



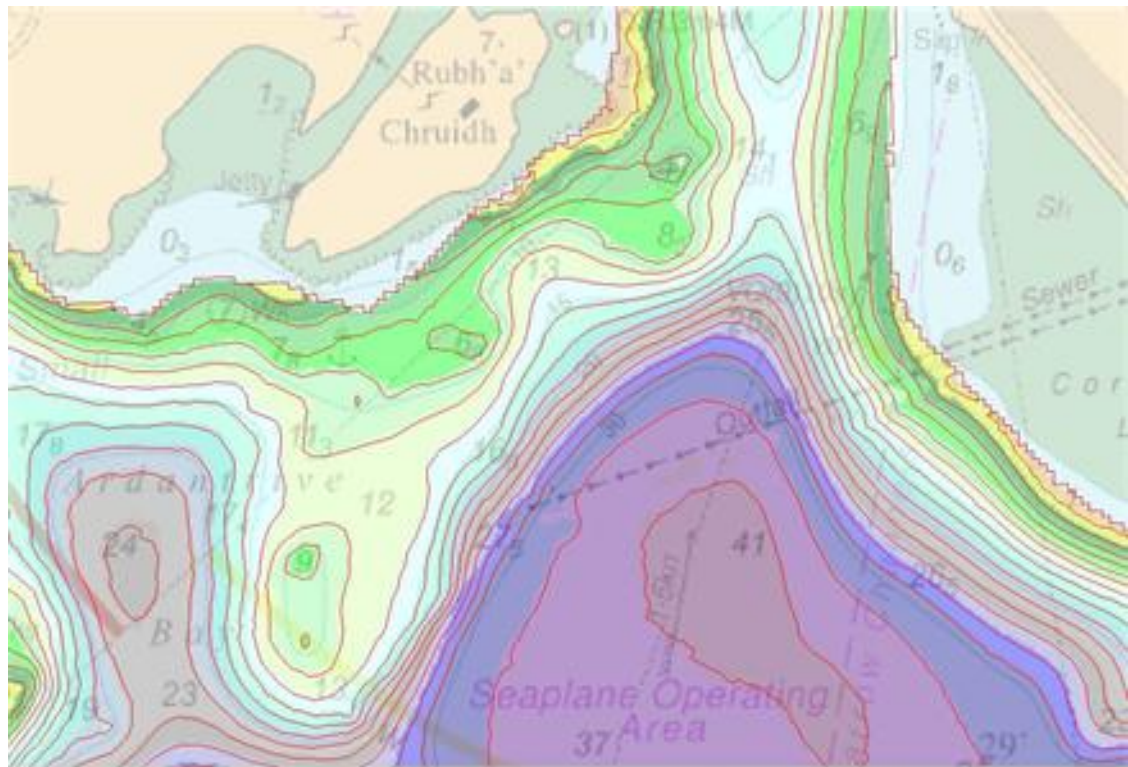
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Automated contouring algorithm

Mike Davis

Senior Data Analyst

33rd North Sea Hydrographic Commission meeting





Context

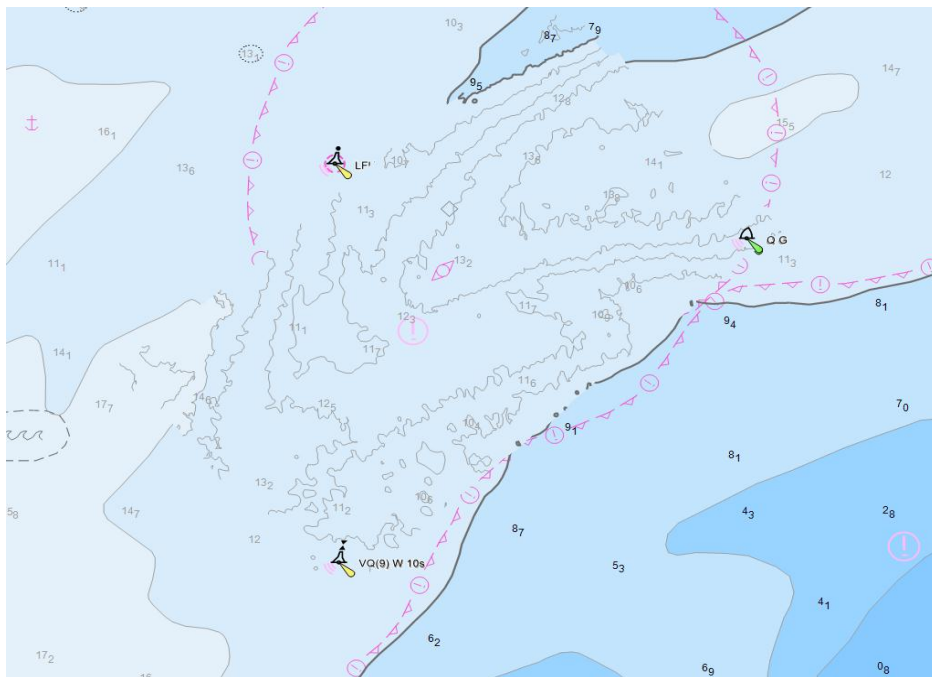
Increasing customer demand

- › More contour intervals – Safety contour
- › Speed of delivery

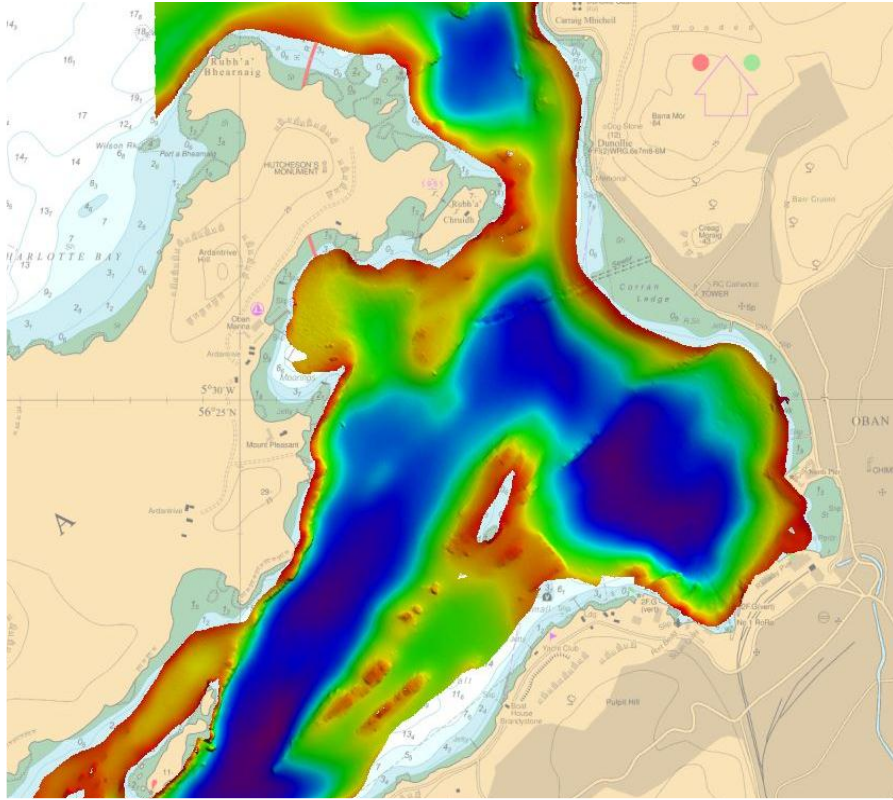
More data available

- › Autonomous surveying
- › Satellite Derived Bathymetry

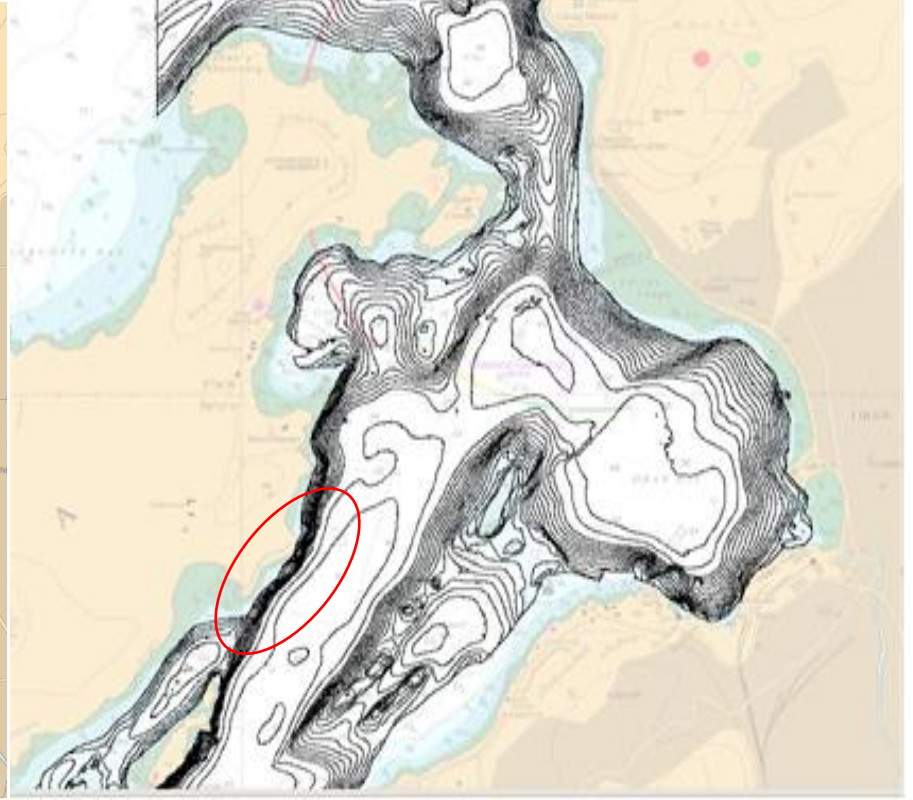
Same resourcing levels



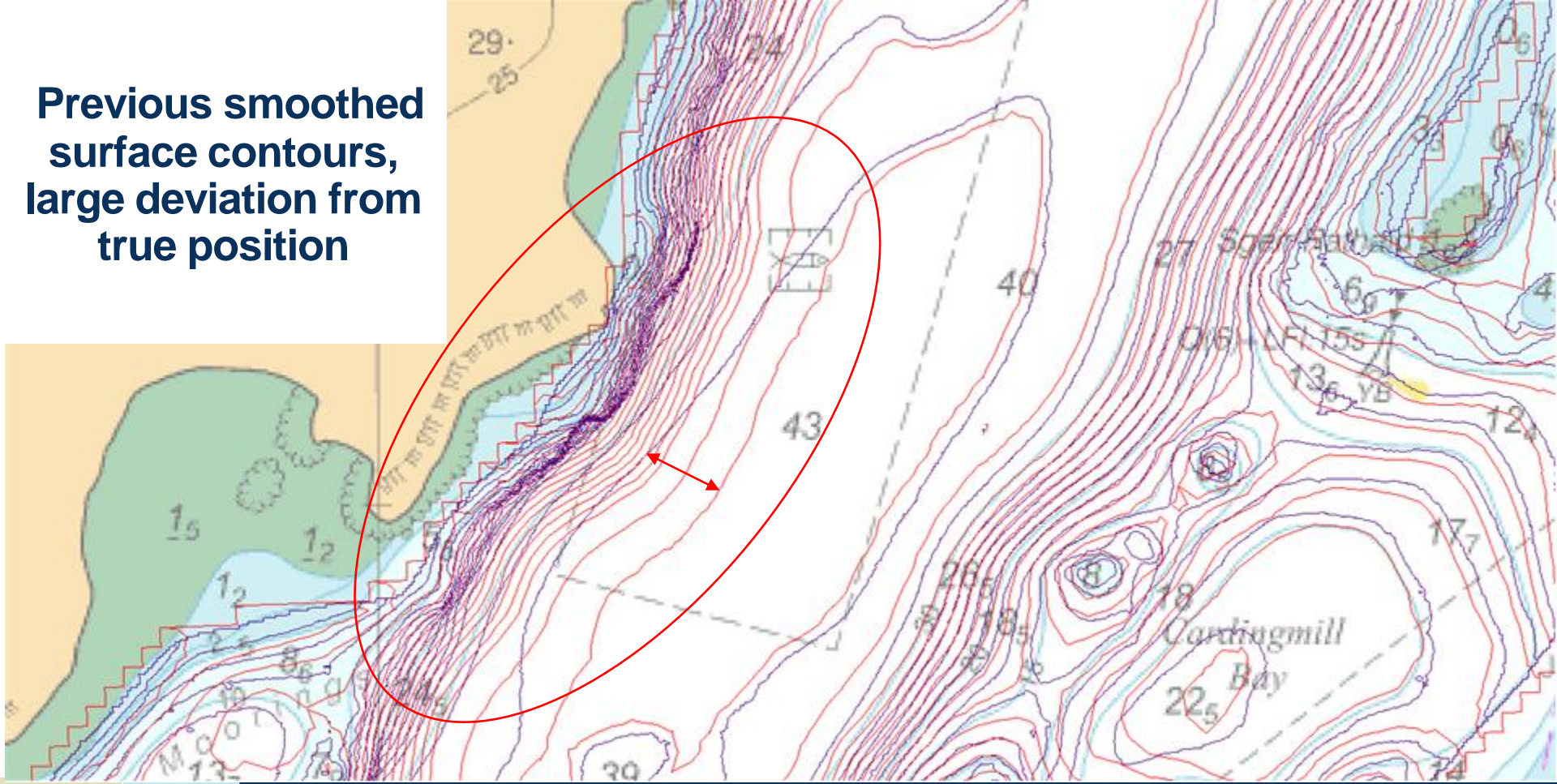
Original Smoothed Surface



Original Contours



**Previous smoothed
surface contours,
large deviation from
true position**





Analysis of new algorithm

Data Supplied to Caris

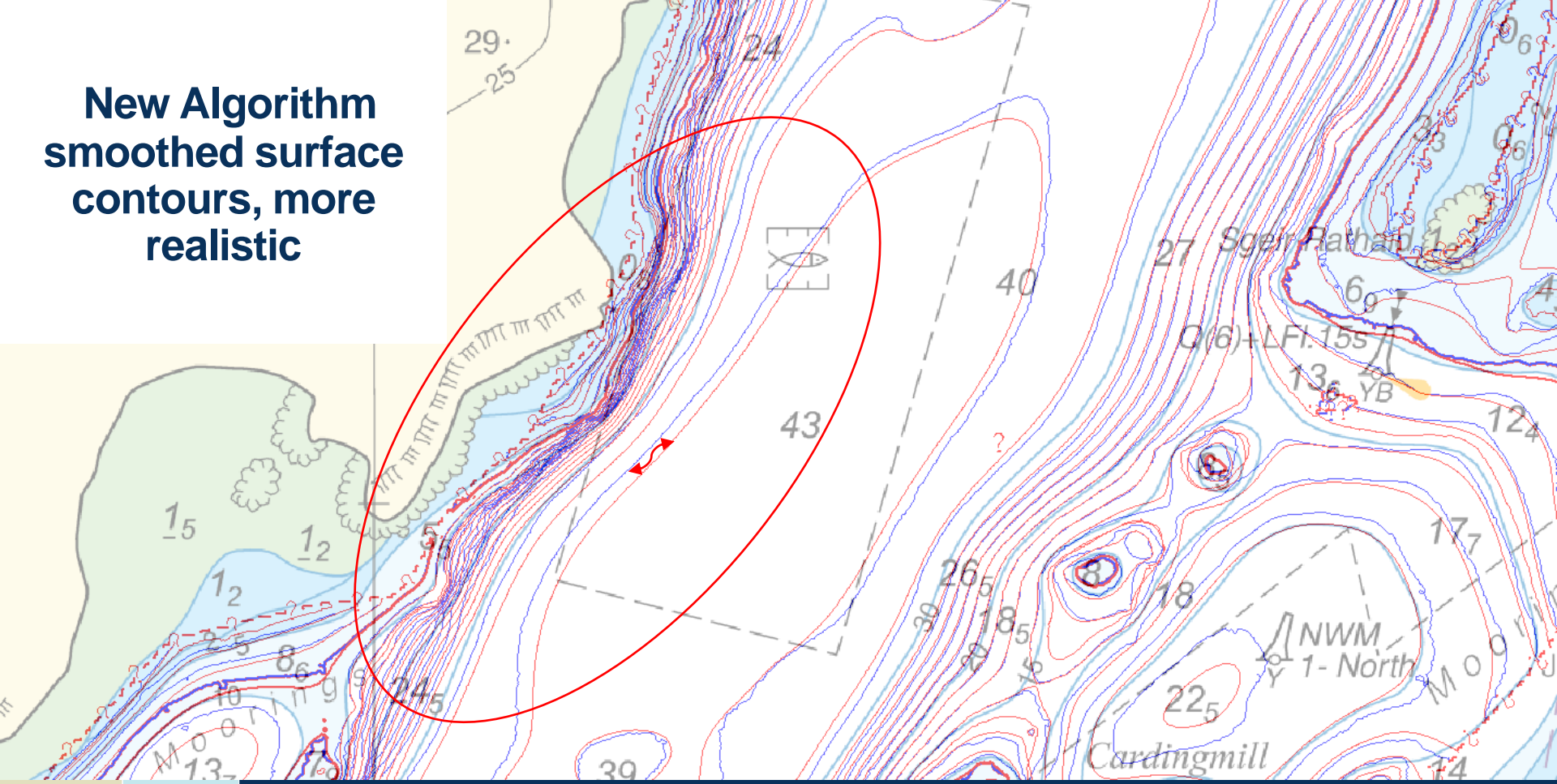
- Area of complex bathymetry (West coast of Scotland)
- Run through New algorithm (Now released in BDB 4.4.0)
- Combined Variable Resolution surface supplied back to UKHO

UKHO dual independent processing comparison

- UKHO cartographer compared automatically generated contours against human compiled contours on the same data set.
- Also compared new algorithm against existing algorithm.



**New Algorithm
smoothed surface
contours, more
realistic**



21

Previous smoothed
contour algorithm at
1:50,000

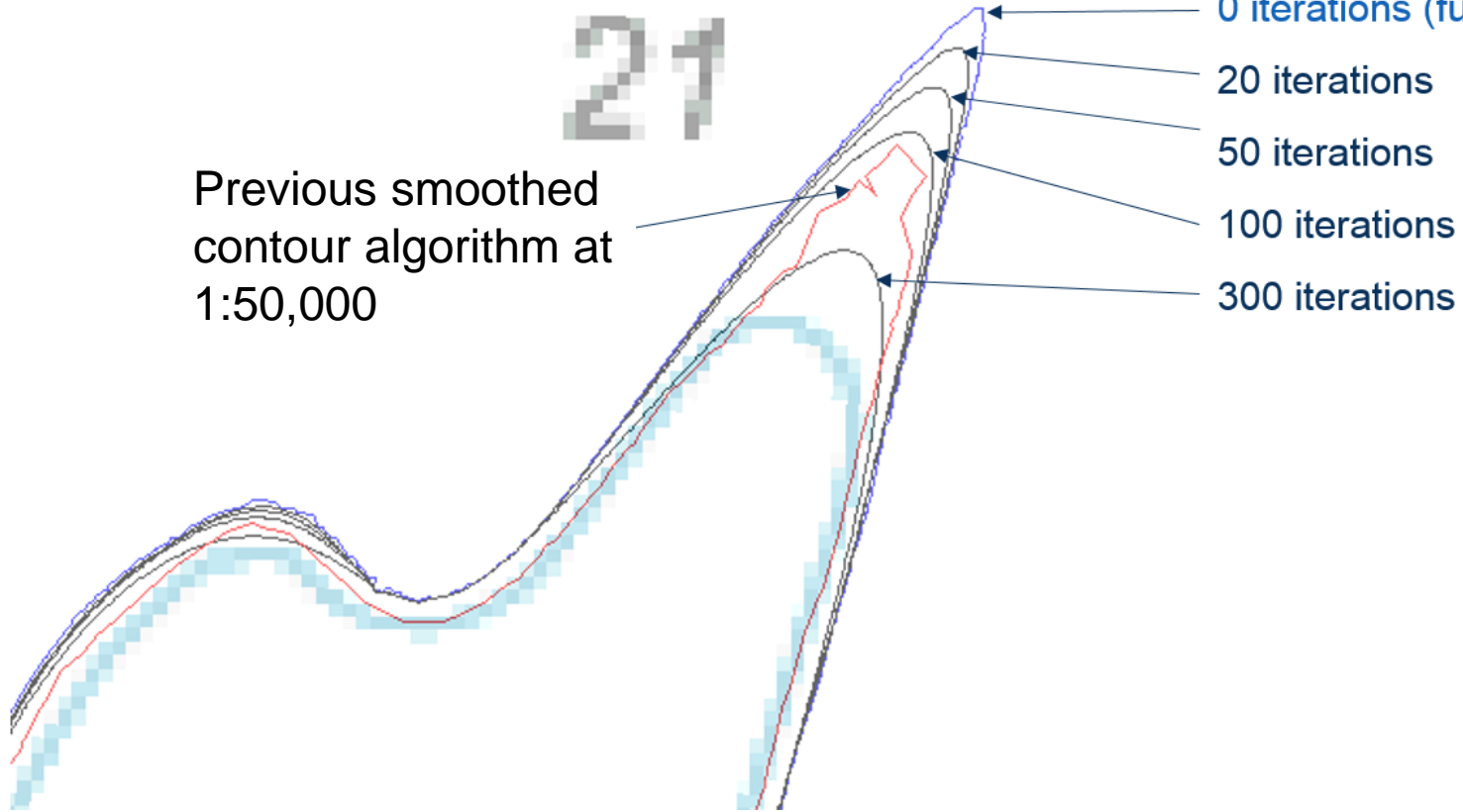
0 iterations (full resolution)

20 iterations

50 iterations

100 iterations

300 iterations

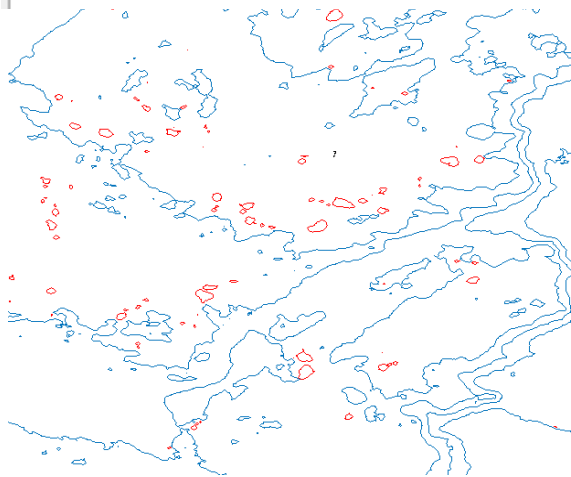




Delete small isolated deeps

Rule Description:

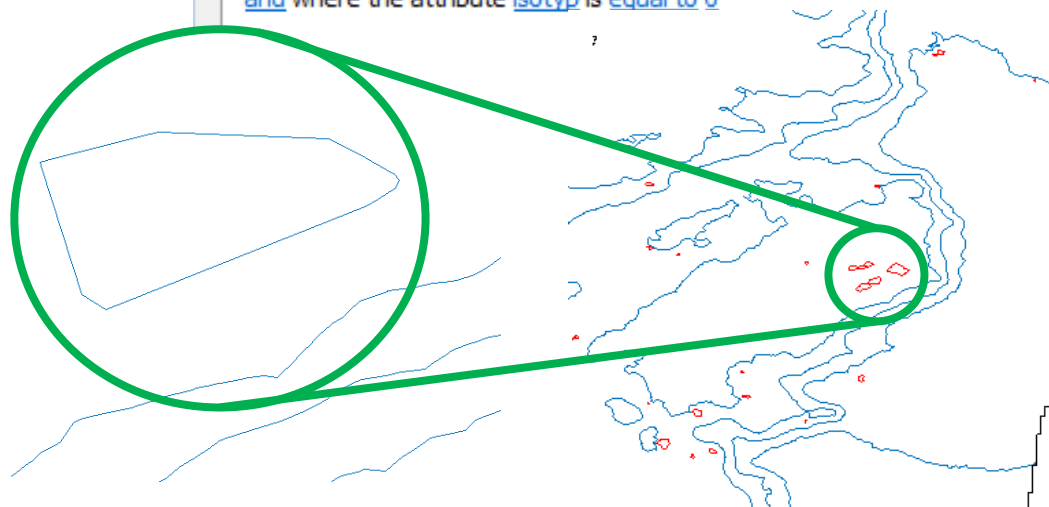
Include objects
where the perimeter is shorter than 100 metres
and where the attribute isotyp is equal to 1



Merge small isolated shoals

Rule Description:

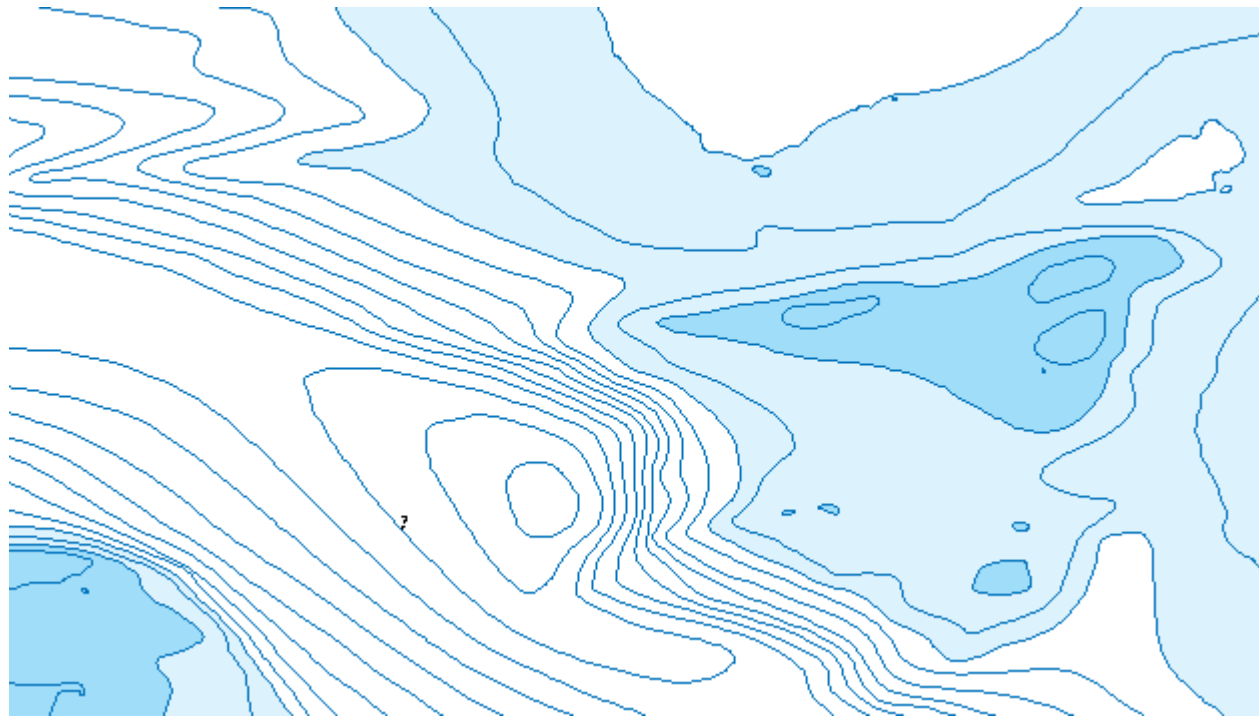
Include objects
where the perimeter is shorter than 100 metres
and where the attribute isotyp is equal to 0





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Create depth areas from contours and cut into existing data

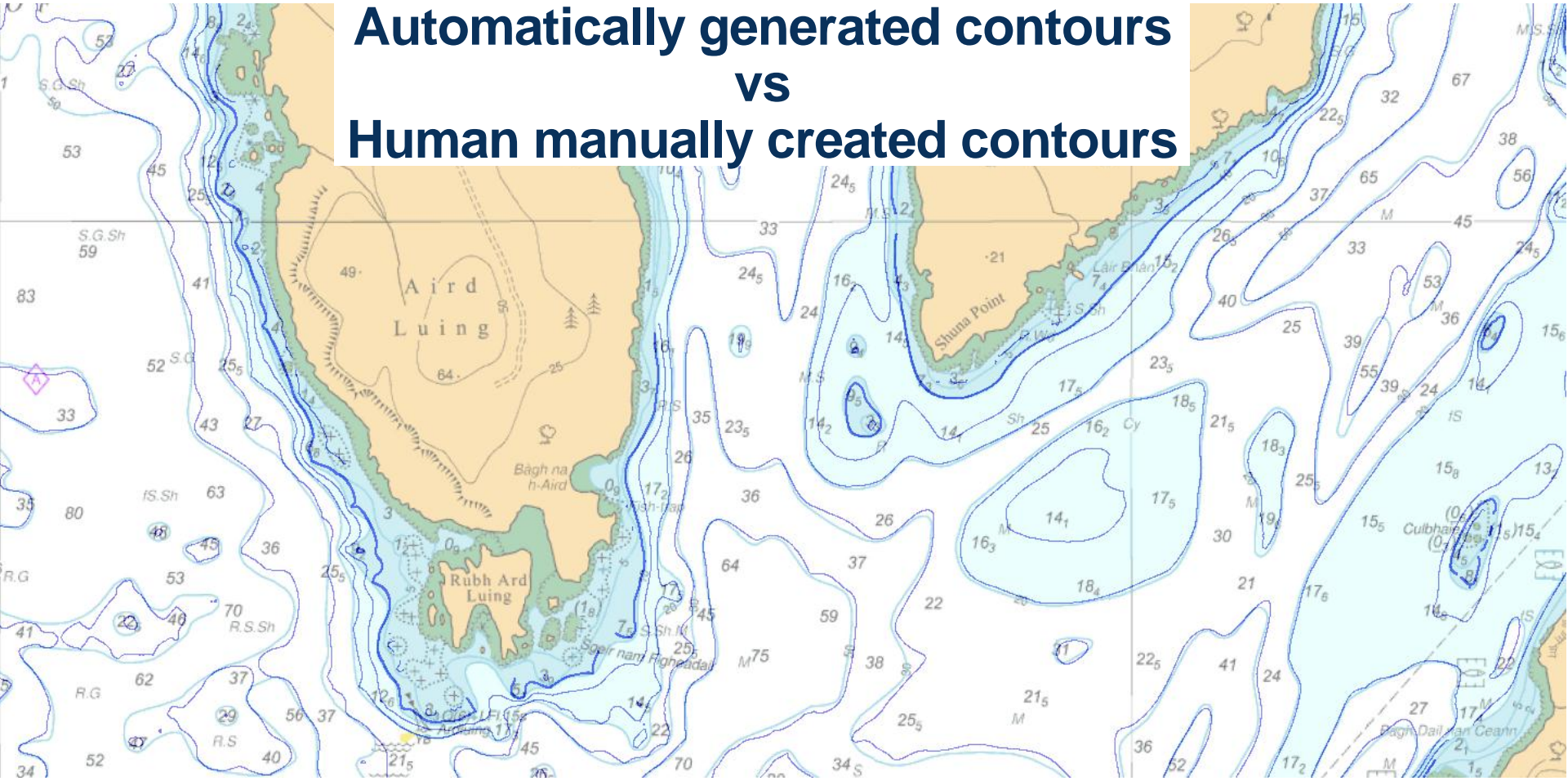




Integrate new data



Automatically generated contours VS Human manually created contours





Conclusions

New surface generalisation algorithm will significantly reduce amount of manual editing required.

- Efficiency savings, particularly in ENC compilation and database maintenance.
- Requirement to integrate new data with existing data will remain, edge matching.
- Application toward high resolution (increased contours) ENCs.

Further use required to build confidence

- Performance in different seabed morphologies, rocky areas require more iterations
- Implications on amount of verification effort if repeatable process

A Master de-conflicted surface would avoid complex cutting in process

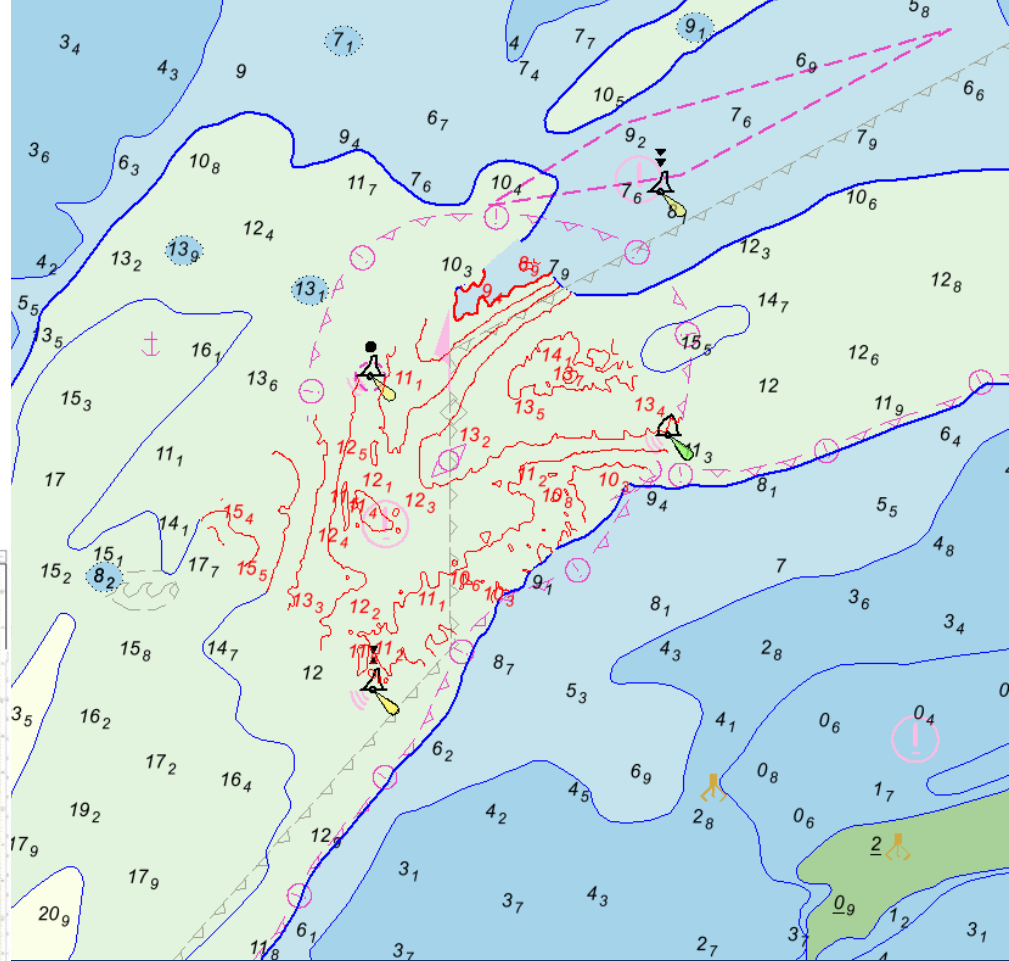
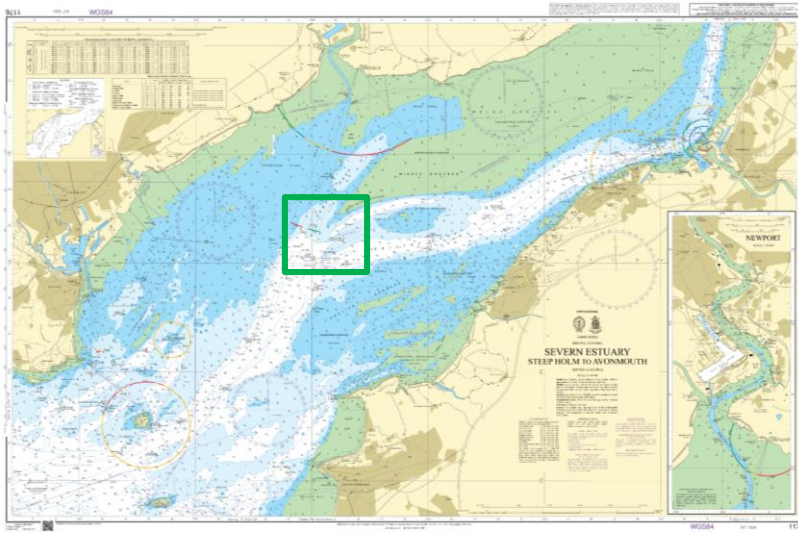
- Variable Resolution could enable this



Practical application of New Algorithm

Bristol Channel: Bridge Patch HD ENC

- 1m contours – few depths
- Embedded in Band 4 area – no edge matching
- 6 mths update - survey frequency
- Achieved 2 week turnaround from receipt of survey to ENC availability
- ENC coverage = survey limit

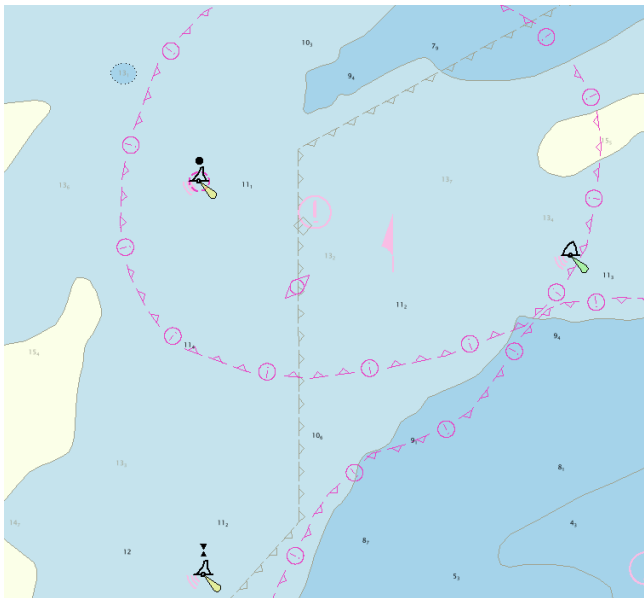




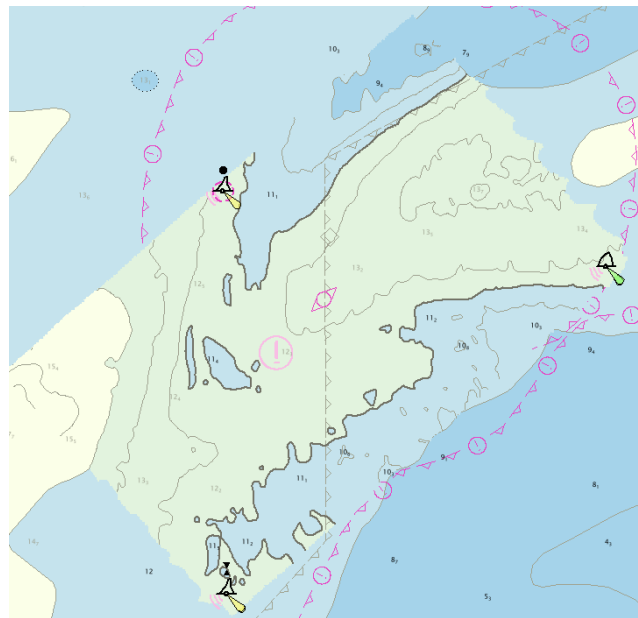
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Safety contour set at 12 metres

ECDIS without the HD Band 6 cell
– *system defaults to 15 m contour*



ECDIS with the HD Band 6 cell



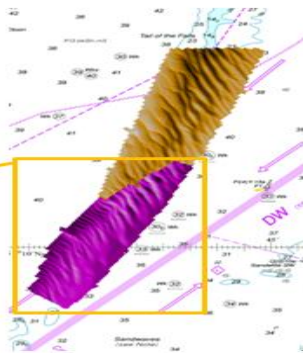
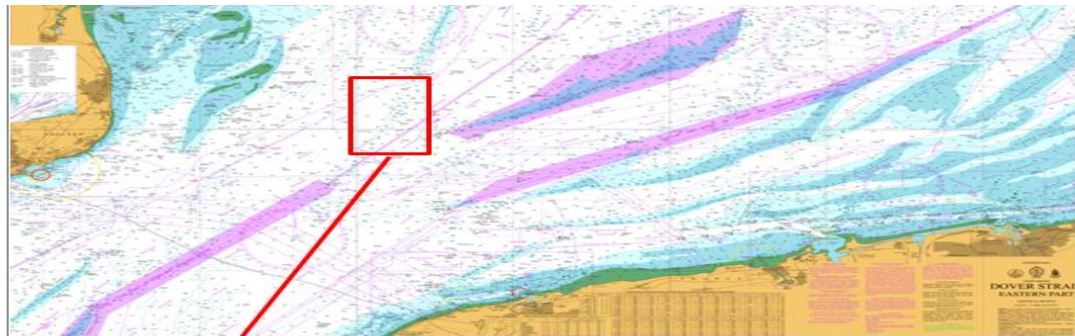


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Huge benefits for RRS

Speed up provision of data

High resolution – set more precise safety contour



Area
C3

Area
C1

Approval / Design phase

HD ENC for Dover Strait RRS is currently being tested & trialled.

First HD ENC covering area of complex hydrography

Discussed at Civil Hydrography Working Group

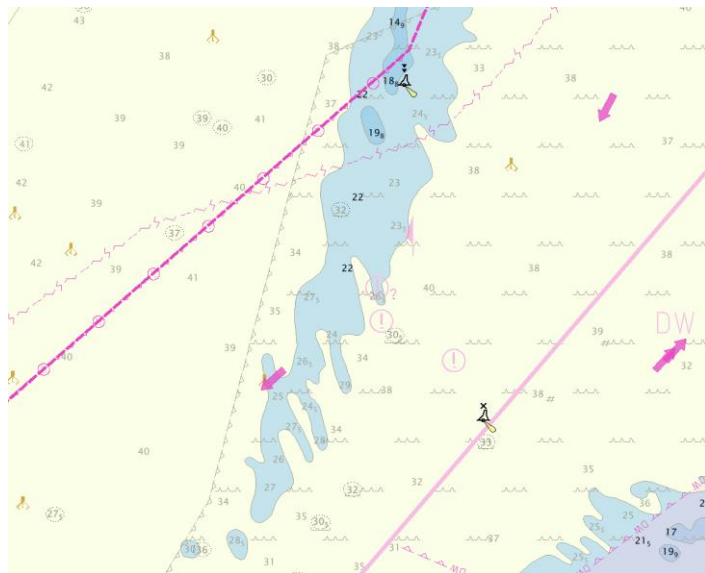




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Safety contour set at 22 metres

ECDIS Without Band 6 cell – defaults to 30 m contour



ECDIS With Band 6 cell – defaults to 22 m contour in area of cell





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Thank you

