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


DIENST DER
HYDROGRAFIE
EX USU NAUTAE

# Introduction and background

IMO-convention **S**afety **O**f **L**ives **A**t **S**ea:

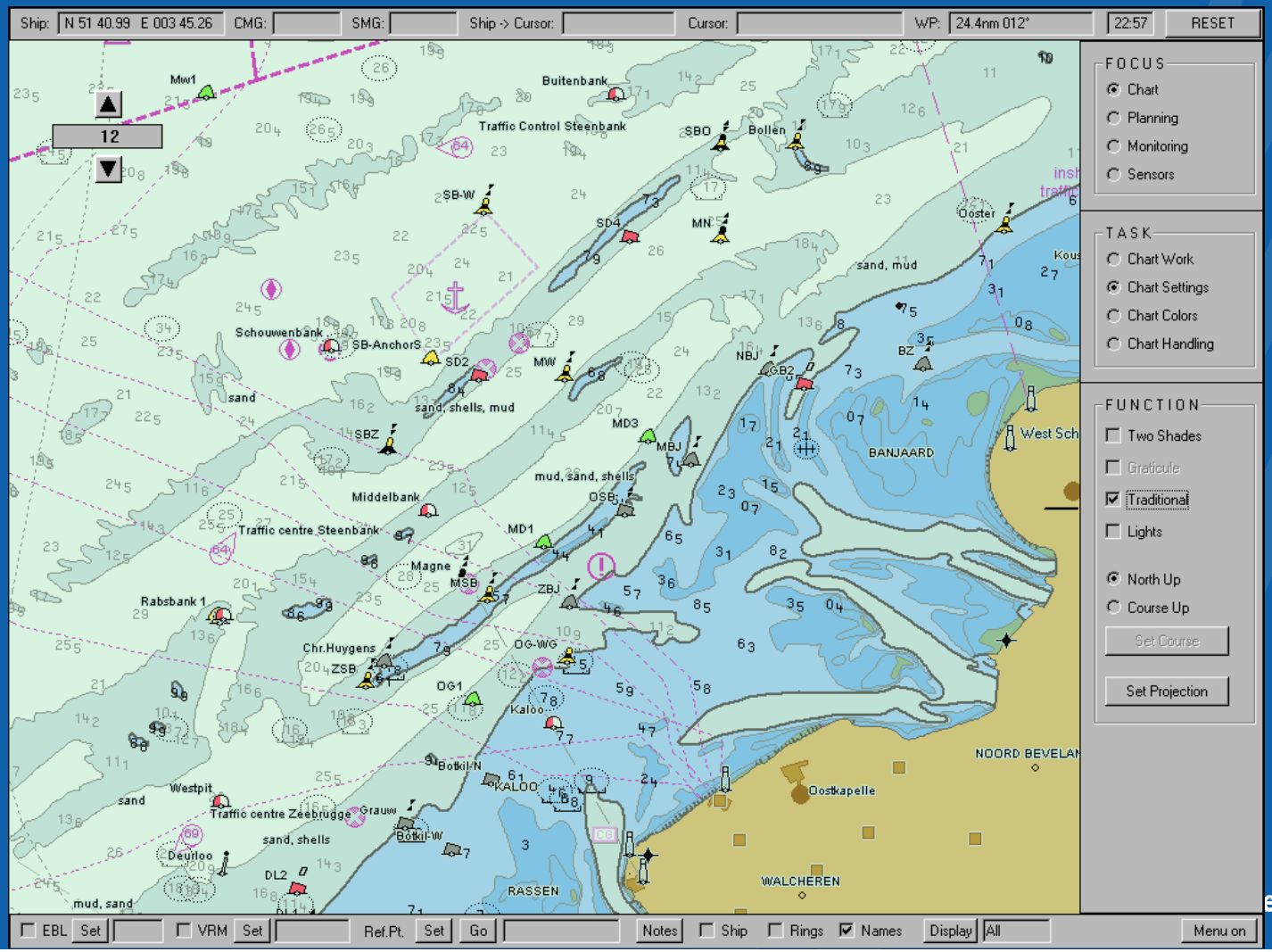
- Obligation for coastal states:

"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

## ENC Dutch Coast



# 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

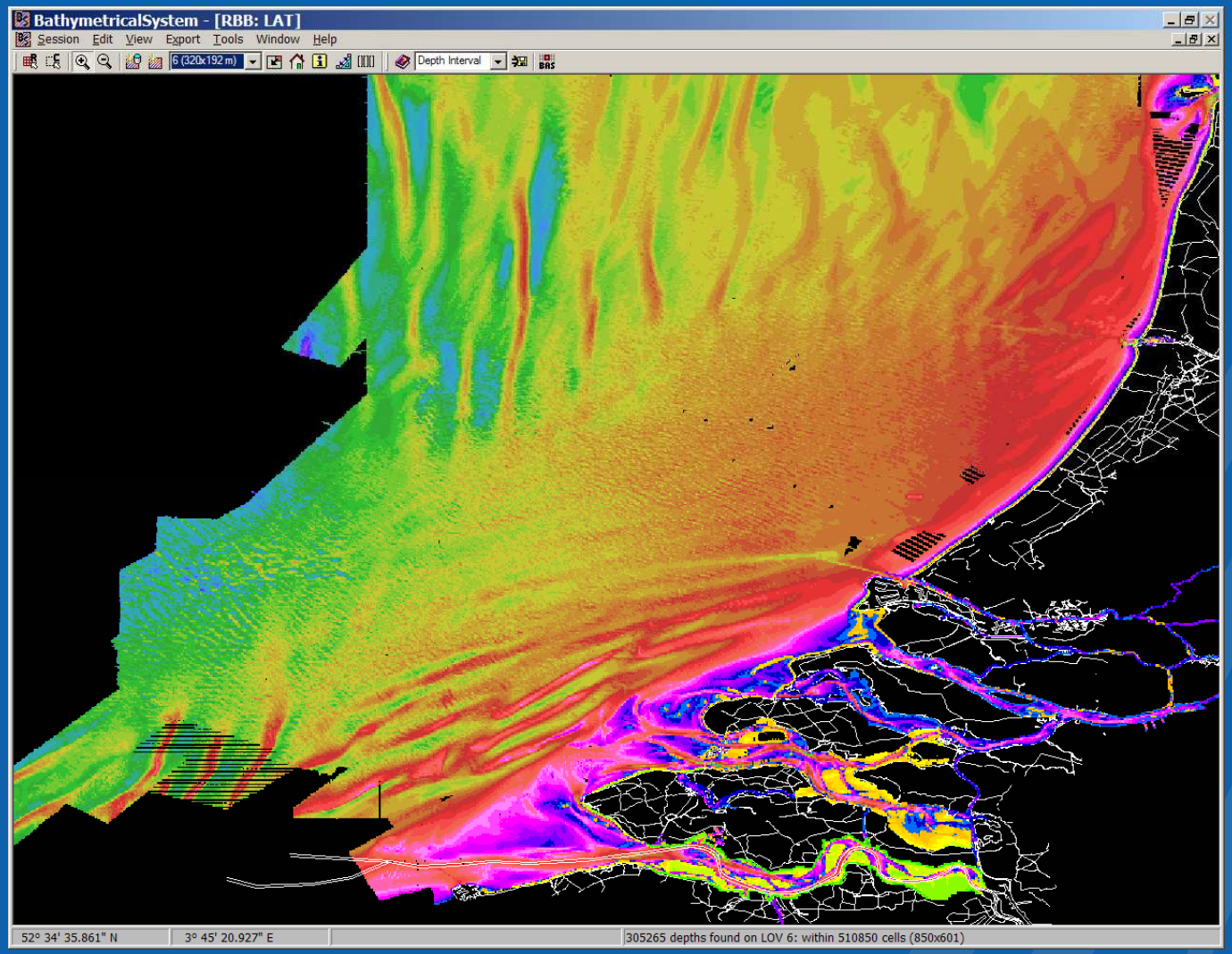
## On board

- 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

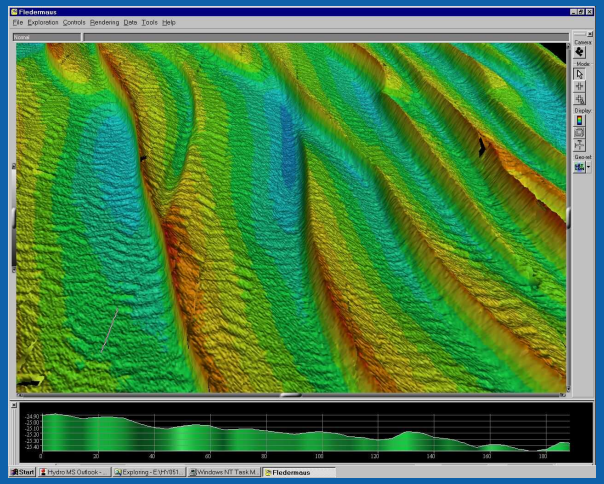
First: Comparison previous surveys in BAS
- Immediate charting action required?

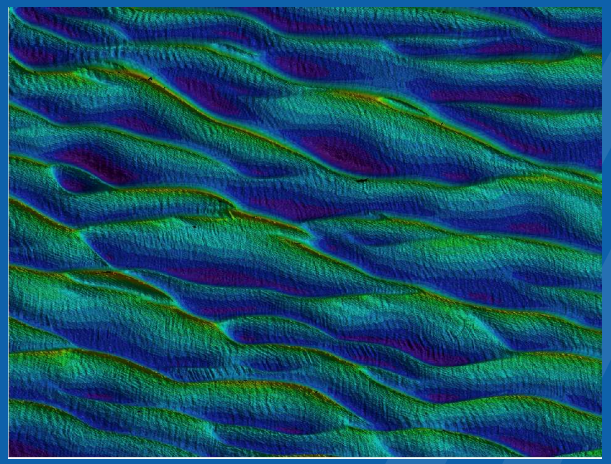
Second: Identify and inspect artifacts in the data
- Visual
- Operator skills necessary
- Subjective interpretation
- lack of algorithms

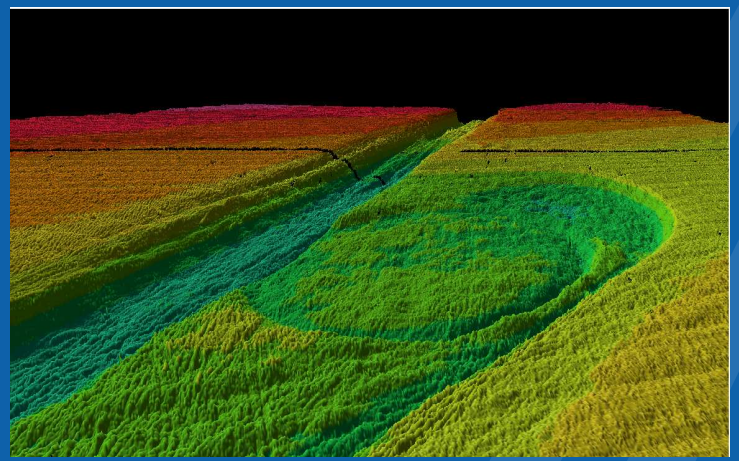
Visualize survey as single picture

# Data validation

## Fledermaus







# Data validation

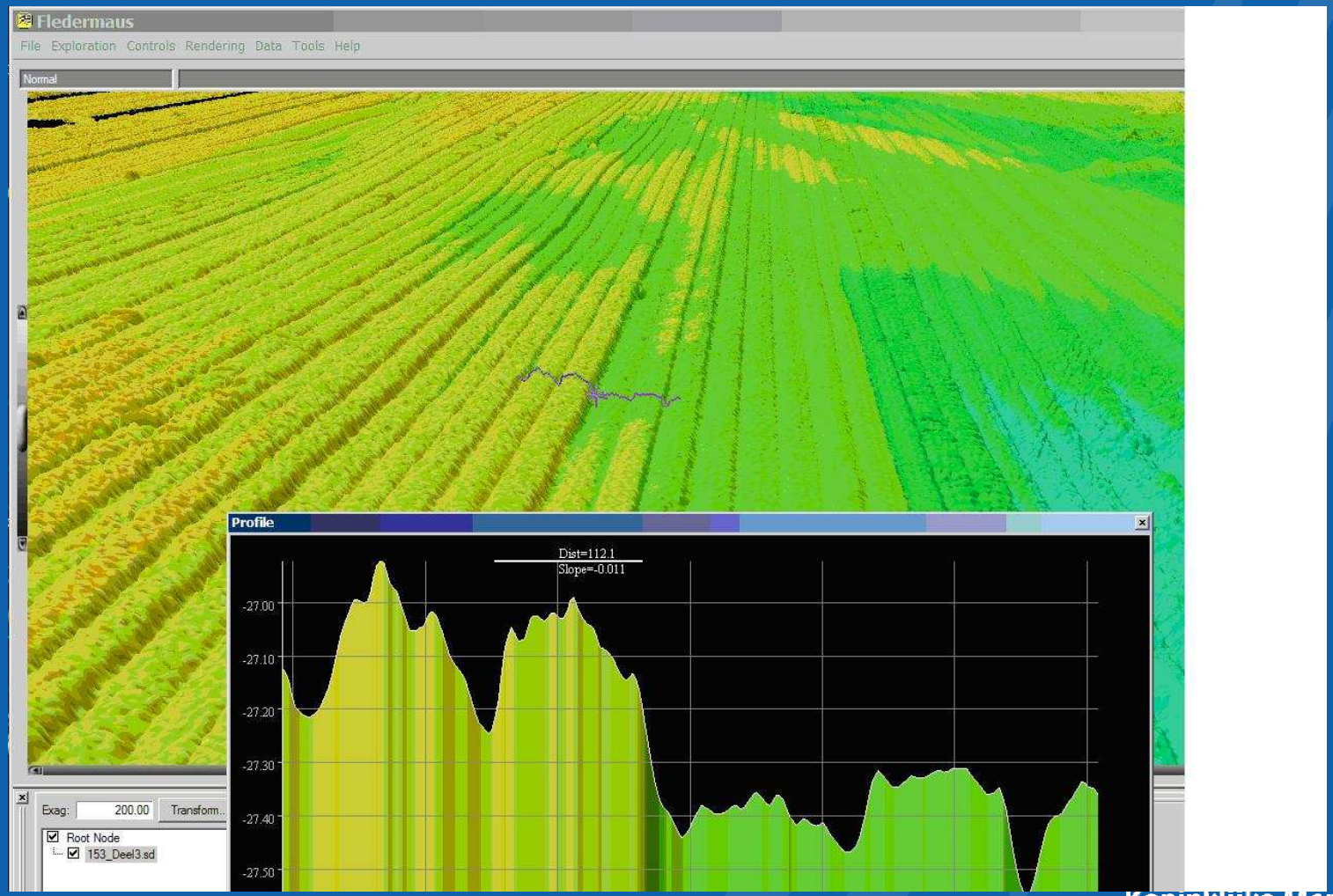
## Subjective interpretation

## 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

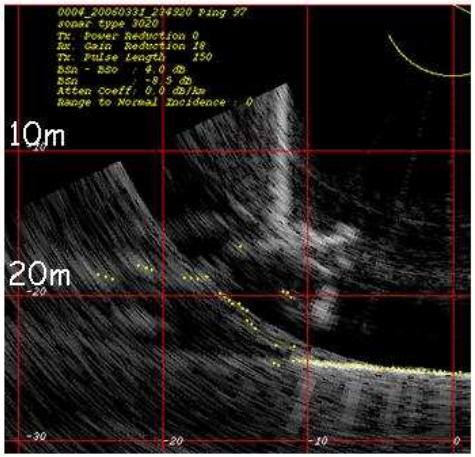
Estimating the minimum clearance over the masthead

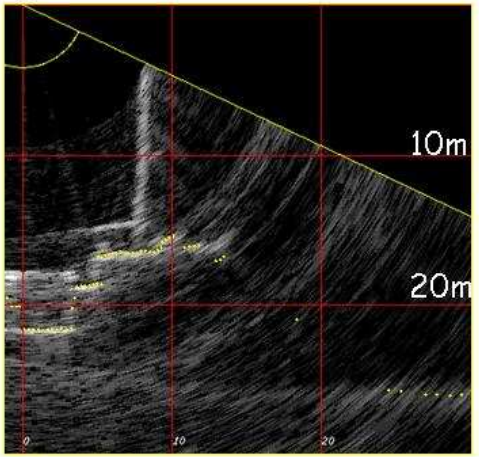
**MV G.B. Church**

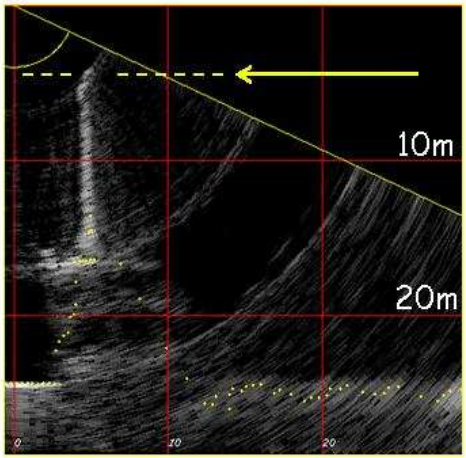
**EM3002**

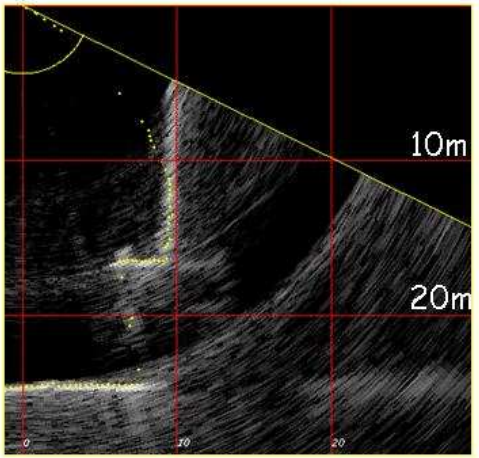
CCGS Otter Bay
March 2006

(yellow dots indicate real-time bottom tracking)



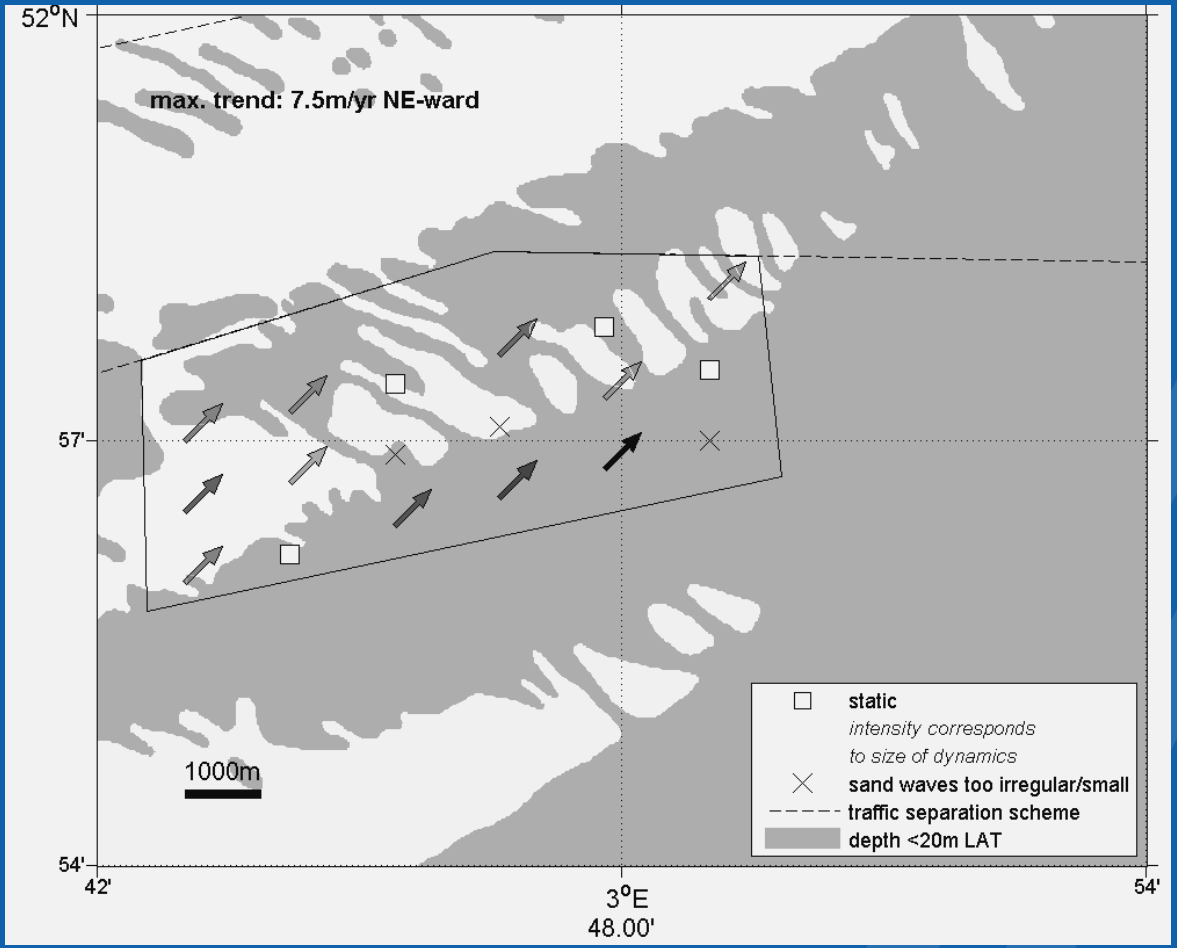



# Developments

- 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

- Knowlegde of relevant morphological and topographical features

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- Essential to distinguish between artifacts

# Finding the needle in the haystack

- Automated process can help

- Knowlegde 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