ENC Bathymetry Plotter

- Simple workflow - data import, modelling, contouring, export
- Shoal biased smoothing and generalization process
- Contours are derived from Nautical Elevation Model
- Sounding selection function
- Export to S-57 (DEPCNT, DEPARE, SOUNDG, M_COVR, M_QUAL)
- Detailed pdf summary report

Nautical Elevation Model

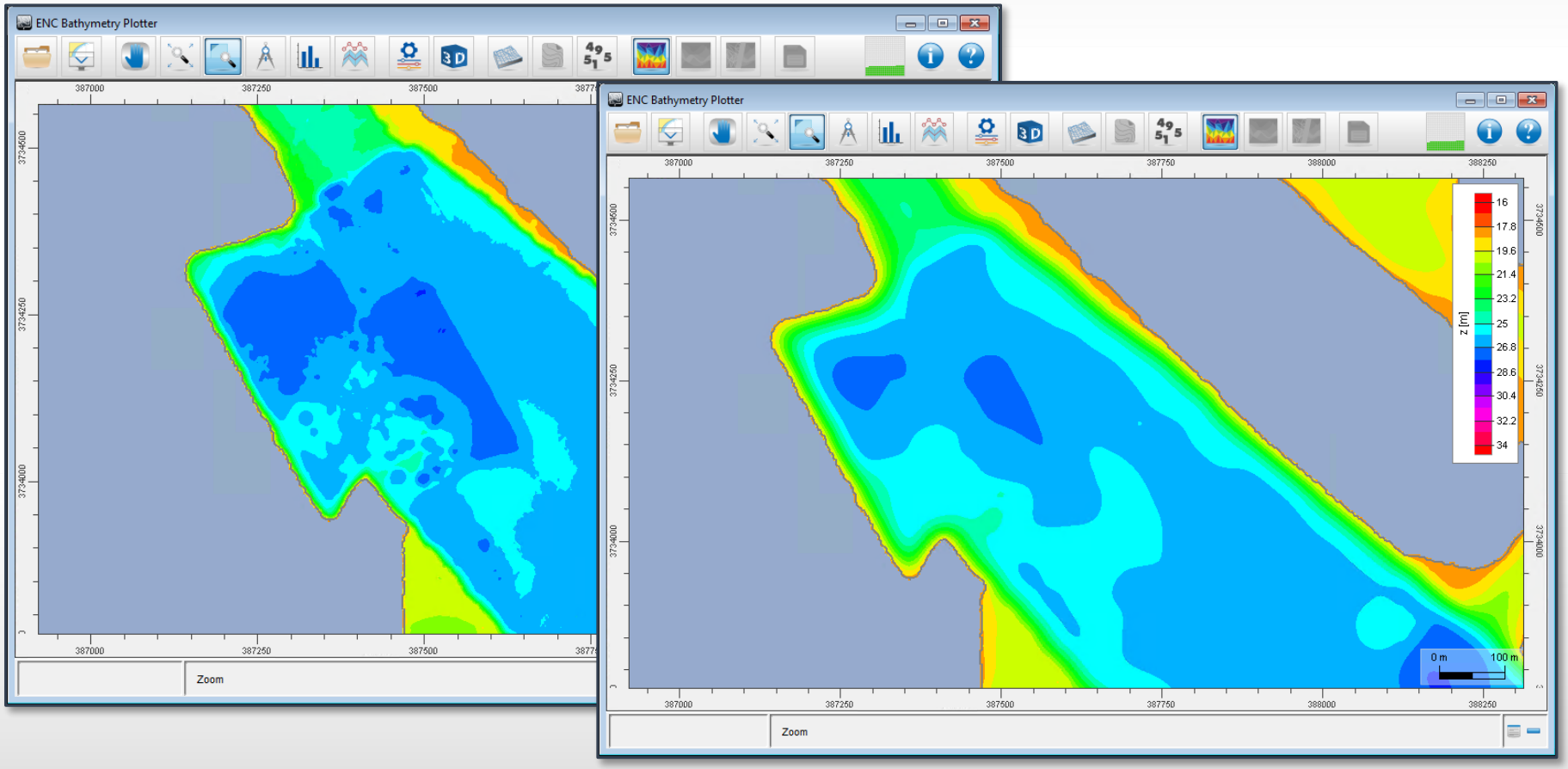
- Based on shoal biased Nautical Elevation Model
- Structured as gridded bathymetry (BAG, S-102)
- Rough source model => Nautical Elevation Model
- Analogy: draping a sheet over a rough bottom
- To some extent similar to Navigation Surface approach developed by Shep M. Smith in 2003





ENC Bathymetry Plotter – Nautical Model

- Input Model vs. Nautical Elevation Model



ENC Bathymetry Plotter – Nautical Model

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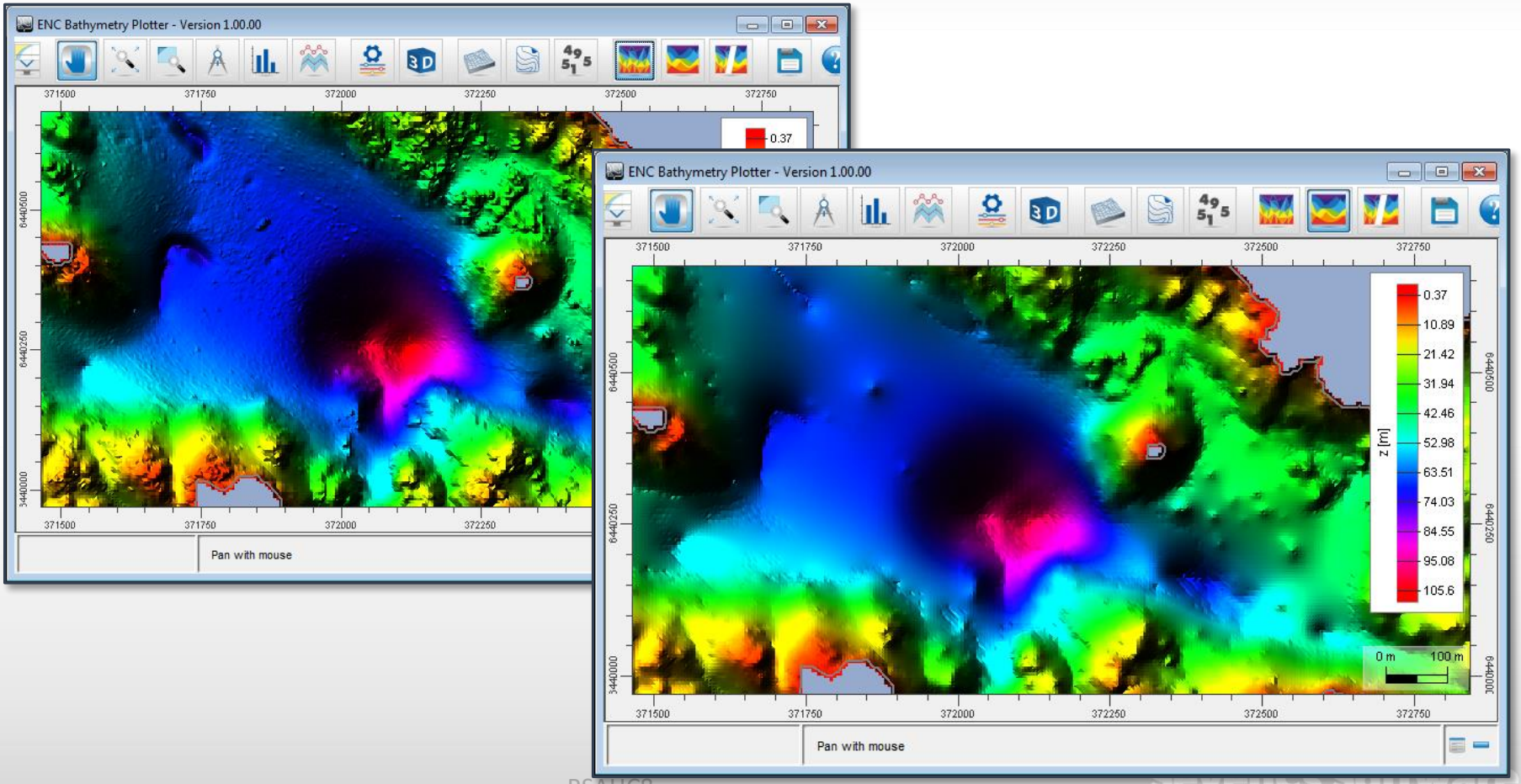
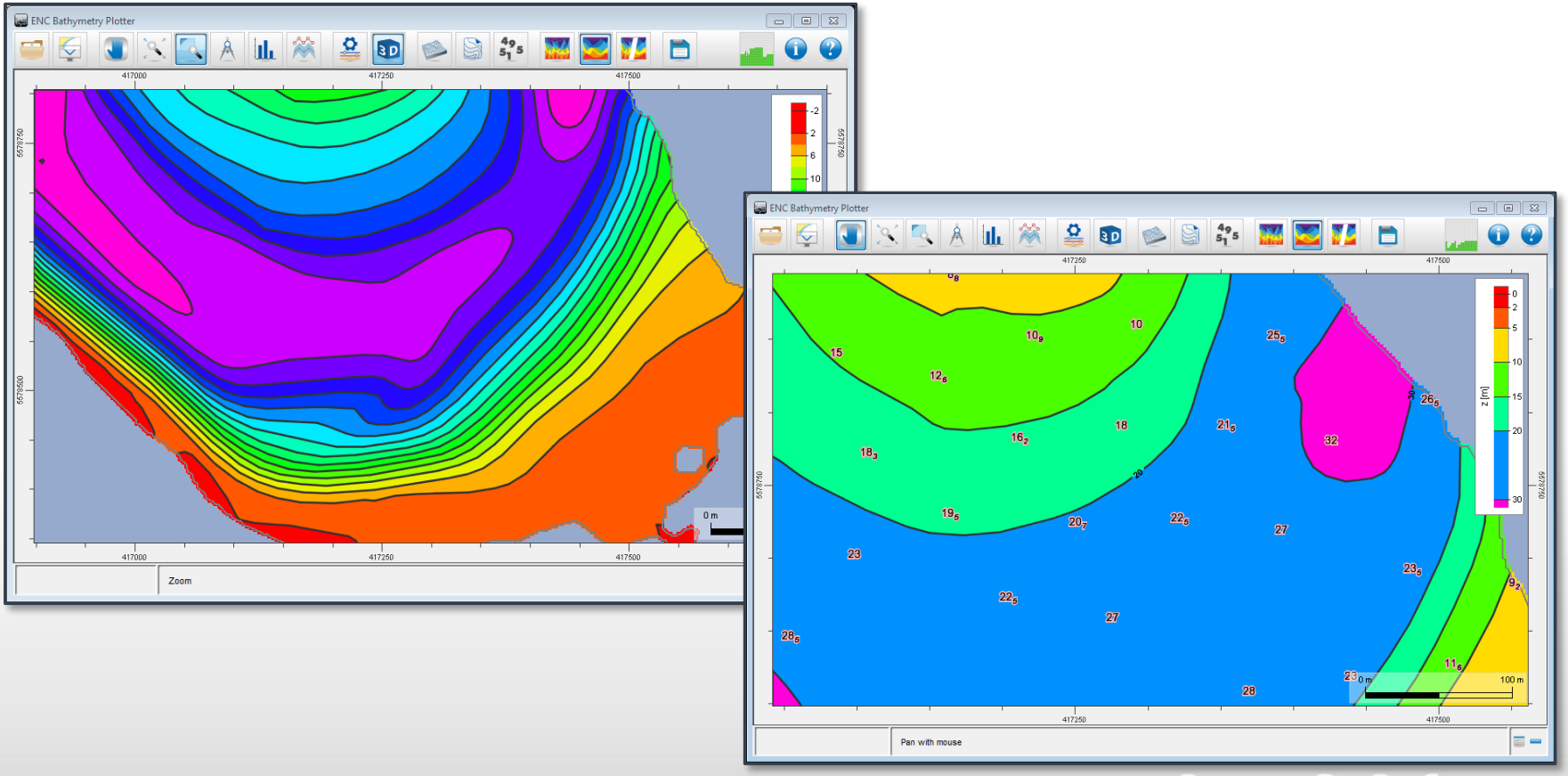


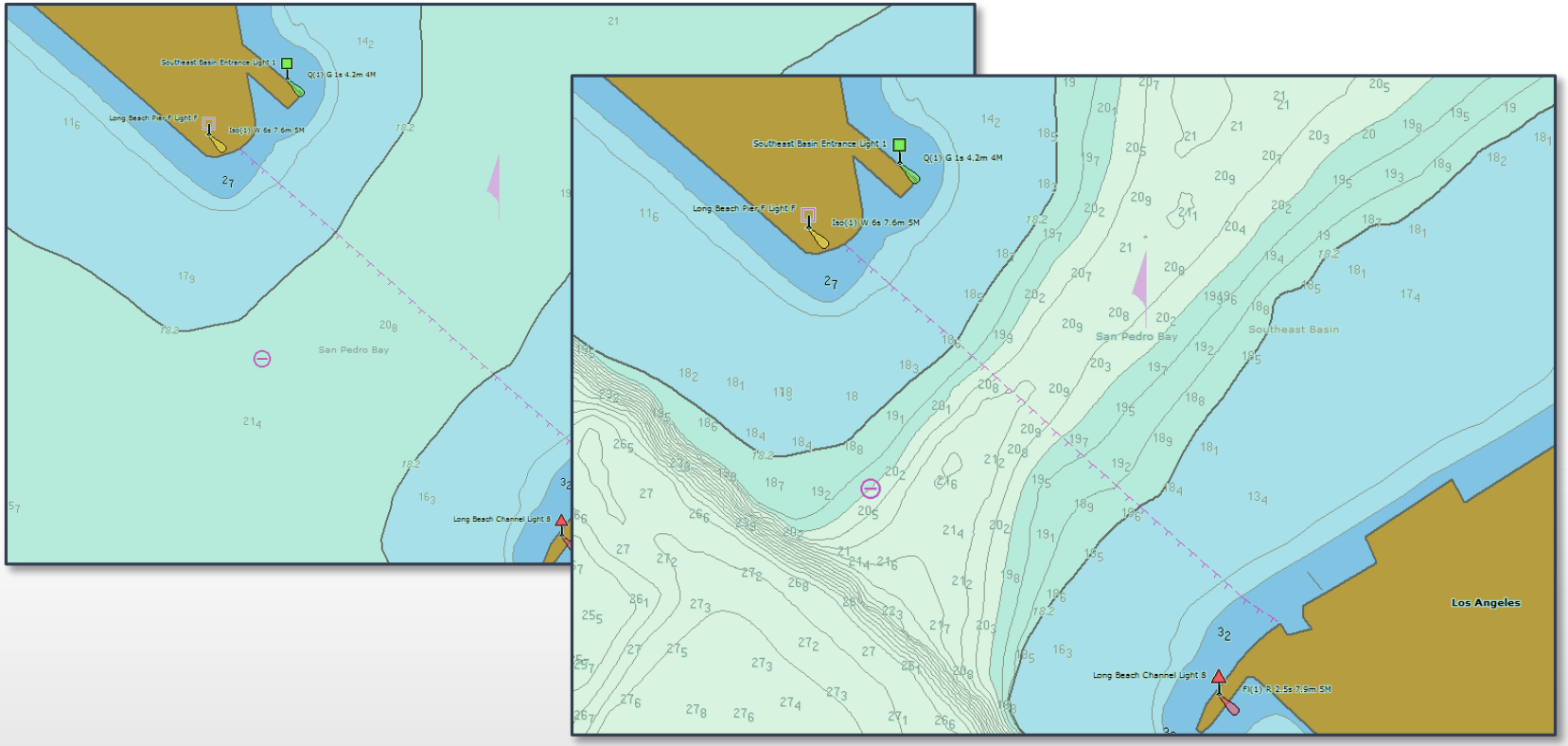
ENC Bathymetry Plotter

- Creation of contours and selected soundings

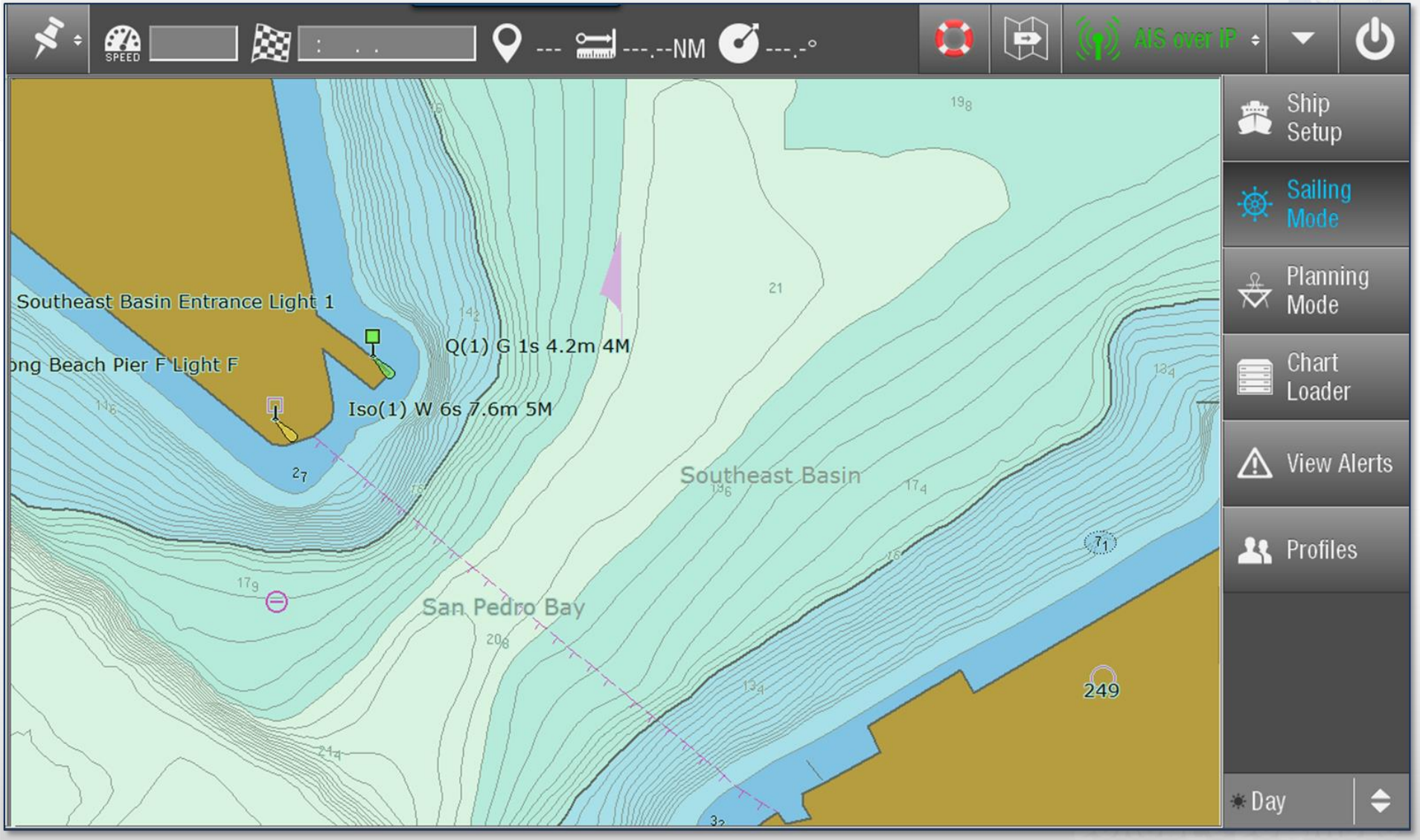


ENC Bathymetry Plotter – S-57 Export

- S-57 Export of bathymetric features



ENC with High Density Contours



Challenges moving forward

- HOs will be facing new challenges if they decide to take the step into regular production of High Density Bathymetry ENCs and also the upcoming S-100 products and standards
- Advanced technical solutions are available and will have to be implemented to cope with the new challenges.
- The introduction of S-100 based digital products will provide additional options, which SevenCs will support.

Thank you very much
for your attention

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