

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, Middelbank, Schouwenbank, Rabsbank 1, Westpit, Chr. Huygens, Kalloo, Rassen, Walcheren, Noord Bevelan, Oostkapelle.
- Navigational Aids:** Traffic Control Steenbank, Traffic centre Steenbank, Traffic centre Zeebrugge, Middelbank, Magne, Chr. Huygens, Kalloo, Rassen, Walcheren, Noord Bevelan, Oostkapelle.
- Depth Contours:** Various depth contours are shown, ranging from 10m to 235m.
- Bottom Nature:** Labels such as 'sand', 'mud', 'sand, shells', 'mud, sand, shells' indicate the seabed composition.
- Other Features:** 'insl. traan' (island), 'Kous', 'West Sch', 'BANJAARD', 'NOORD BEVELAN', 'WALCHEREN', 'RASSEN'.

**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

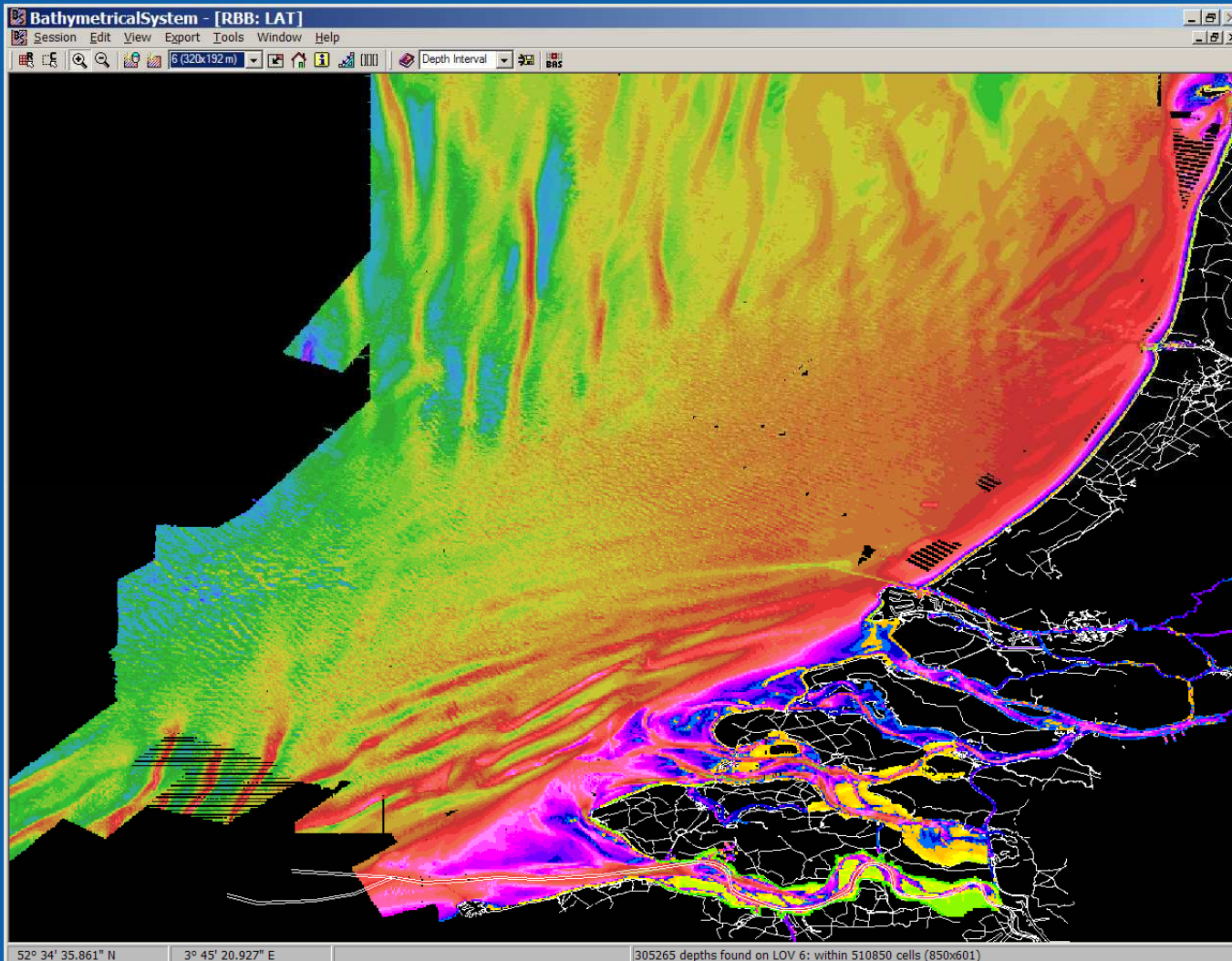
## On board

- 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?

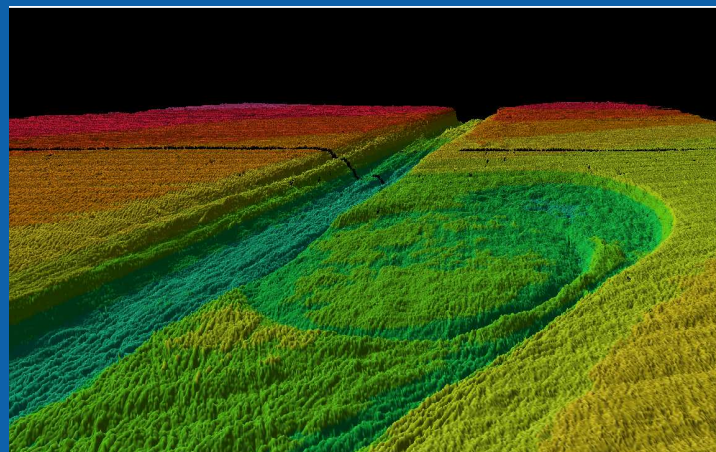
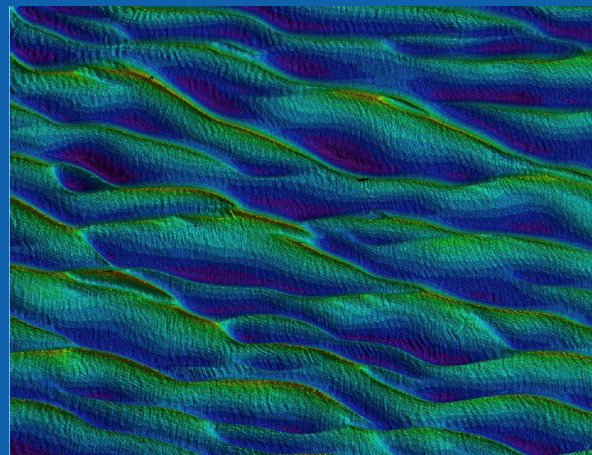
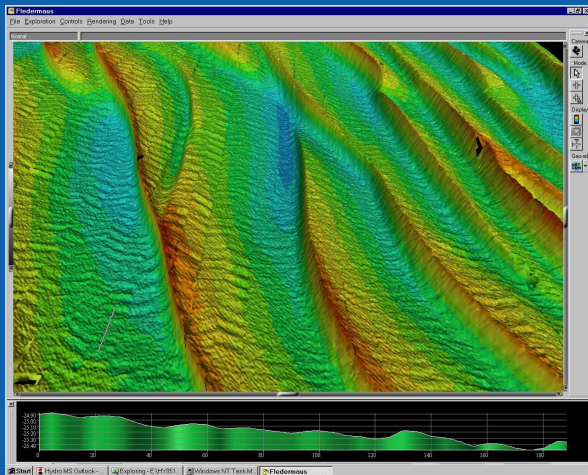
### Second: Identify and inspect artifacts in the data

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

Visualize survey as single picture

# Data validation

## Fledermaus



# Data validation

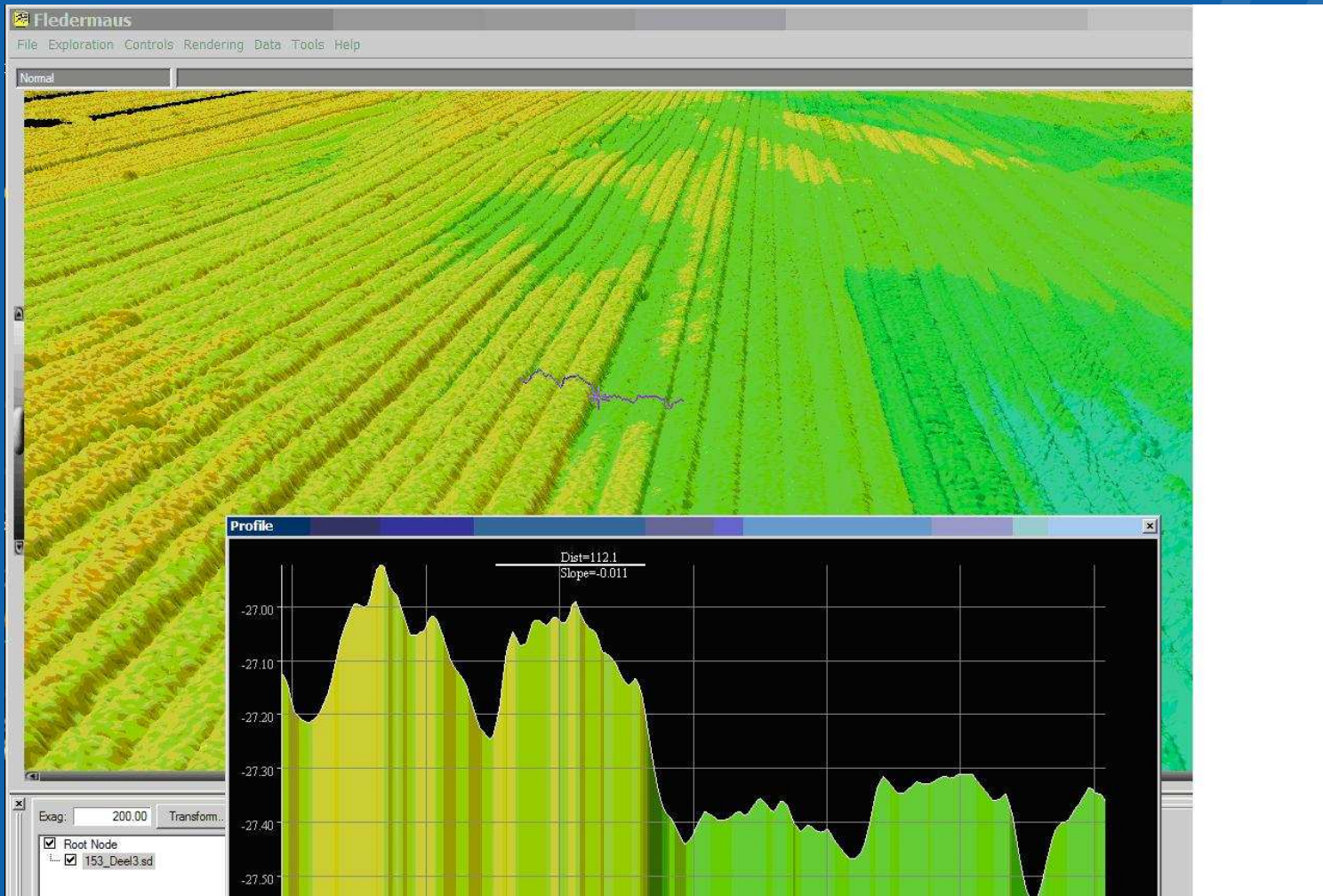
## Subjective interpretation

### Identifying errors

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

# Data validation

## Example Smile effect



# 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



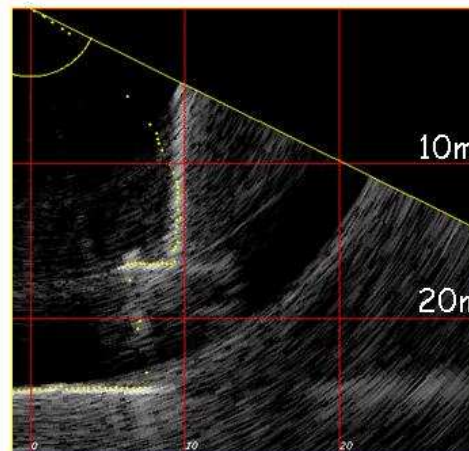
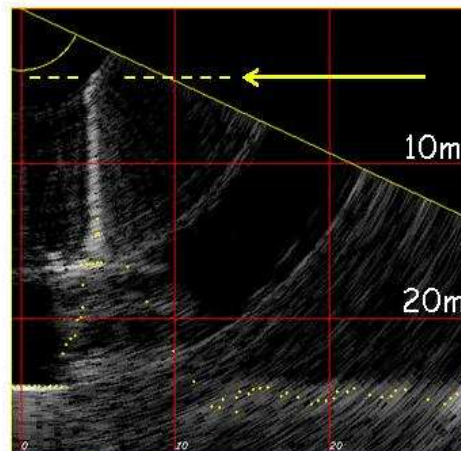
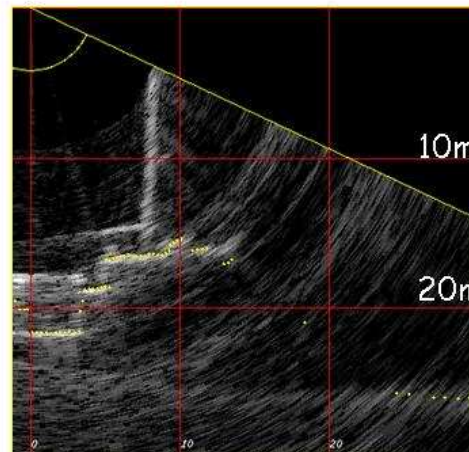
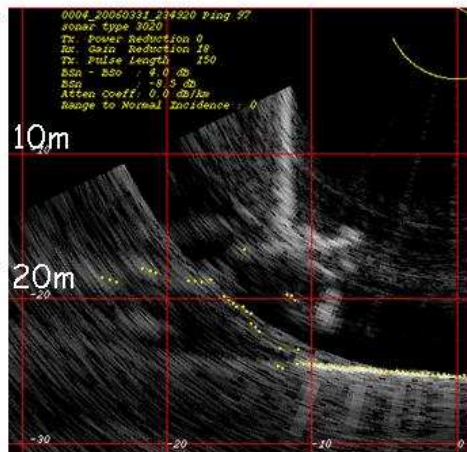
Estimating the minimum clearance over the masthead

**MV G.B. Church**

**EM3002**

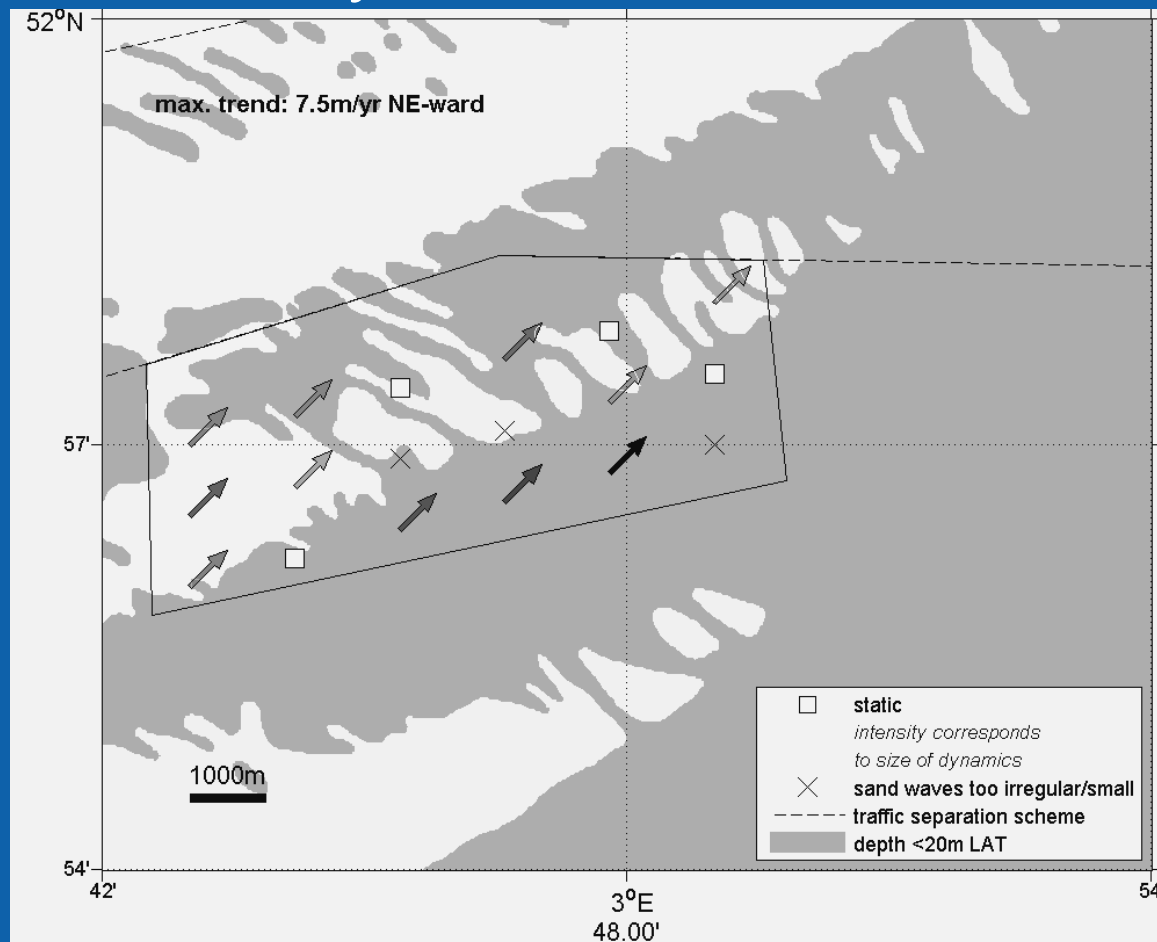
CCGS Otter Bay  
March 2006

(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

