Experiences with the integration of high density bathymetry in PPUs/ECS

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Overview

- Vector bathymetry
- Example bENC
- Gridded bathymetry
- Aspects of integration with ENCs

Vector bathymetry

Representations of high density bathymetry

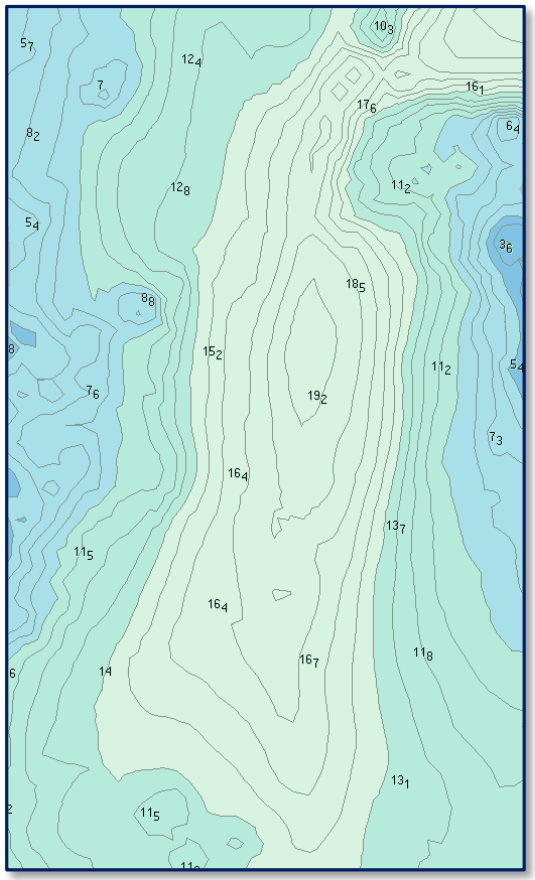
Vector bathymetry

- points, lines, areas
- CAD formats, xyz data
- S-57 Contour Line Bathymetry (AML)
- ENC, S-57 bathymetric ENCs

Experiences with bathymetric ENCs

- **S-57 based bathymetry layers**
- **Well established in Germany**
- **Produced by relevant authorities**
- **Frequent update cycles**
- **Used by pilots in PPUs**

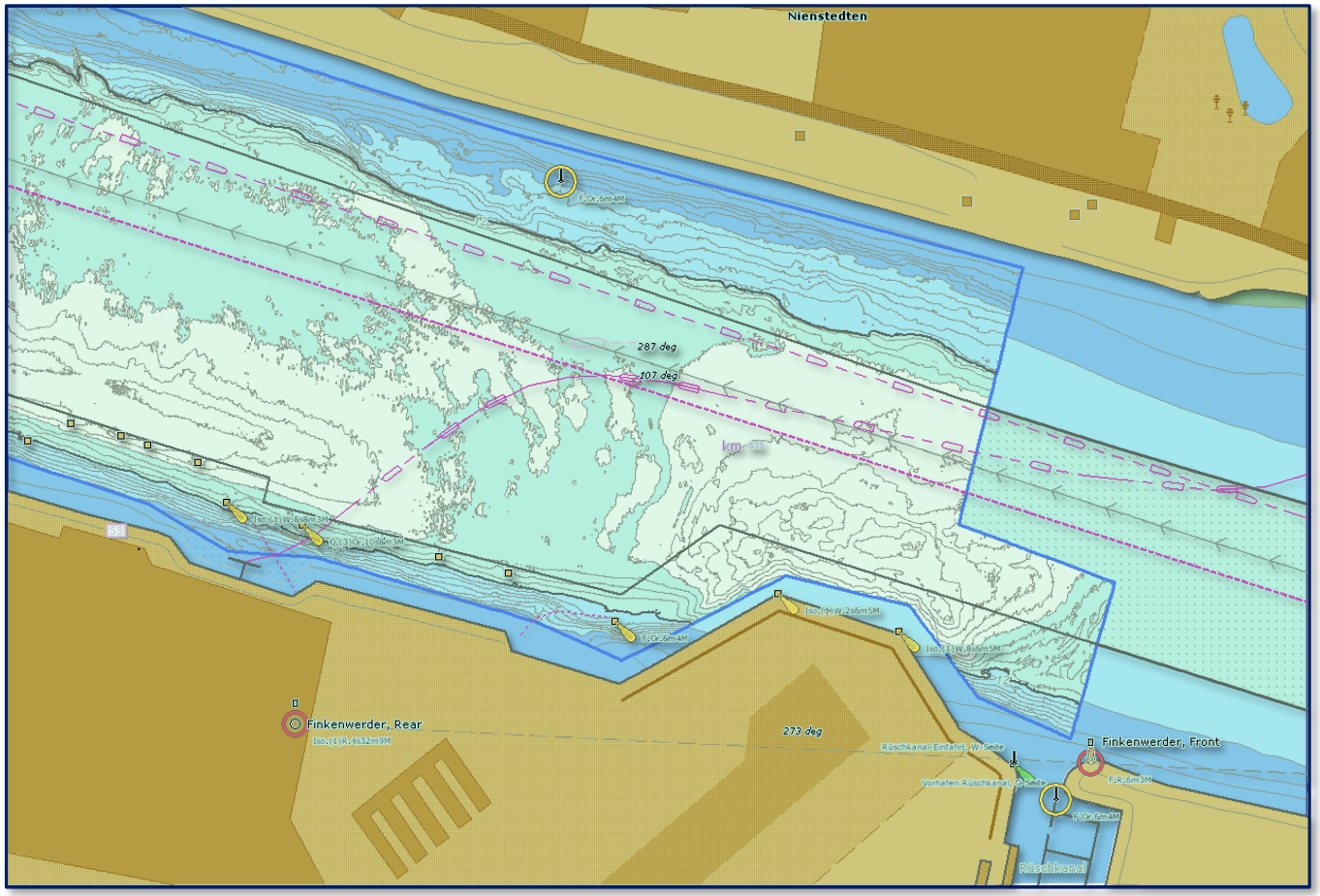
Experiences with bathymetric ENCs



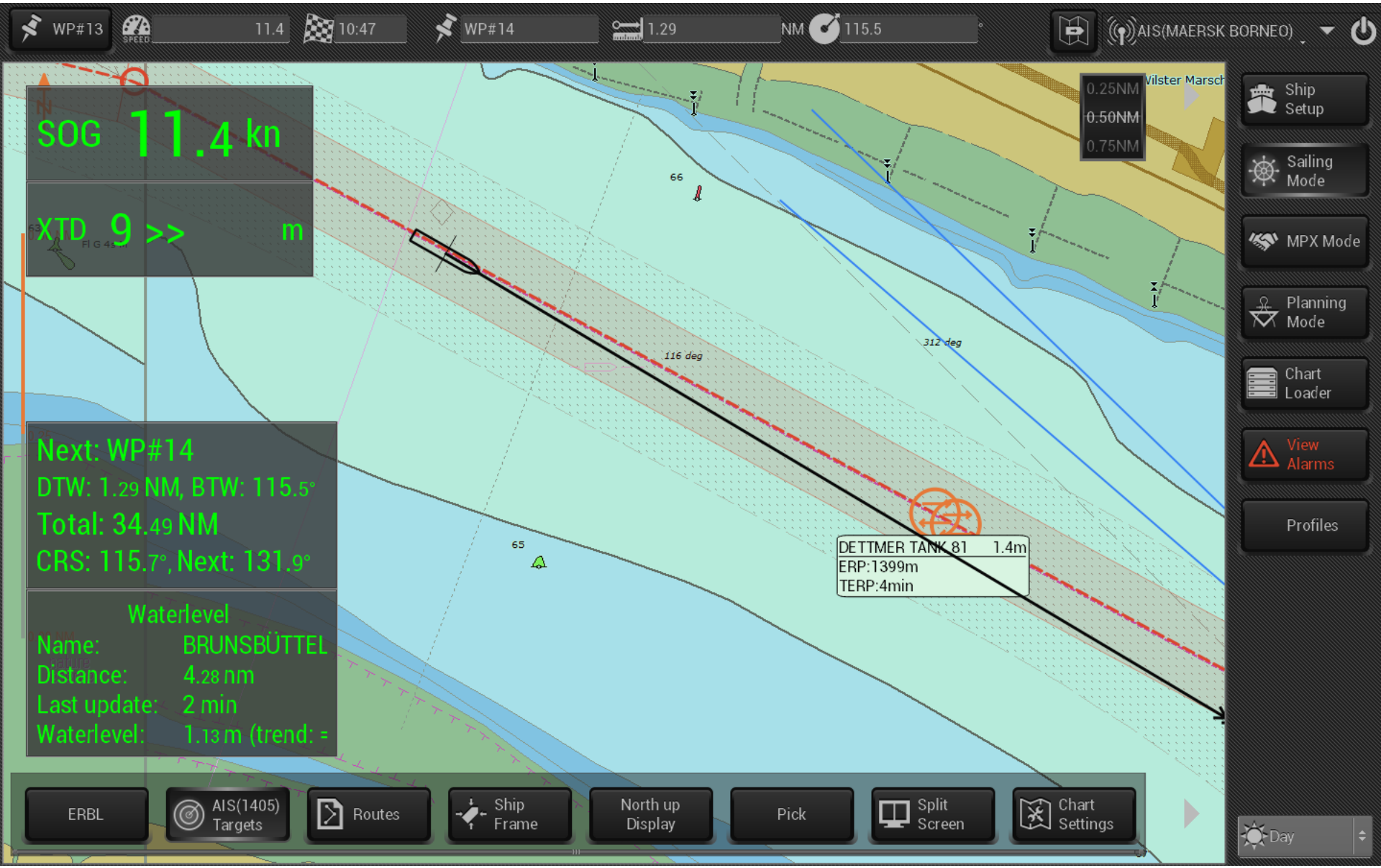
bENC with contour lines and spot soundings.

Integration of bathymetric ENCs in PPU Display

Import of bENC



Use of bENCs in PPU software


WP#13
11.4
10:47
WP#14
1.29
NM
115.5
AIS(MAERSK BORNEO)
SOG 11.4 kn
XTD 9 >> m
0.25NM
0.50NM
0.75NM
Ship Setup
Sailing Mode
MPX Mode
Planning Mode
Chart Loader
View Alarms
Profiles
66
65
116 deg
312 deg
DETTMER TANK 81 1.4m
ERP:1399m
TERP:4min
Next: WP#14
DTW: 1.29 NM, BTW: 115.5°
Total: 34.49 NM
CRS: 115.7°, Next: 131.9°
Waterlevel
Name: BRUNSBÜTTEL
Distance: 4.28 nm
Last update: 2 min
Waterlevel: 1.13 m (trend: =
ERBL
AIS(1405) Targets
Routes
Ship Frame
North up Display
Pick
Split Screen
Chart Settings
Day

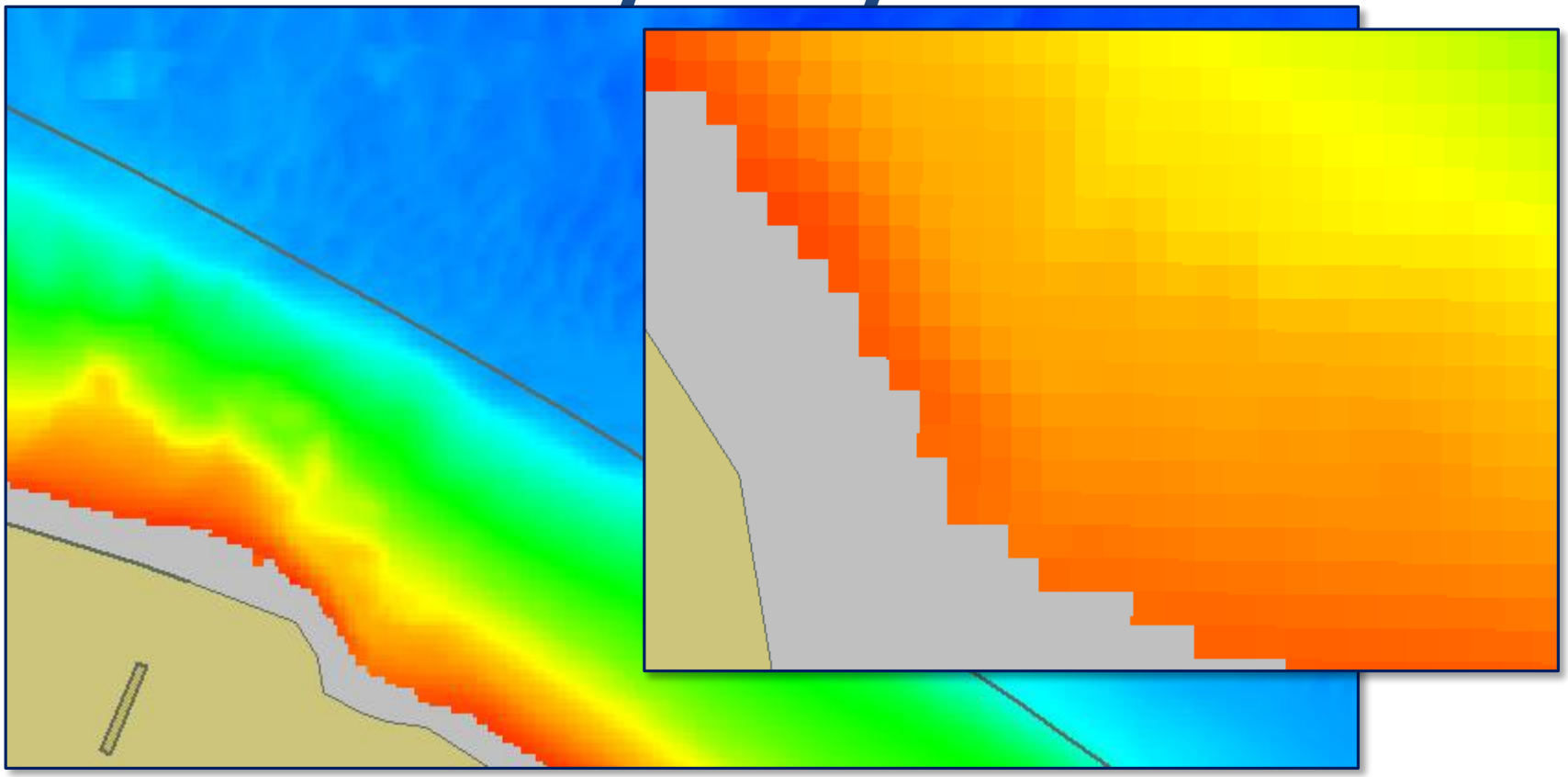

WP#13
11.5
10:47
WP#14
1.21
NM
115.4
AIS(MAERSK BORNEO)
SOG 11.5 kn
XTD 12 >> m
Next: WP#14
DTW: 1.21 NM, BTW: 115.4°
Total: 34.41 NM
CRS: 115.7°, Next: 131.9°
Waterlevel
Name: BRUNSBÜTTEL
Distance: 4.36 nm
Last update: 3 min
Waterlevel: 1.13 m (trend: =
0.25NM
0.50NM
0.75NM
116 deg
312 deg
DETTMER TANK 81 1.4m
ERP:1262m
TERP:4min
Ship Setup
Sailing Mode
MPX Mode
Planning Mode
Chart Loader
View Alarms
Profiles
ERBL
AIS(1405) Targets
Routes
Ship Frame
North up Display
Pick
Split Screen
Chart Settings
Day


WP#13
11.5
10:47
WP#15
1.73
NM
130.6
AIS(MAERSK BORNEO)
SOG 11.5 kn
XTD 74 >> m
Next: WP#15
DTW: 1.73 NM, BTW: 130.6°
Total: 32.28 NM
CRS: 131.9°, Next: 146.2°
Waterlevel
Name: BRUNSBÜTTEL
Distance: 6.38 nm
Last update: 4 min
Waterlevel: 1.35 m (trend: =
0.20NM
0.25NM
0.50NM
Ship Setup
Sailing Mode
MPX Mode
Planning Mode
Chart Loader
View Alarms
Profiles
ERBL
AIS(1405) Targets
Routes
Ship Frame
North up Display
Pick
Split Screen
Chart Settings
Day
69/Reede
Fl(1) G 4s


WP#13
11.4
10:47
WP#15
1.66
NM
130.5
AIS(MAERSK BORNEO)
SOG 11.4 kn
XTD 74 >> m
Chart depths include +4.0 m manual offset
Watchdog waterlevel offset: 4.00 m
0.20NM
0.25NM
0.50NM
Ship Setup
Sailing Mode
MPX Mode
Planning Mode
Chart Loader
View Alarms
Profiles
Next: WP#15
DTW: 1.66 NM, BTW: 130.5°
Total: 32.21 NM
CRS: 131.9°, Next: 146.2°
Waterlevel
Name: BRUNSBÜTTEL
Distance: 6.44 nm
Last update: 2 min
Waterlevel: 1.40 m (trend: +
132 deg
69/Reede
Fl(1) G 4s
ERBL
AIS(1407) Targets
Routes
Ship Frame
North up Display
Pick
Split Screen
Chart Settings
Day

Representations of high density bathymetry

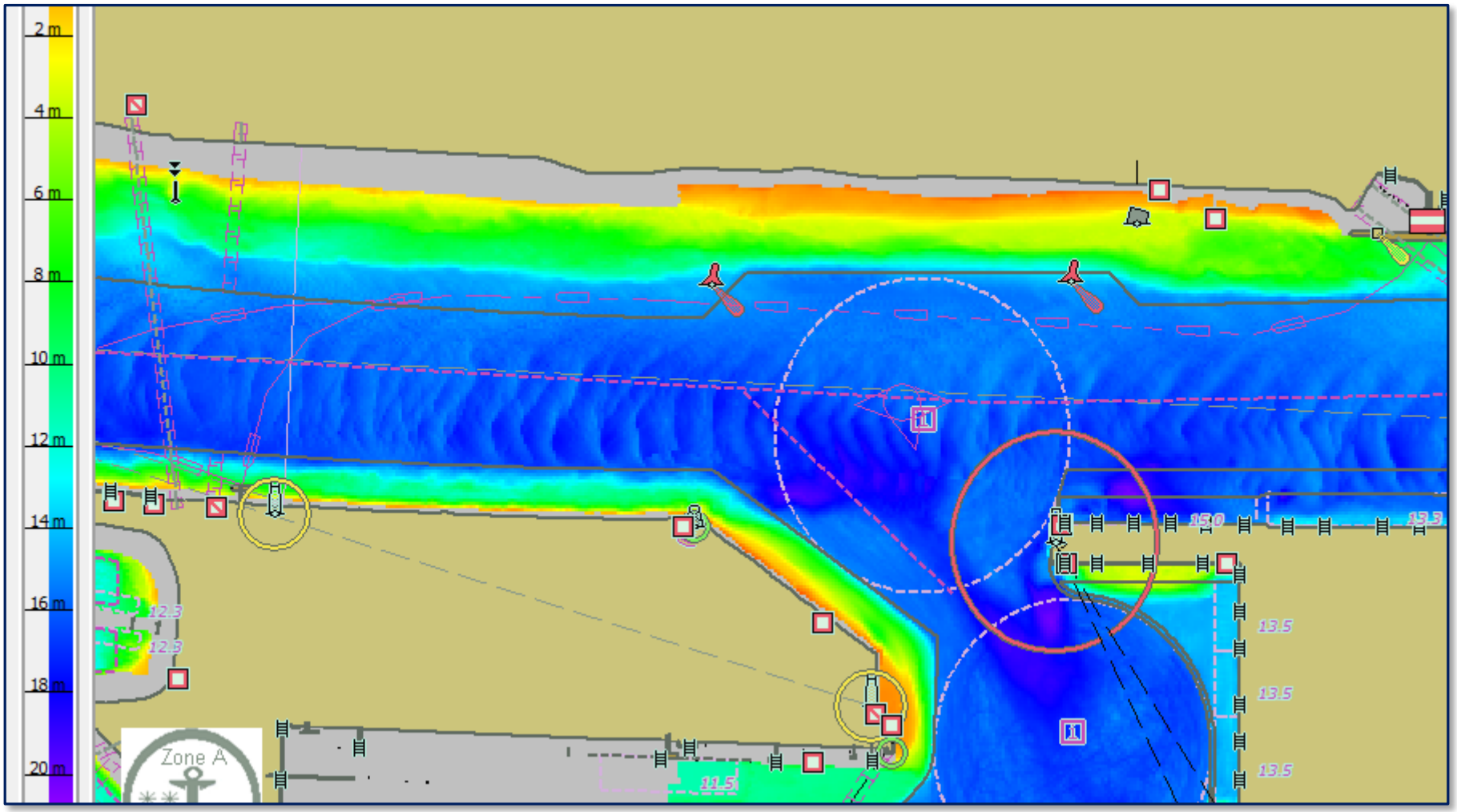
Gridded bathymetry



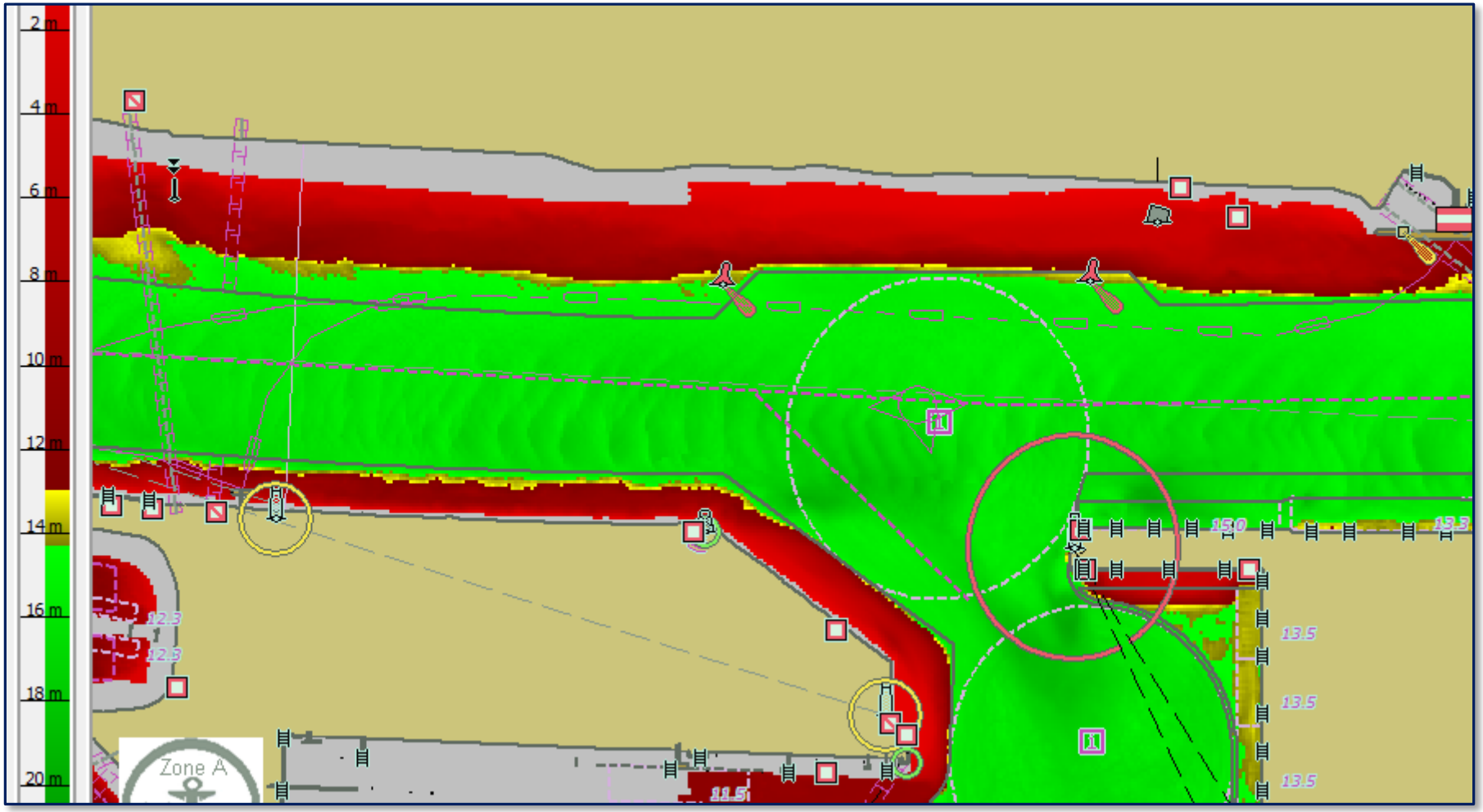
Representations of high density bathymetry

- **Gridded bathymetry**
  - **Rows and columns of depth values**
  - **Defined cell spacing and origin**
  - **Proprietary grid formats exist**
  - **Exchange format S-102/BAG**

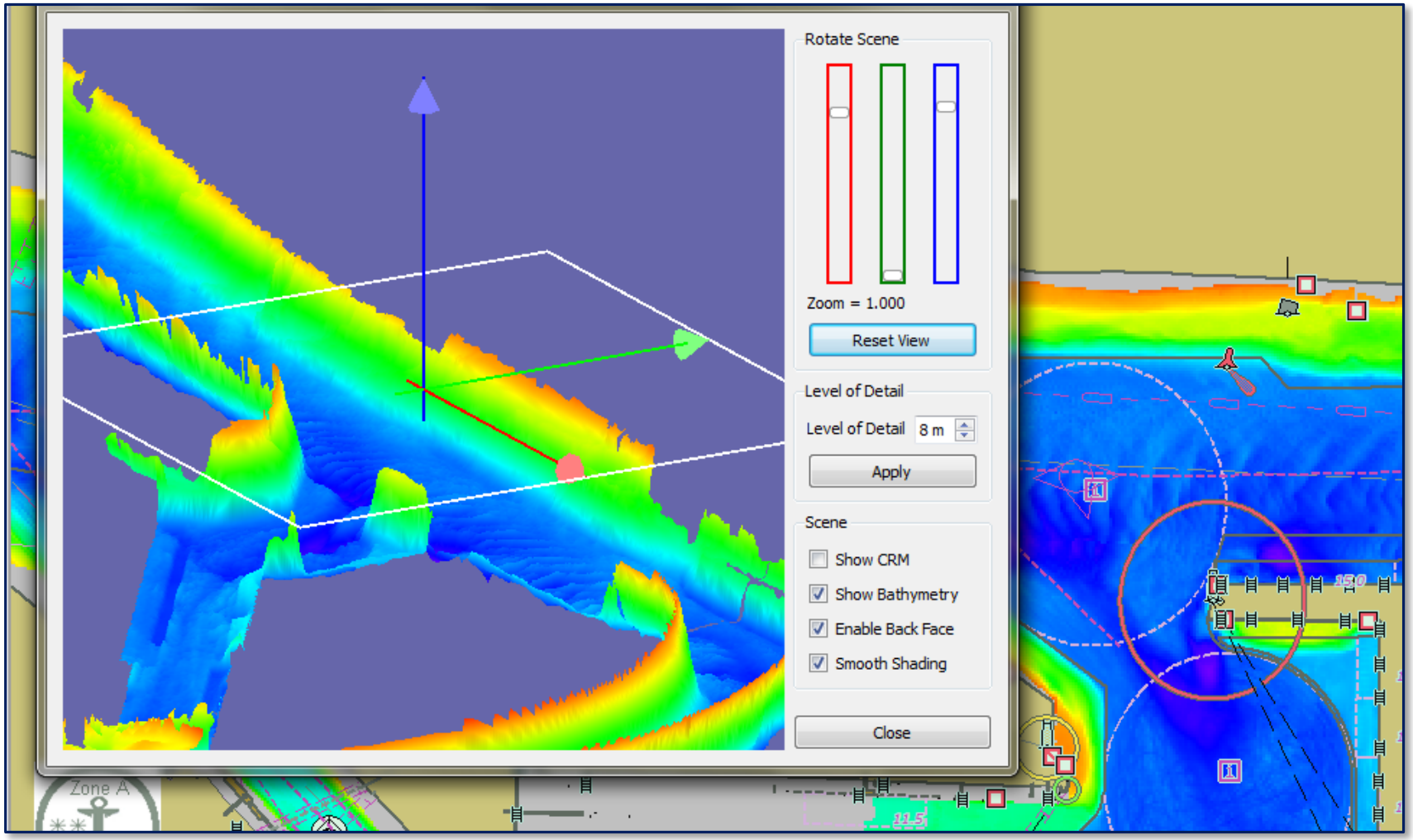
Examples gridded bathymetry and ENCs



Examples gridded bathymetry and ENCs



Examples gridded bathymetry in 3D



Aspects regarding the integration of vector and gridded bathymetry in ENC chart display

Integration of S-57 Vector Bathymetry and ENCs

- **Easy integration with ENC**
- **Same data model and portrayal**
- **Reasonably small file size**
- **Same encryption and distribution**
- **Limited use (navigation only)**

Integration of Gridded Bathymetry and ENCs

- **Integration with ENC more complex**
- **Relatively large file size**
- **Very powerful and flexible (3d, tides)**

Summary

- **Concepts are NOT mutually exclusive**
- **Use the best of both approaches**
- **Contribute to S-102 standardization**
- **Prototyping**
- **Integration in PPU/ECS/ECDIS**