

in - innovative navigation GmbH

New trends in navigation tools



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New trends in navigation tools

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- (1) State-of-the-art
- (2) Multi radar solution
- (3) Navigation on narrow waterways
- (4) Look ahead – important objects
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State-of-the-art navigation tools

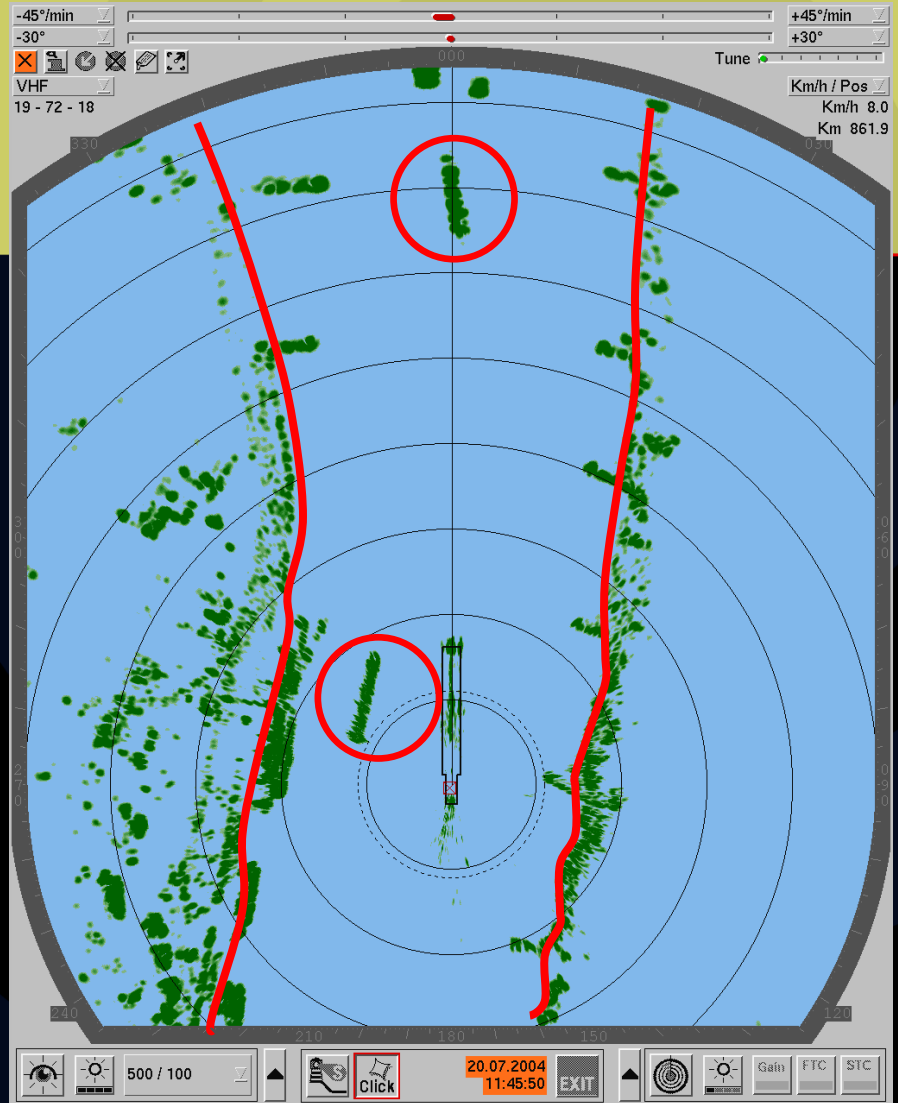


Radar is
the eye of
the skipper



State-of-the-art navigation tools

- radar
- rate of turn indicator
- autopilot
- VHF
- chart viewer
(Inland-ECDIS information system)

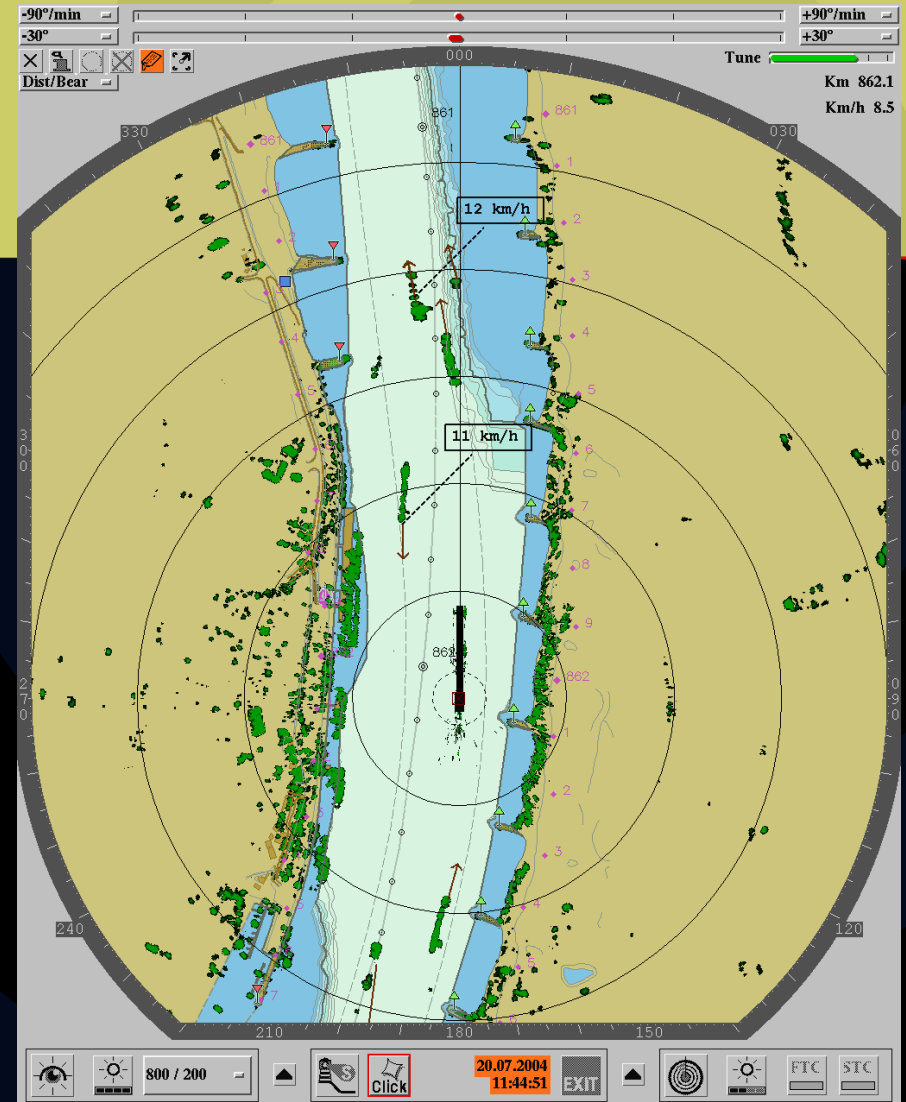


Recent navigation tools

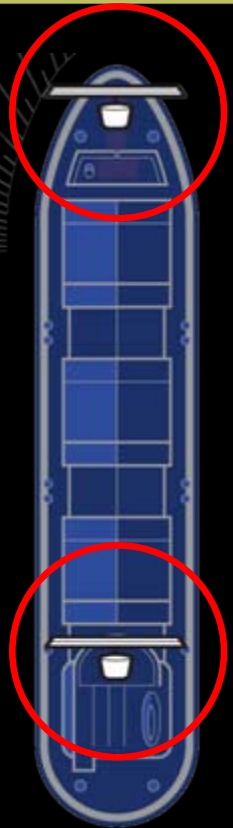
Inland-ECDIS navigation systems

RADAR **pilot** 720°

Inland-AIS transponder



Common radar problems



**Inland navigation:
one radar antenna at the bow
one radar antenna at the stern**

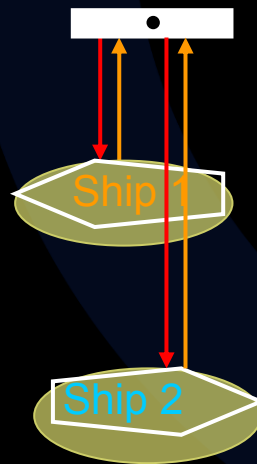
but radar image not always unequivocal

Common radar problems

False radar echoes

Distance and size of an object measured by radar

Display of radar image with vessels at the according site



radar scanner



Common radar problems

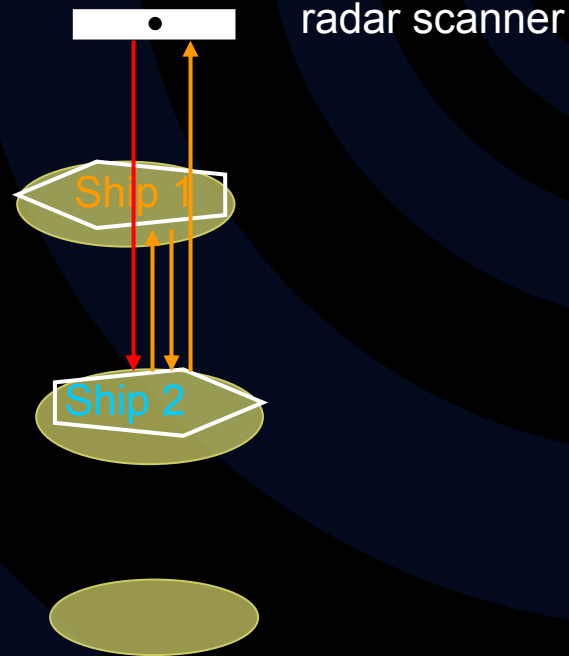
Basic Problem 1: False radar echoes

Distance and size of an object measured by radar

Display of radar image with vessels at the according site

multiple reflexion occurs

→ additional false echo



Common radar problems

Example

Correct echo

False echoes

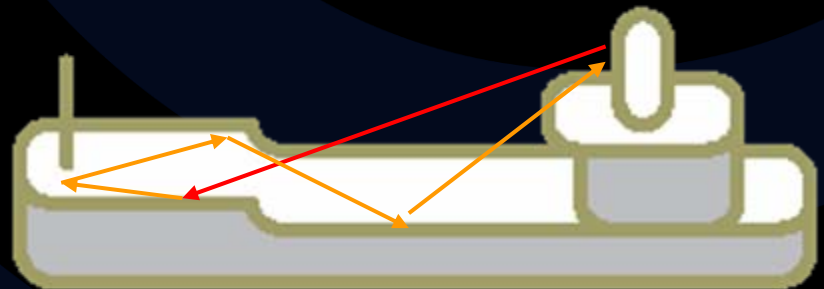


Common radar problems



False radar echoes may arise, e.g.

- when two vessels pass by simultaneously at a certain angle
- by multiple reflexion of the radar beam within the hopper well when traveling empty



Common radar problems

Example

radar at the bow

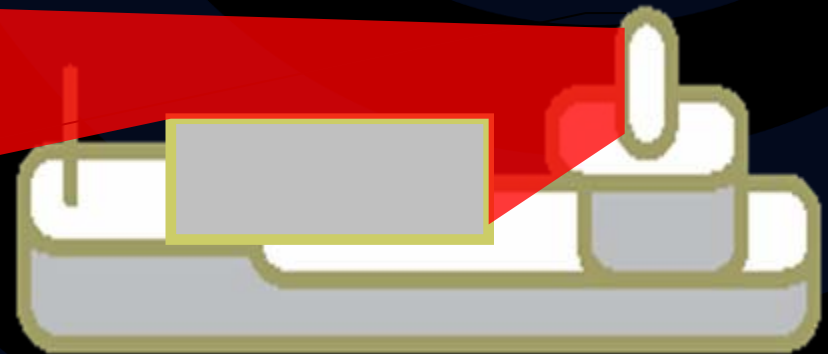
False echo
caused by
radar reflexion within
the hopper well



Common radar problems

Shading effects

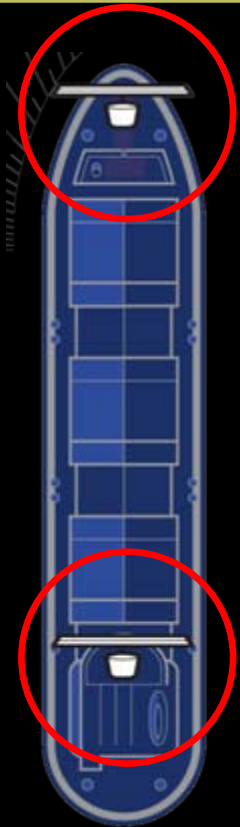
- Load as high as the radar scanner at the stern
- container causes large shaded area in front of the vessel



Solution: Multi Radar Image



- two radar scanner
- bow radar provides clear image in front of vessel
- combination of both radar images
- false echoes can be distinguished from correct echoes because they are not confirmed by the other radar



Multi Radar Image

RADAR *pilot* 720°

Overlay of both radar images:

- Display of images separated by a dividing line
- Elimination of false echoes caused by own vessel
- Elimination of shading effects

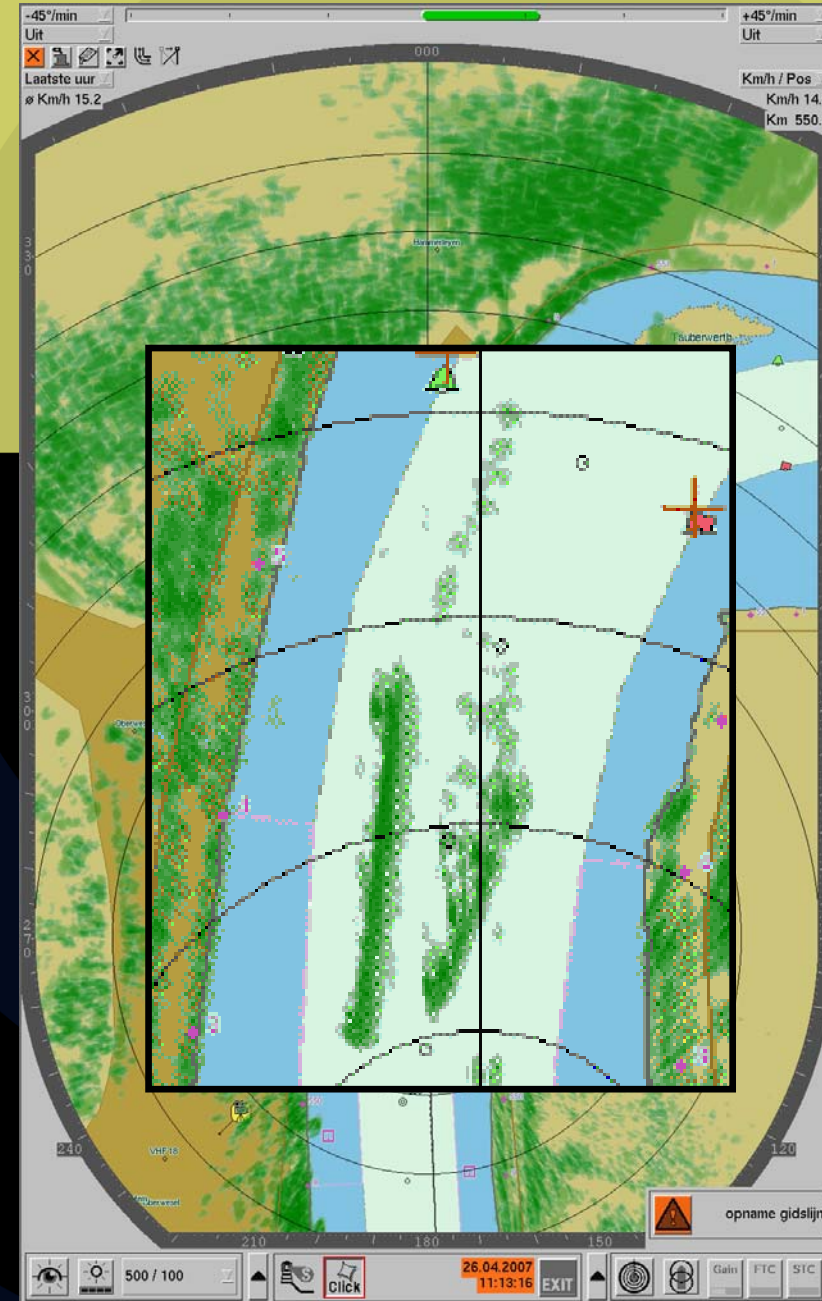


Multi Radar Image

RADAR *pilot* 720°

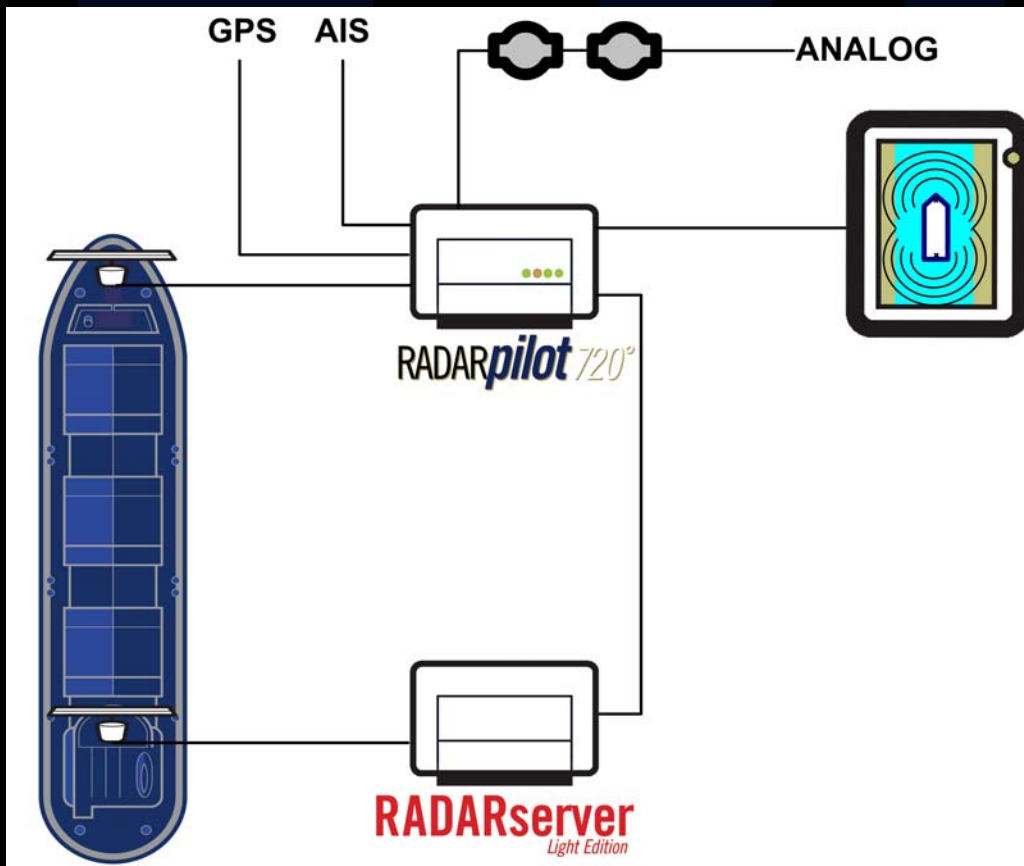
Overlay of both radar images :

- overlap of masked images of bow and stern radar
- echo thicker when present in both radar images
- echo thinner when present only in one of both radar images
- reduces false echoes



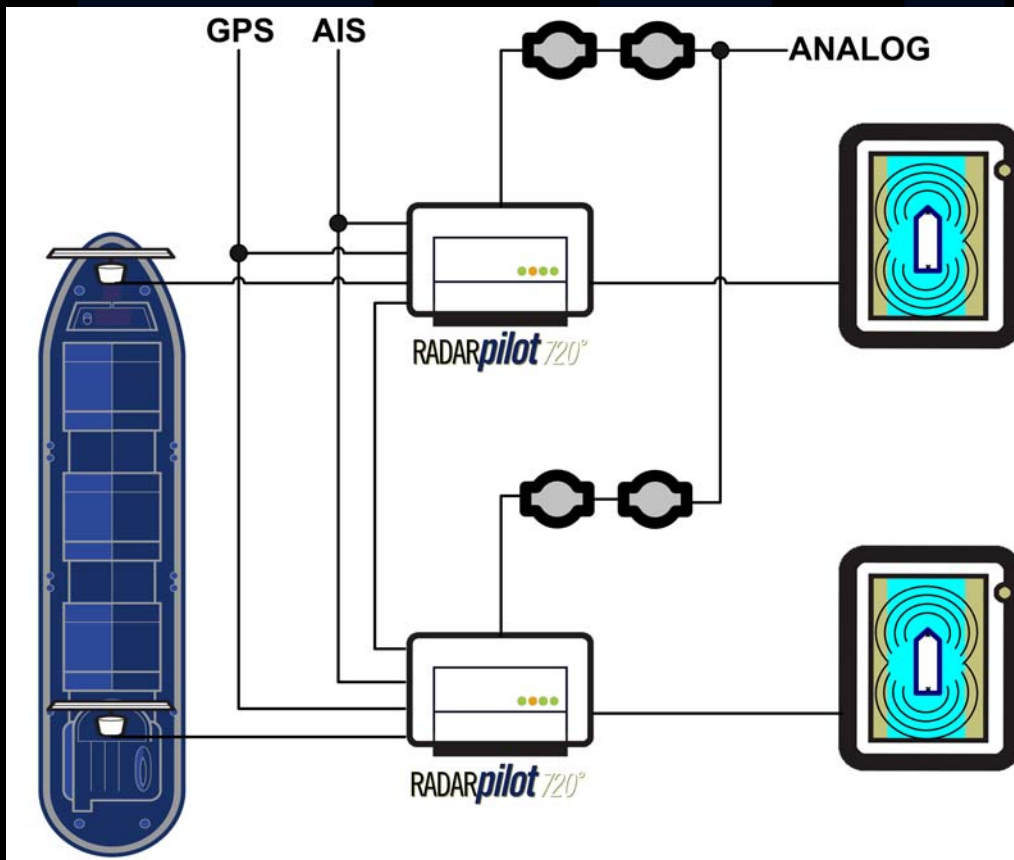
Multi Radar Image - System

Solution 1: integration of second radar image



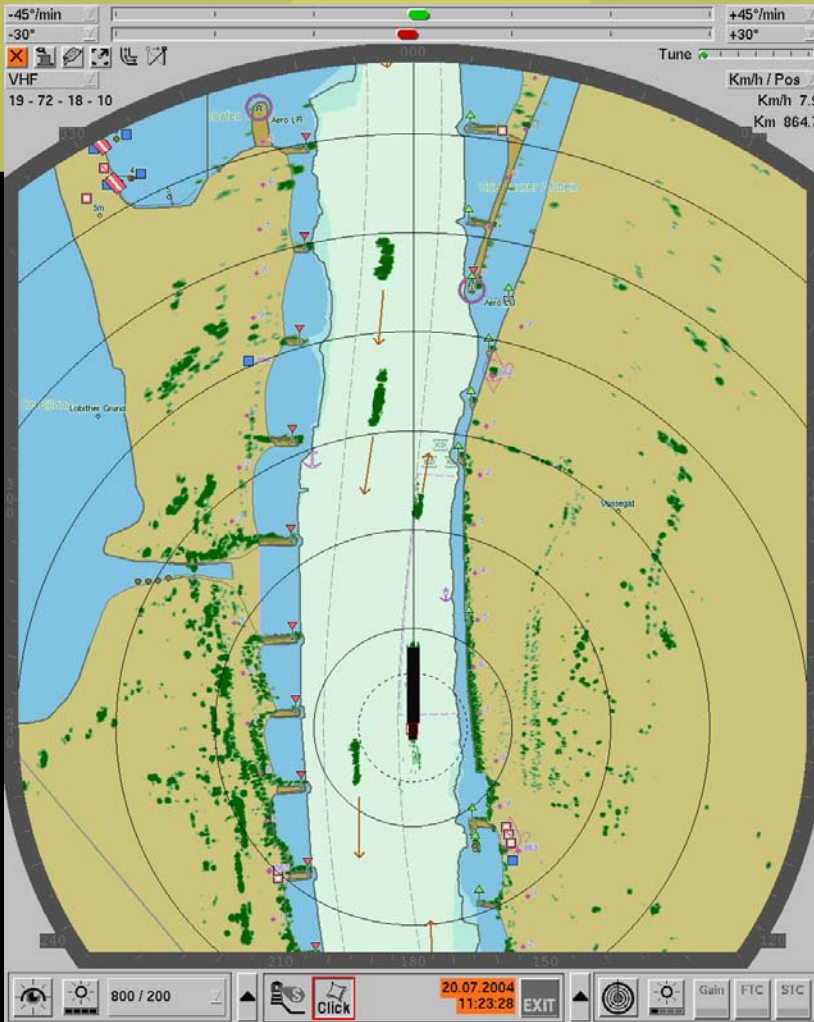
Multi Radar Image - System

Solution 2: fully redundant system



RADAR*pilot* 720°

with large screen



55 cm

Navigation on narrow waterways



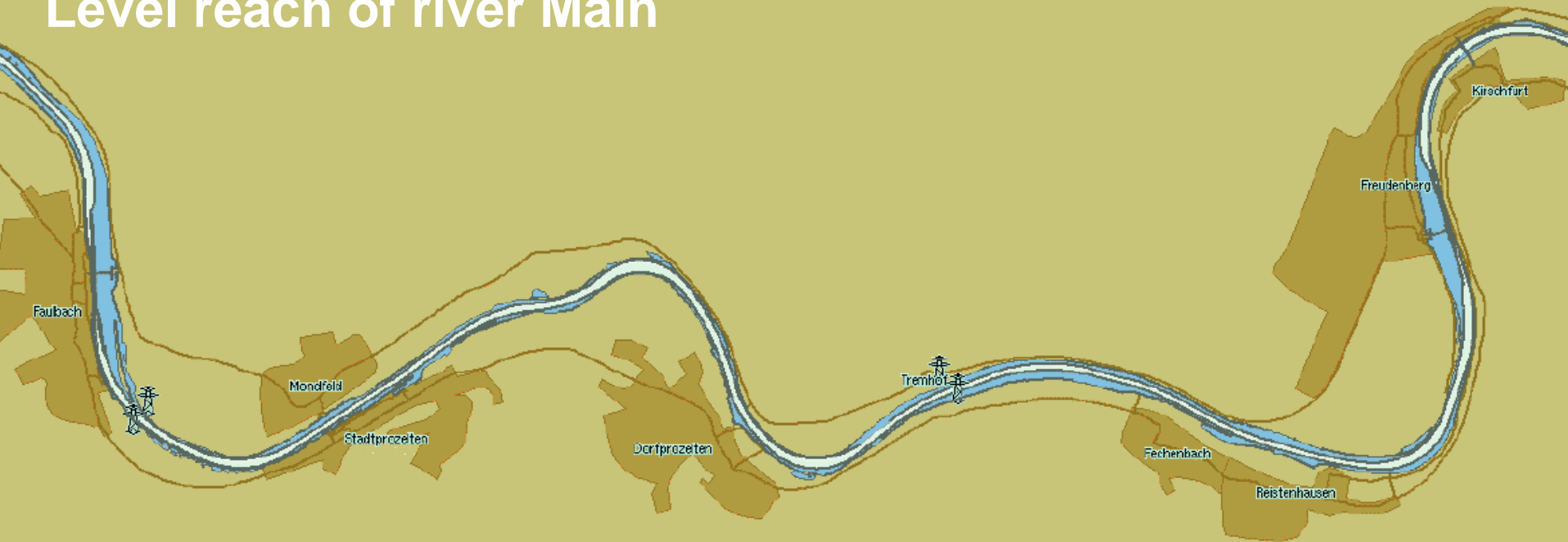
Navigation on narrow waterways



- narrow river
- bended section
- large vessel
- ⇒ Selection of area of encounters desirable
- ⇒ Foresight essential

Navigation on narrow waterways

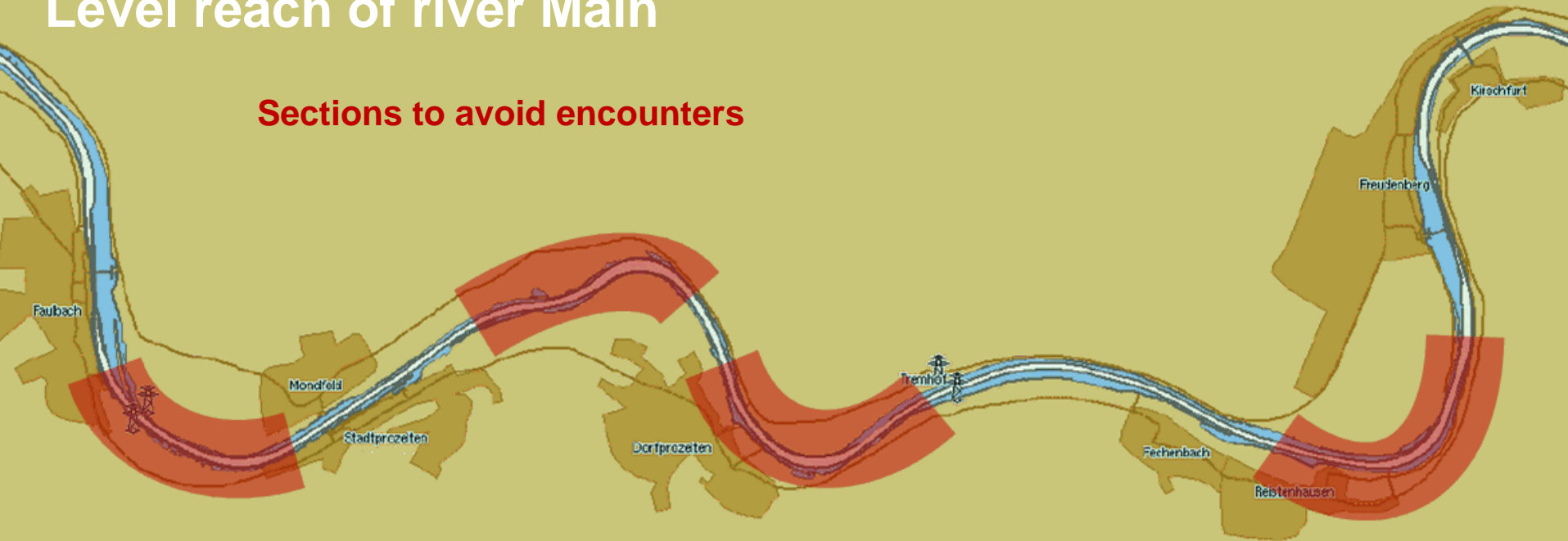
Level reach of river Main



Navigation on narrow waterways

Level reach of river Main

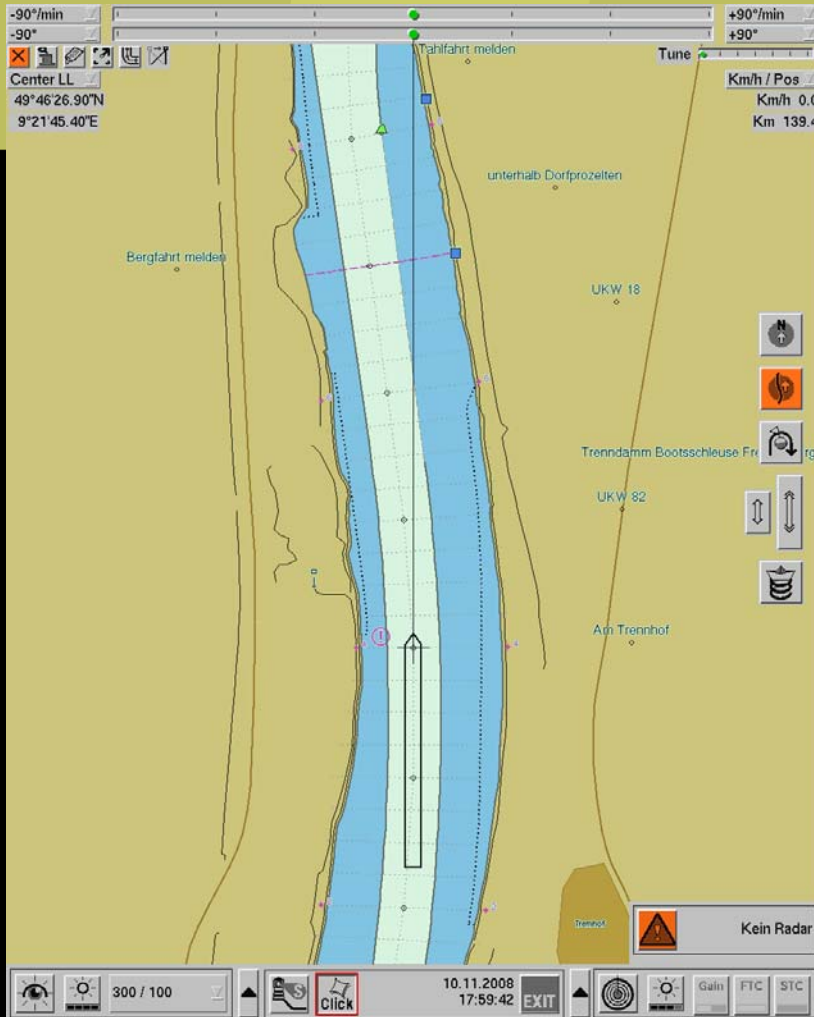
Sections to avoid encounters



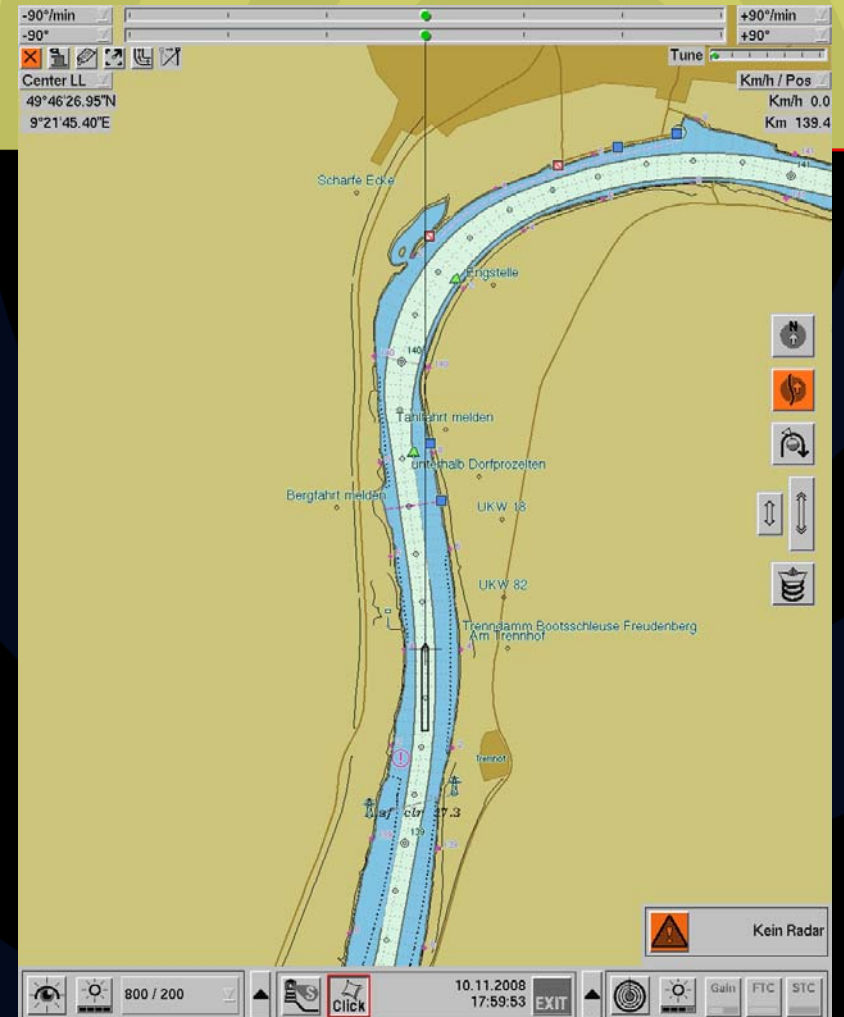
AIS provides information about ships behind the bend

Navigation with large ships on narrow waterways

navigation display: range 300m



navigation display: range 800m



Navigation with large ships on narrow waterways



Problem: simultaneous display of short and long range area showing navigation tasks coming up and exact current navigation situation

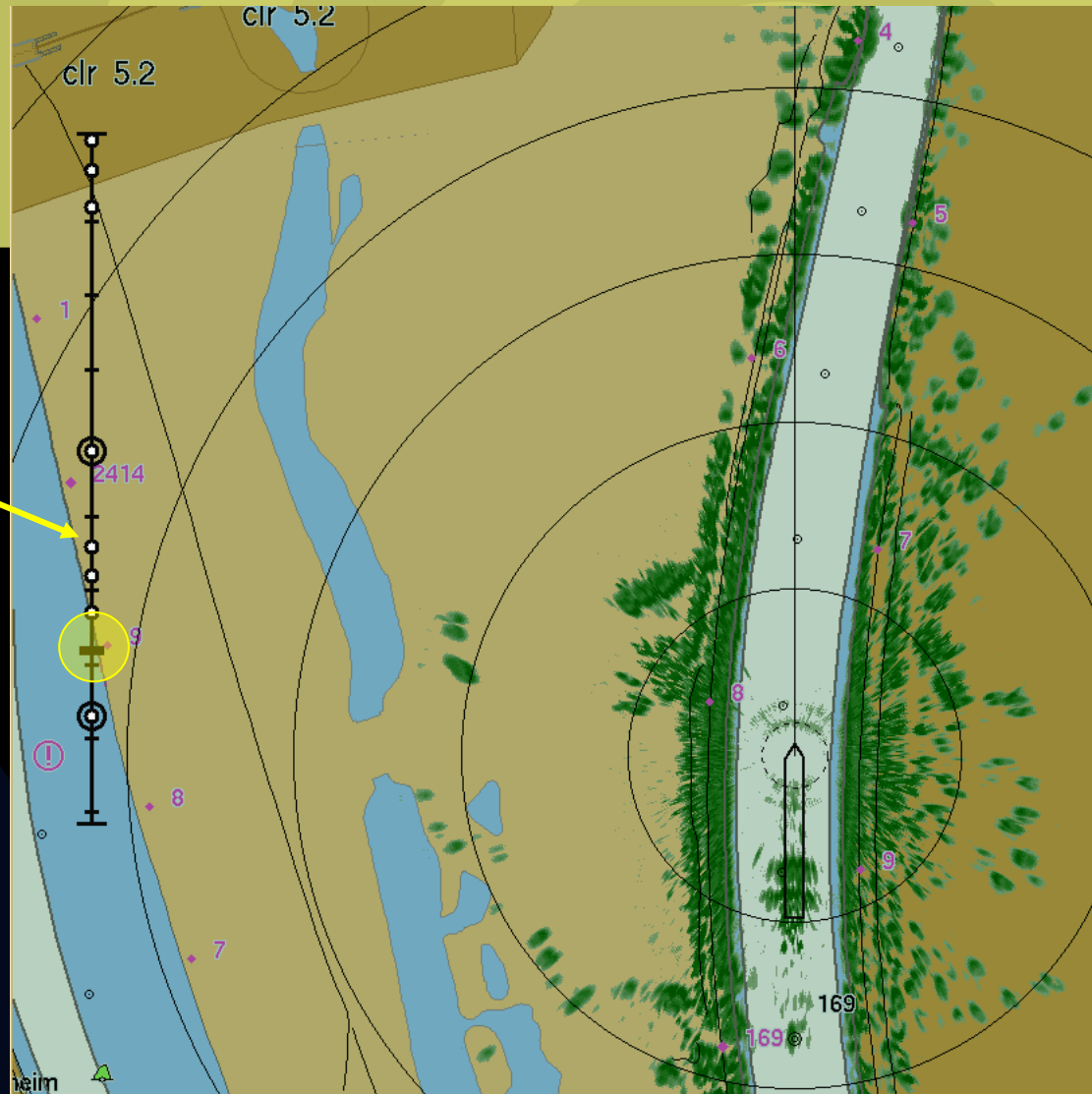
Solution: additional indication of the long range area as simple bar along the river chart providing the most important information

Important objects in **RADAR***pilot* 720°

Display objects relevant
for navigation as

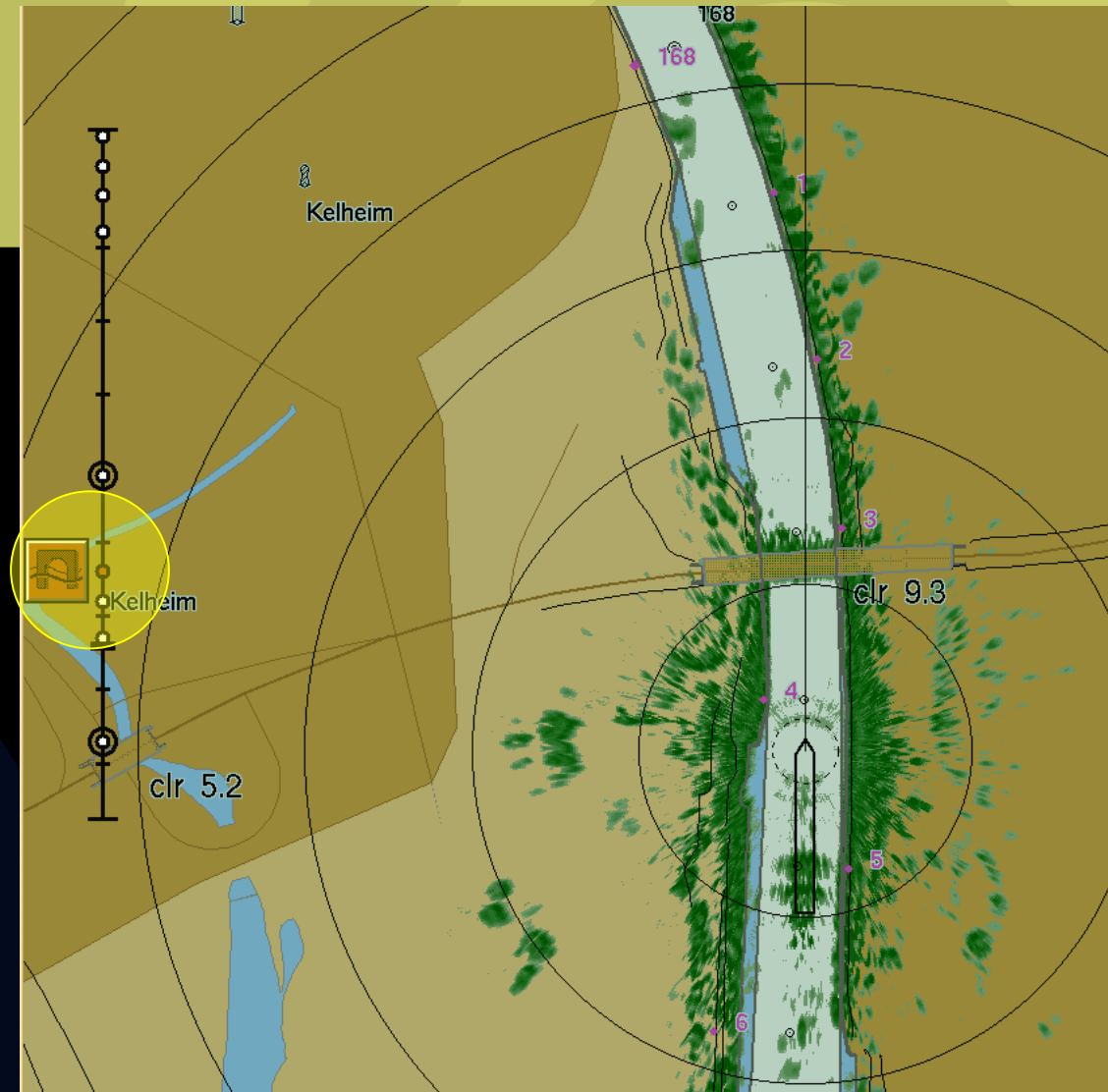
- bridges
- locks
- ferries

in front of the own vessel



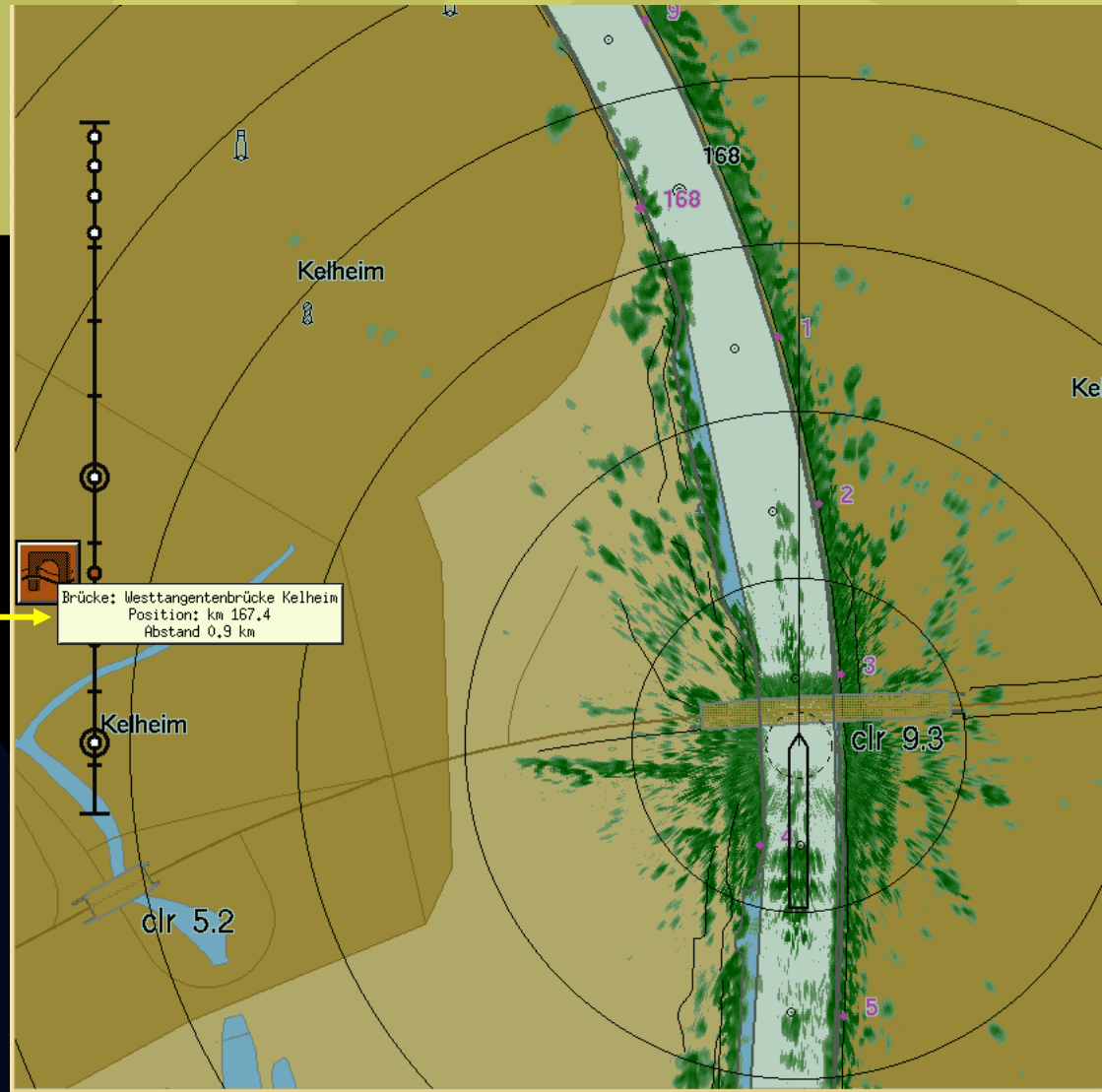
Important objects in **RADAR***pilot* 720°

Mouse cursor above
the bar shows the symbol



Important objects in RADAR*pilot* 720°

Detailed information in
the context menu



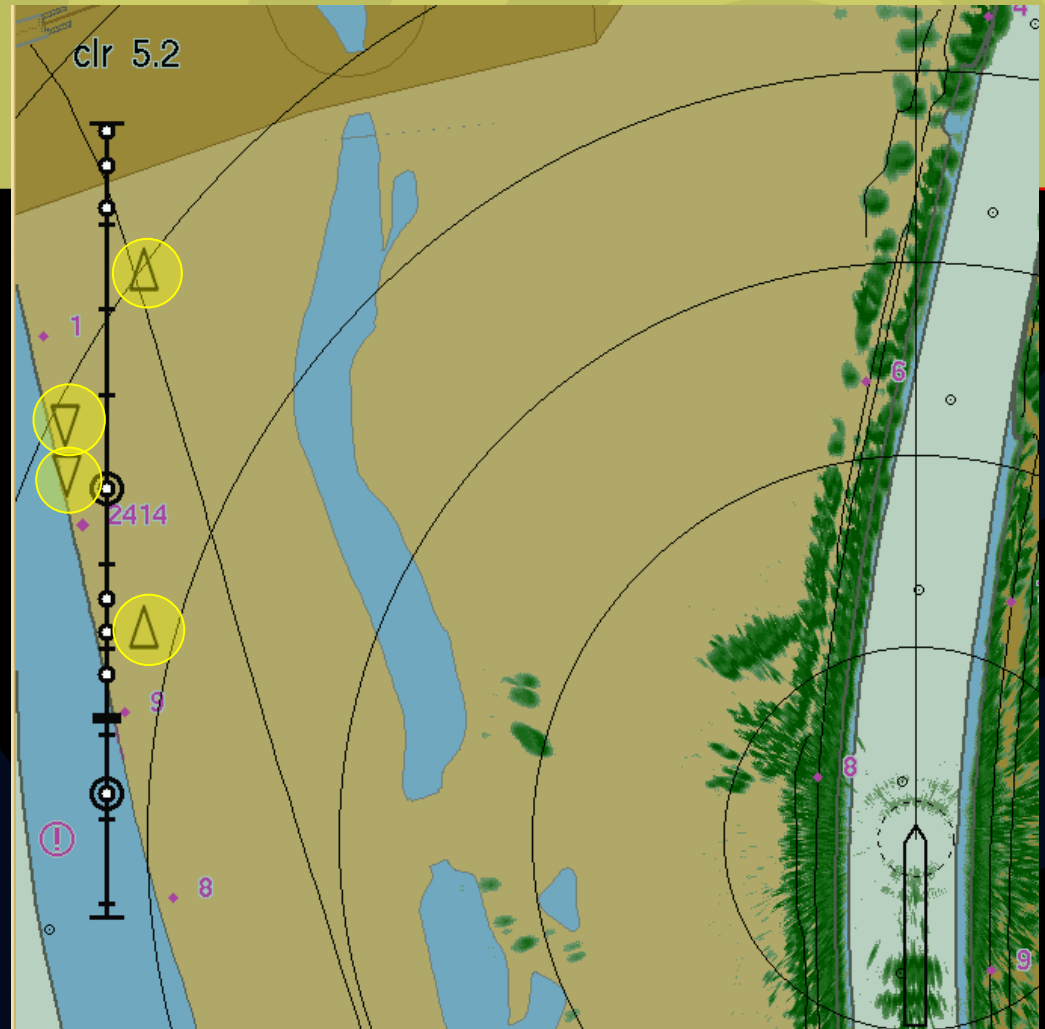
Important objects in RADAR*pilot* 720°

With AIS:

path-position diagram

for vessels

- going downstream
- going upstream



Conclusion



- new navigation functions for Inland ECDIS applications as multi radar and look ahead
- combining two radars in one display enhances the overall radar presentation and interpretation
- combination of short range and long range display advantageous for proper tactical navigation
- in future, application possible for traffic coordination, especially upcoming traffic on difficult river reaches

Thank you for your attention

