

Koninklijke Marine



# Needle in a haystack

Hydrographic Service Royal Netherlands Navy

Jan Schaap

# Content

Introduction and background NLHO

Data route

Data validation

Future developments

Finding the needle in the haystack

# Content





# Introduction and background

## IMO-convention **Safety Of Lives At Sea:**

- Obligation for coastal states:

“Contracting Governments undertake to arrange for the **collection** and **compilation** of hydrographic data and the **publication, dissemination** and **keeping up to date** of all nautical information for **safe navigation.**”

- NLHO fulfills obligation for NL
  - Electronic and paper navigational charts, Nautical Publications
  - North Sea, the Dutch Antilles, Aruba, Surinam
  - High seas, rivers and ports.

# Introduction and background

27-11-2009

## ENC Dutch Coast

Ship: N 51 40.99 E 003 45.26 CMG: SMG: Ship -> Cursor: Cursor: WP: 24.4nm 012° 22:57 RESET

The chart displays a detailed view of the Dutch coast, including the Scheldt estuary and the North Sea coast. Key features include:

- Coastal Landmarks:** Buitenbank, Steenbank, Middelbank, Rabsbank 1, Westpit, Chr. Huygens, and the islands of Walcheren and Rassen.
- Navigational Aids:** Traffic Control Steenbank, Traffic centre Steenbank, Traffic centre Zeebrugge, and various buoys (SD, SB, MN, MD, ZB, MB, DG, DL, BO, KA).
- Depth Contours:** Shaded areas representing different depths, with labels like 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 210, 220, 230, 240, 250, 260, 270, 280, 290, 300, 310, 320, 330, 340, 350, 360, 370, 380, 390, 400, 410, 420, 430, 440, 450, 460, 470, 480, 490, 500, 510, 520, 530, 540, 550, 560, 570, 580, 590, 600, 610, 620, 630, 640, 650, 660, 670, 680, 690, 700, 710, 720, 730, 740, 750, 760, 770, 780, 790, 800, 810, 820, 830, 840, 850, 860, 870, 880, 890, 900, 910, 920, 930, 940, 950, 960, 970, 980, 990, 1000.
- Substrates:** sand, mud, shells, sand, shells, mud.
- Other Features:** BANJAARD, West Sch, Oostkapelle, NOORD BEVELAN, RASSEN, WALCHEREN.

**FOCUS**

- Chart
- Planning
- Monitoring
- Sensors

**TASK**

- Chart Work
- Chart Settings
- Chart Colors
- Chart Handling

**FUNCTION**

- Two Shades
- Graticule
- Traditional
- Lights
- North Up
- Course Up

Set Course  
Set Projection

EBL Set  VRM Set Ref.Pt. Set Go Notes  Ship  Rings  Names Display All Menu on

# Introduction and background

Needed: Up-to-date and validated data:

- Nautical (bouys, wrecks etc.)
- Bathymetric/oceanographic

Correct: legal liability

Vital importance Netherlands:

- accessibility (main) ports
- safe passage through our coastal area

Information easily accessible to end-user

# Introduction and background



Berge Stahl  
Length 360 meter  
Width 65 meter  
Draught 25 meter  
Weight 365.000 ton

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# Data route

## Main sources:

- Own ships
- 
- Ministry of Transport & Public Works (“Rijkswaterstaat”)

# Data route

NL Survey ships

HNLMS Snellius

HNLMS Luymes



# Data route

## From SBES to MBES around 2003

- Multiplication in volume
- Exchange and storage devices media

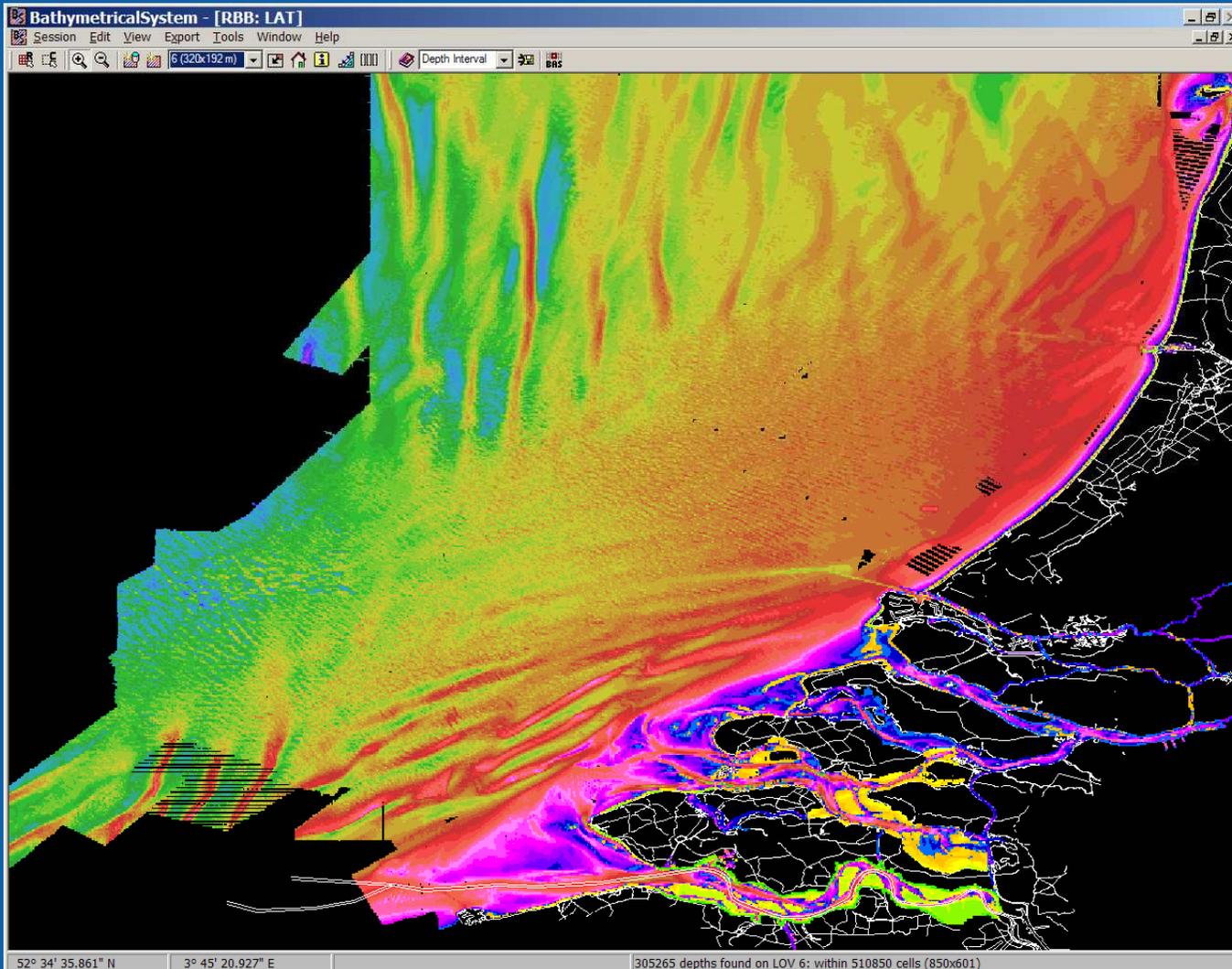
## On board

- Processing – tidal corrections – overlap – cleaning etc.
- automatic pruning processes > loss of important data
- all data to office

## Office

- Inspection and validation
- Binned 3\*5 m, reduction
- Storage mean/minimum depth per bin plus metadata
- Processed to cartographic representations

# Data route



Bathymetric  
Archive  
System

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# Data validation

## Compliance IHO S44

### First: Comparison previous surveys in BAS

- Immediate charting action required?

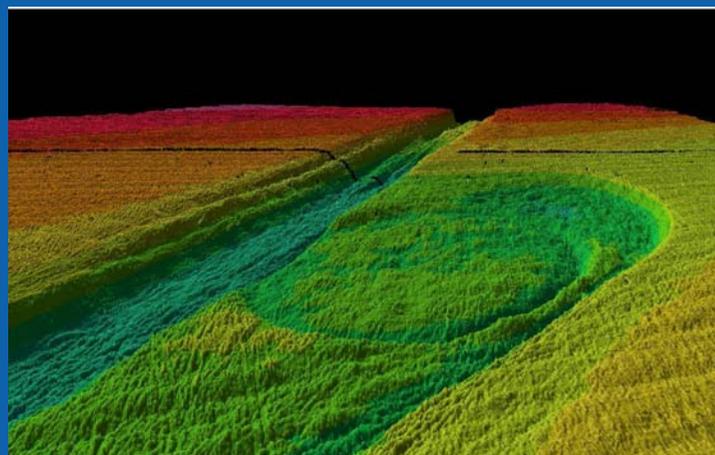
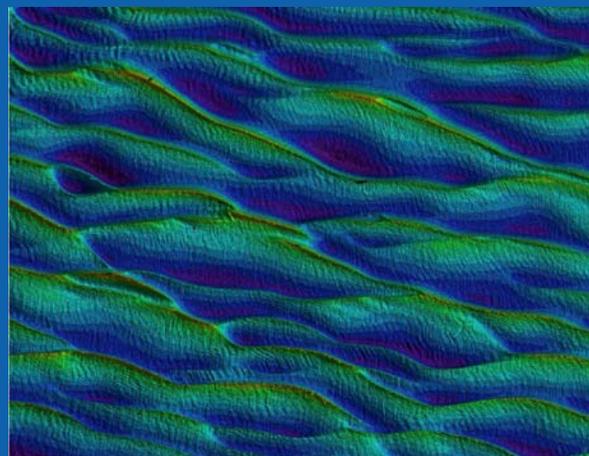
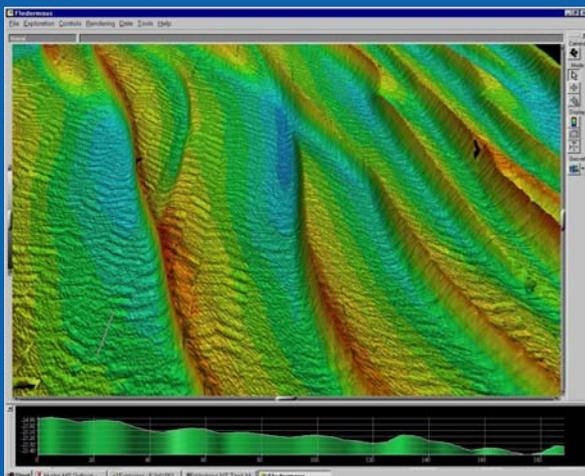
### Second: Identify and inspect artifacts in the data

- Visual
- Operator skills necessary
- Subjective interpretation
- lack of algorithms

Visualize survey as single picture

# Data validation

## Fledermaus



# Data validation

## Subjective interpretation

### Identifying errors

- Tidal corrections
- Incorrect sound velocity profile
- Poor weather conditions



# Data validation

Recognition depends largely on quality of visualization

Need for qc software, auto error and feature identification, quantification

No black box, interaction man-machine needed

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# Developments

More data to be expected!!

- multiple AUV per survey vessel
- Interferometric sonar systems
- Water column imaging
- Seabed dynamics at NLHO

# Developments

- Water column imaging



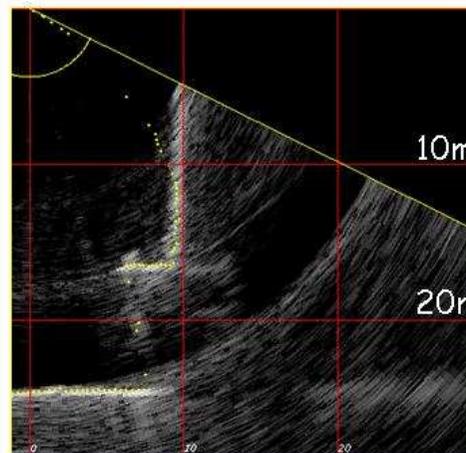
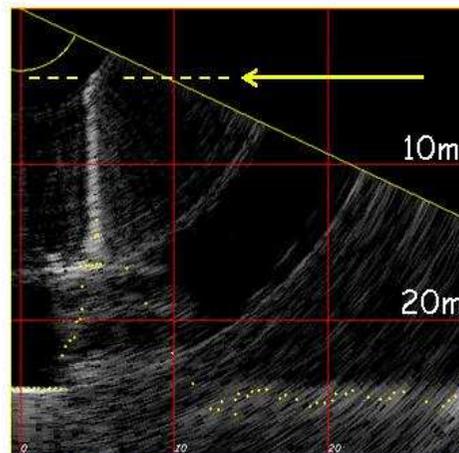
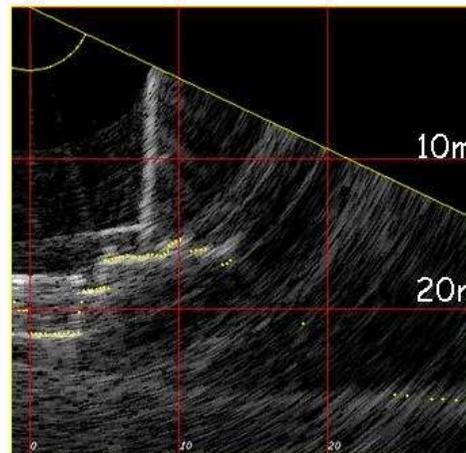
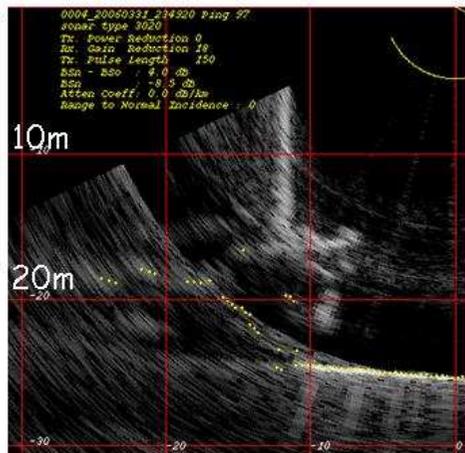
Estimating the minimum clearance over the masthead

**MV G.B. Church**

**EM3002**

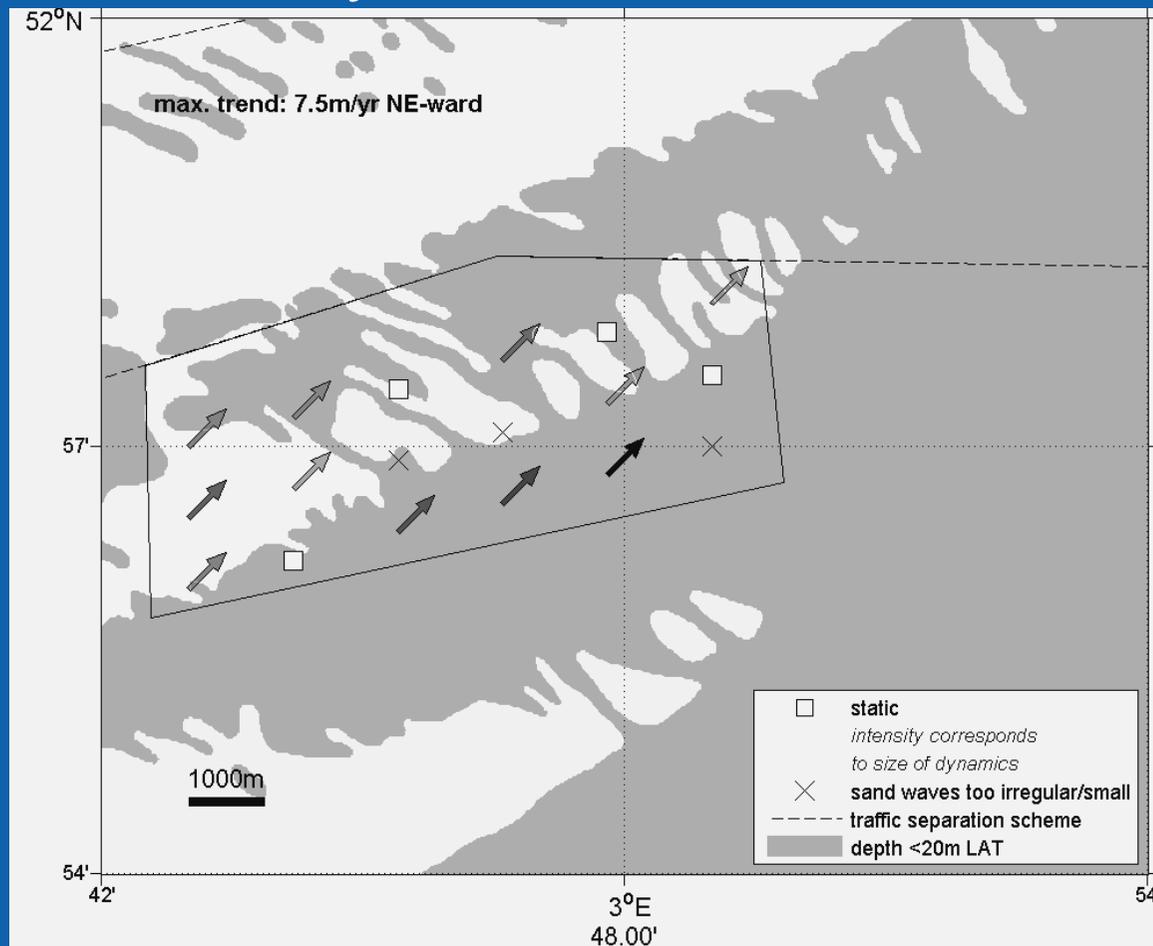
CCGS Otter Bay  
March 2006

(yellow dots indicate real-time bottom tracking)



# Developments

- Seabed dynamics at NLHO



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# Finding the needle in the haystack

Selecting that single sounding from millions



# Finding the needle in the haystack

- Automated process can help
- Knowledge of relevant morphological and topographical features



# Finding the needle in the haystack

- Automated process can help
- Knowledge of relevant morphological and topographical features
- Essential to distinguish between artifacts



# Finding the needle in the haystack

- Automated process can help
- Knowledge of relevant morphological and topographical features
- Essential to distinguish between artifacts and real world features



# Conclusion

At the moment

“good enough for Government work”

Larger quantities of data at the horizon

Need to be evaluated and stored

Anticipate

However, human factor needed

