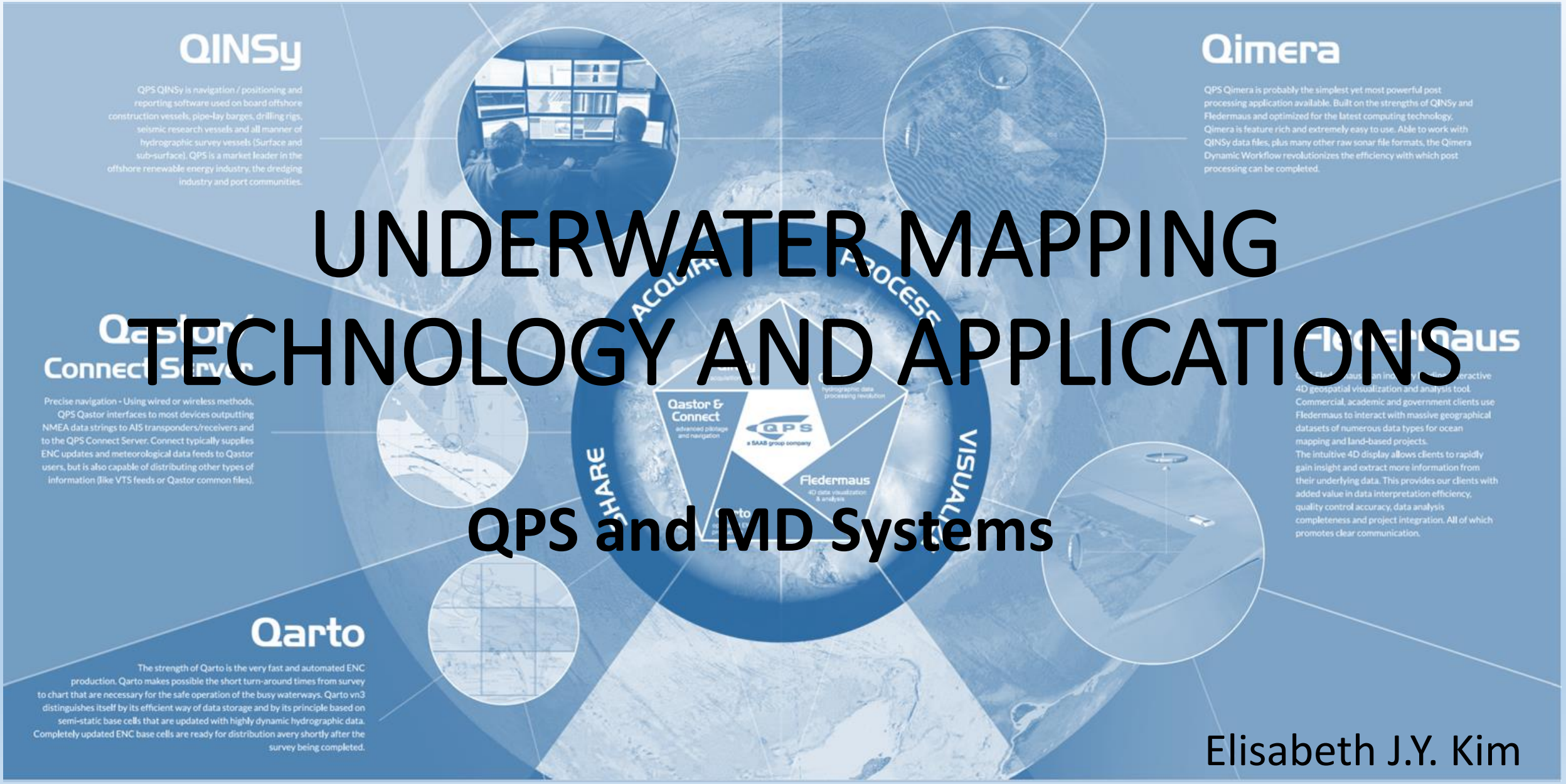
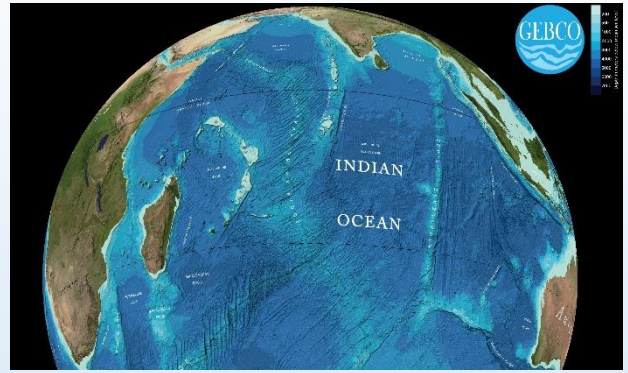



# UNDERWATER MAPPING TECHNOLOGY AND APPLICATIONS

## QPS and MD Systems

Elisabeth J.Y. Kim

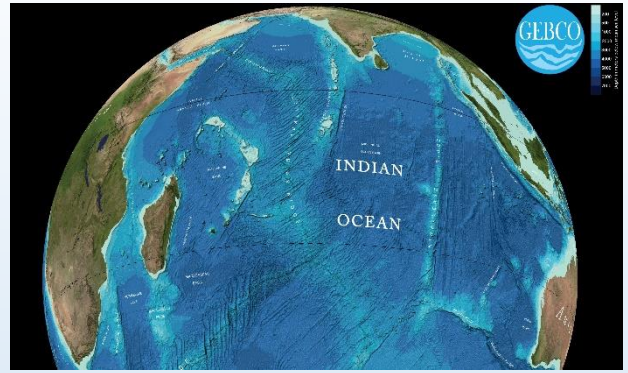
# Ocean Mapping Is Exciting..




*.. and the more we learn about our seafloor, the more we understand scientific processes and their impact on commerce, shipping, safety of navigation, climate change and the coastal environments.*

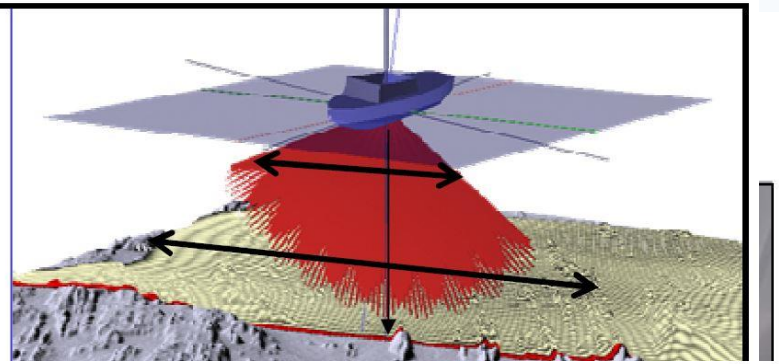
**Using Acoustics.** Acoustic systems (single-beam echosounder, multibeam echosounder, and side scan sonar) are efficient tools capable of monitoring the environmental (physical and biological) evolution.

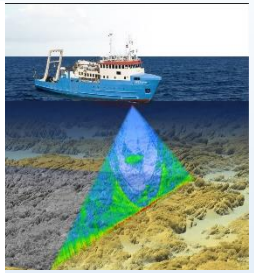
# Ocean Mapping Is Exciting..

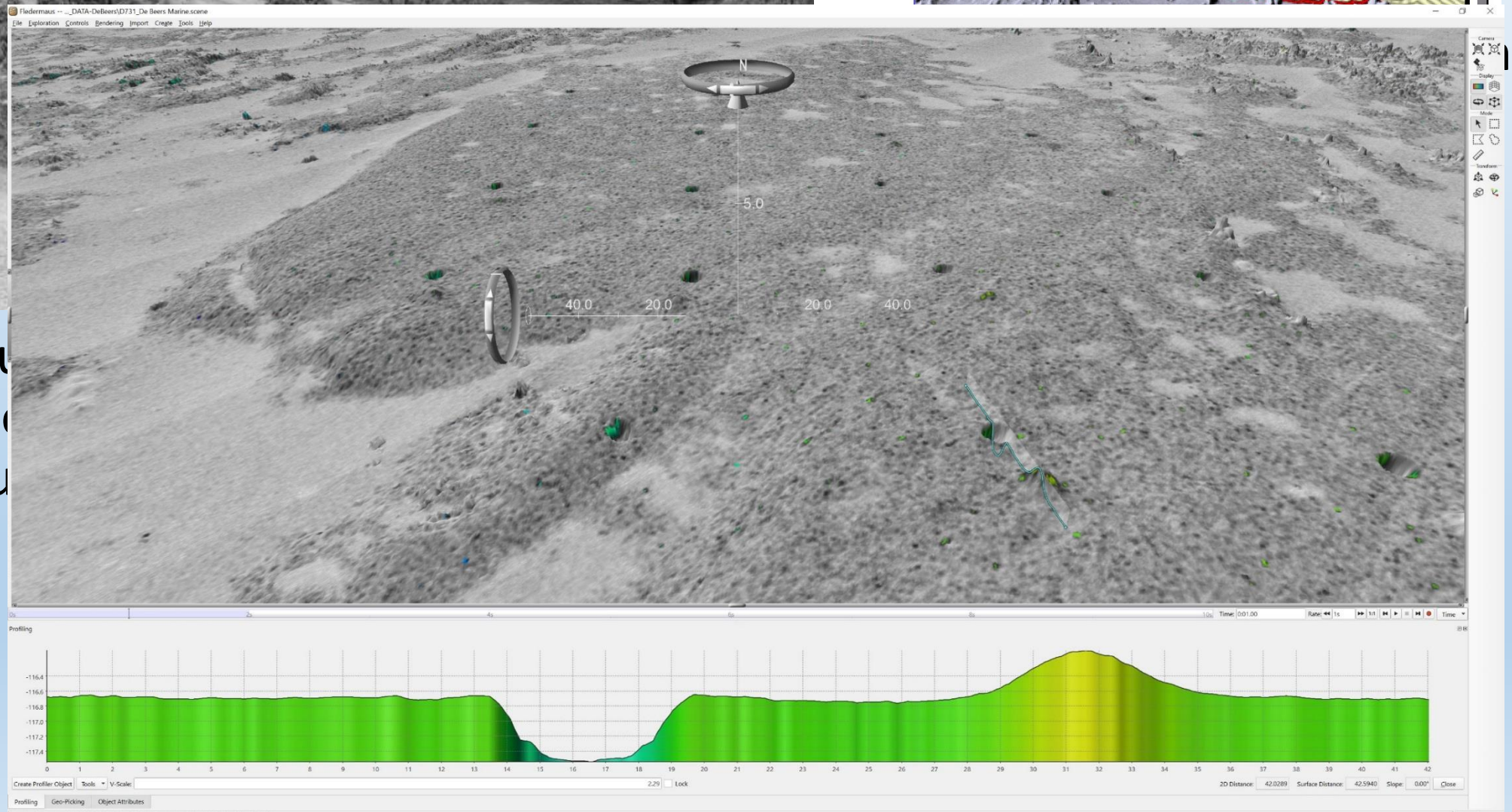



**About This Talk:**

- Principles of echosounding, and especially MBES
- MBES type and choosing
- MBES data types
- Emerging technologies with MBES data
- Sharing results – linkage with GIS
- Summary & Take Home Message



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Create Profiler Object
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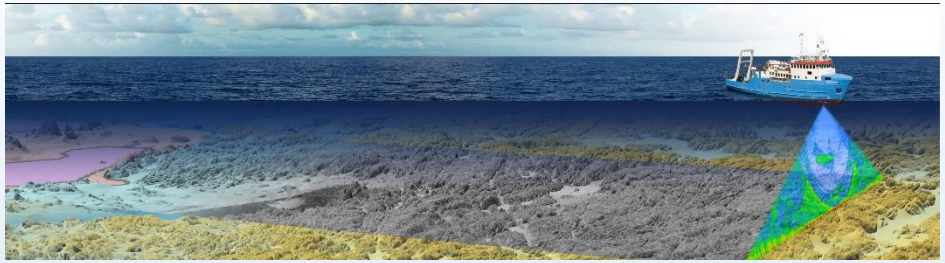
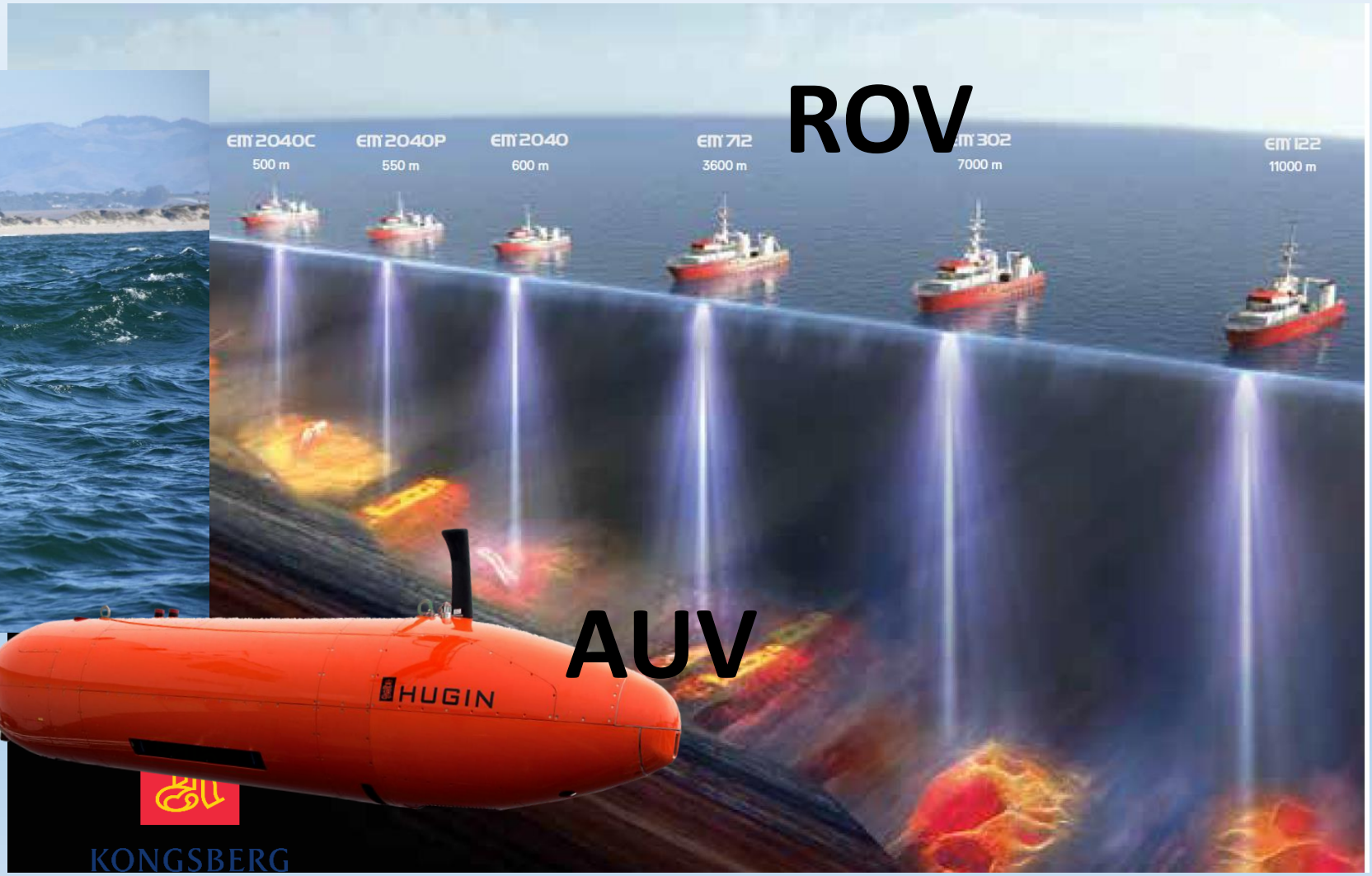
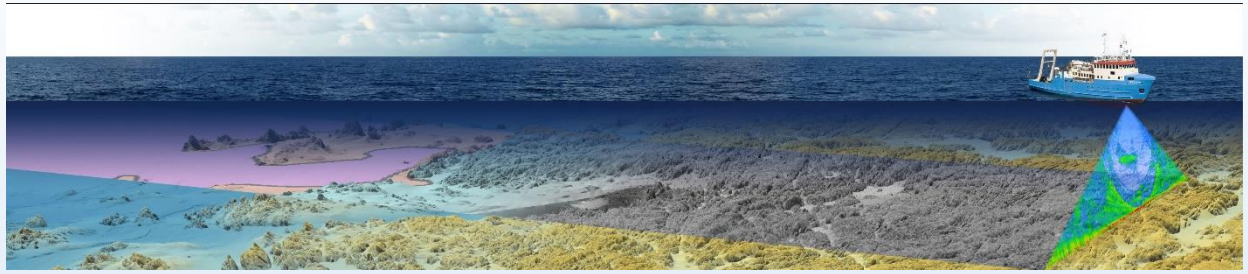
2D Distance:
Surface Distance:
Slope:
Close
Profiling
Geo-Picking
Object Attributes

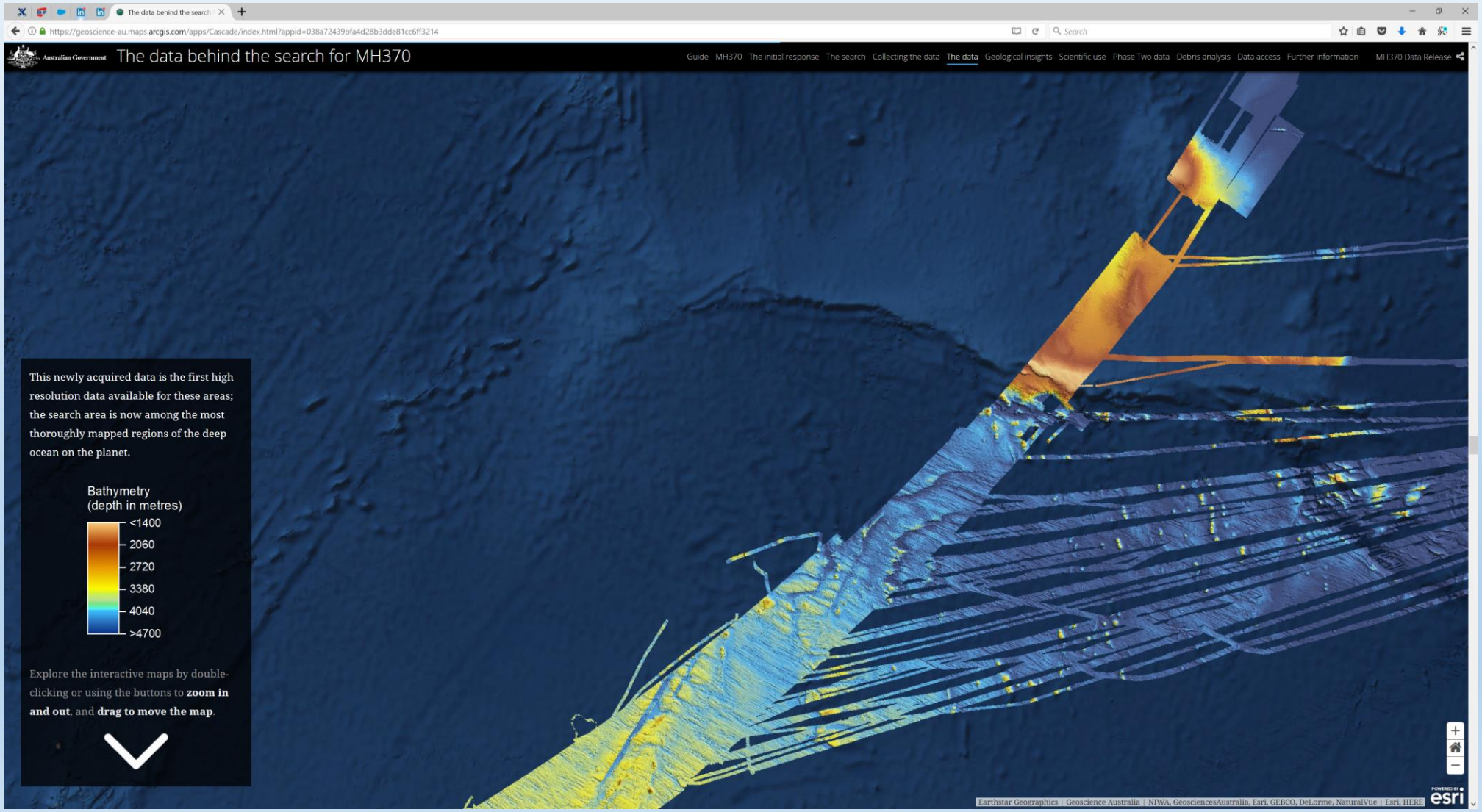
# MBES Installation and survey:



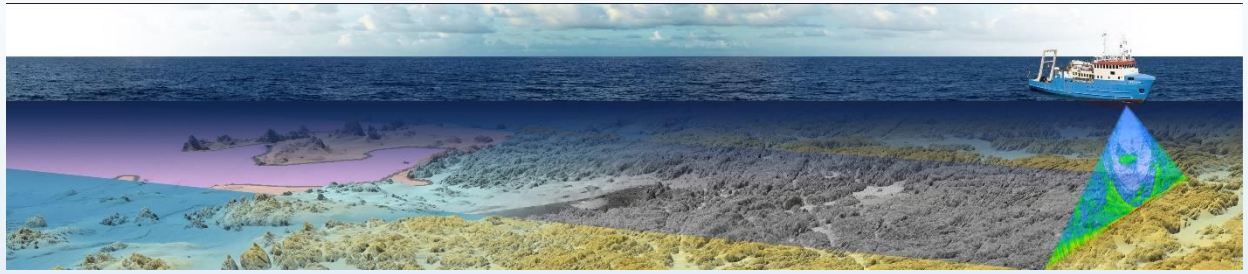



# Modern Day Example





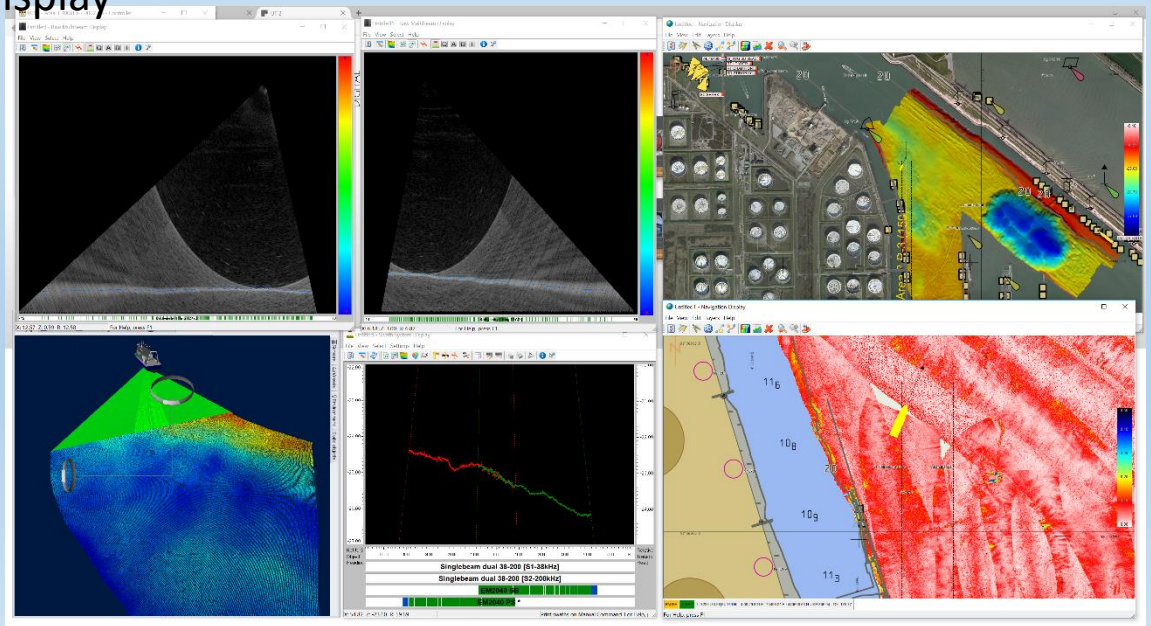
# MBES Data Types



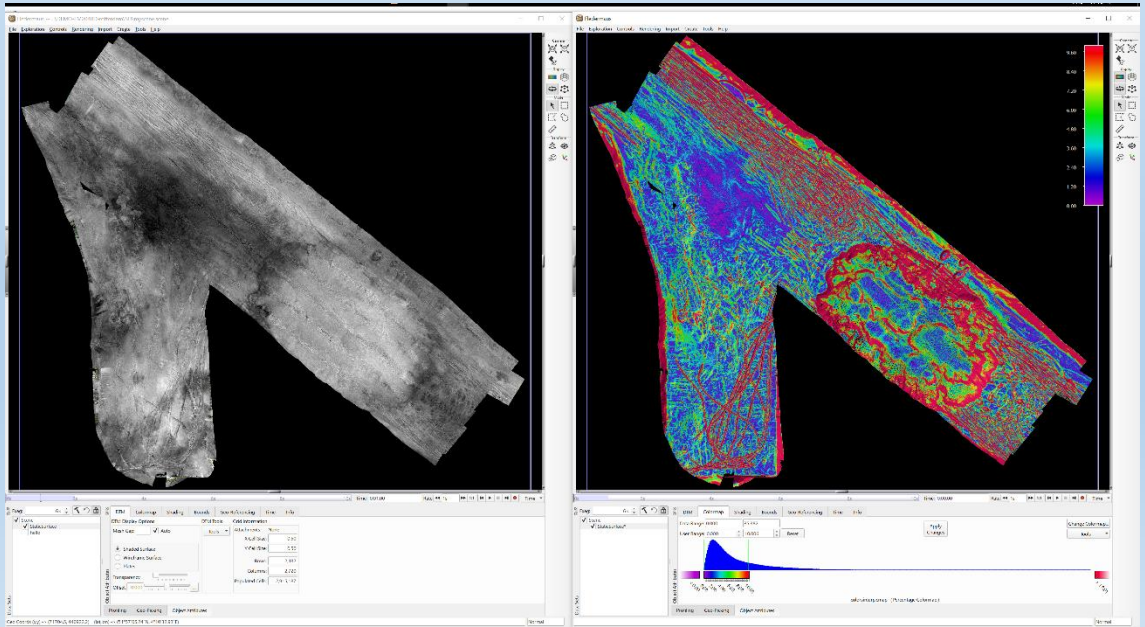
geo-referenced:

- Bathymetry; point cloud or surface, and derived slope/roughness
- Backscatter (amplitude / signal strength)
- Water Column

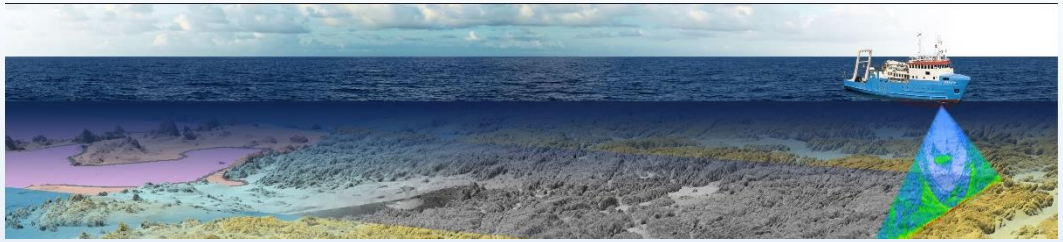
Data display



Processed results

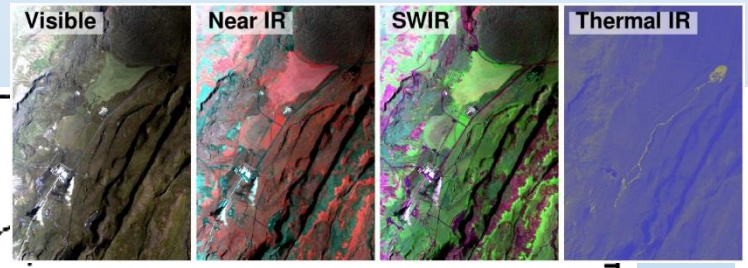


# Multi-Spectral Multibeam



## Multi-Frequency MBES backscatter, and learning from Remote Sensing:

Electro-Magnetic

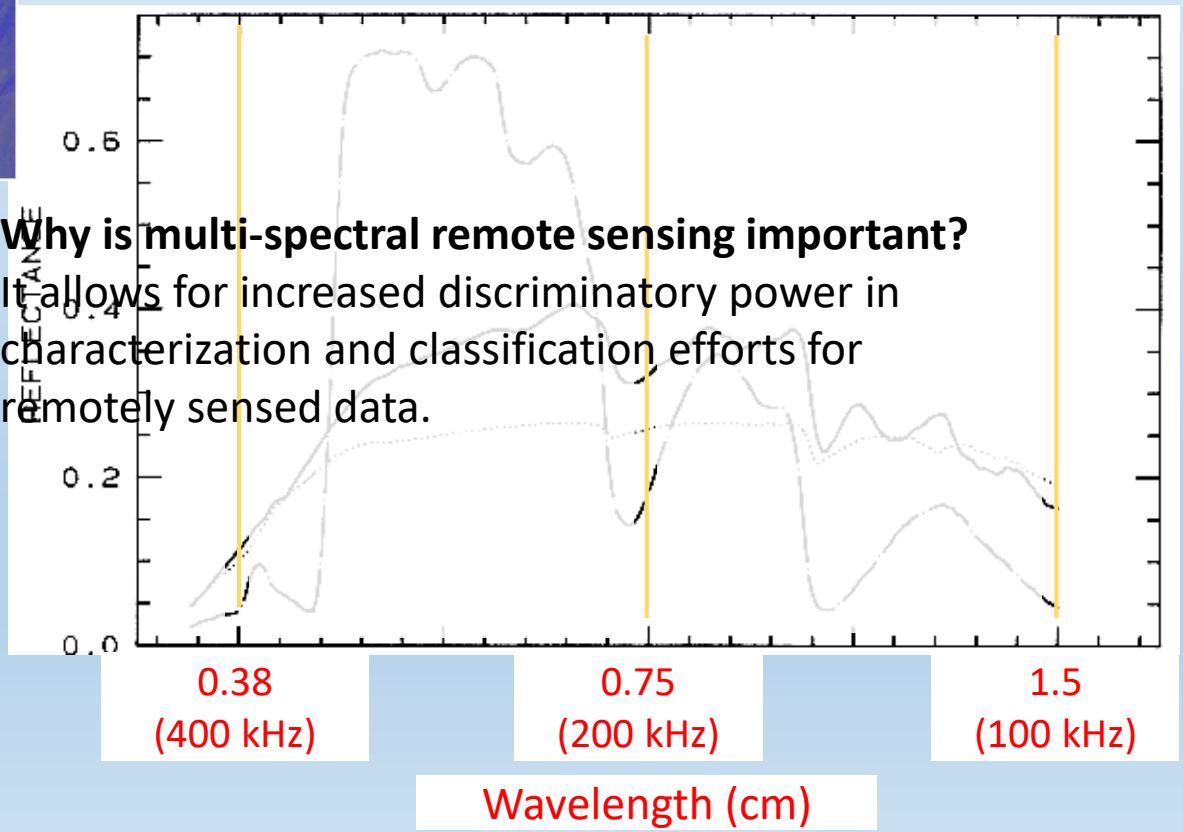






If we can do this with electromagnet sensors, can we do it with acoustic sensors?

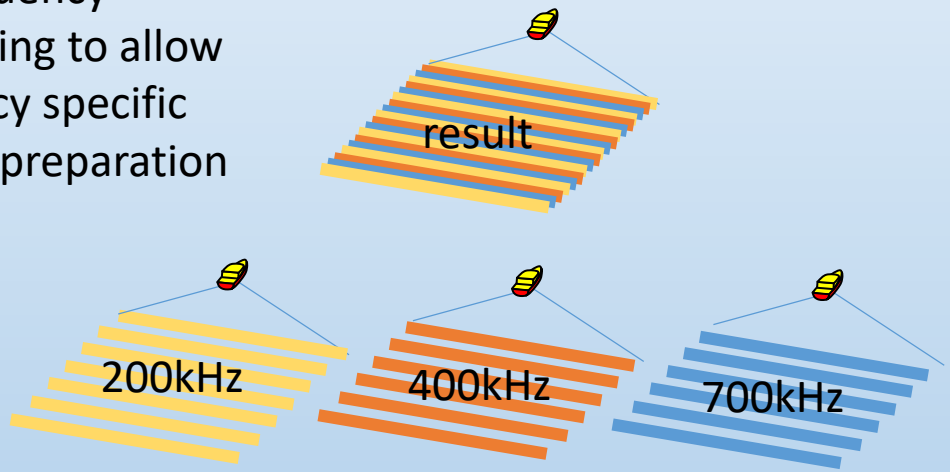
Acoustics

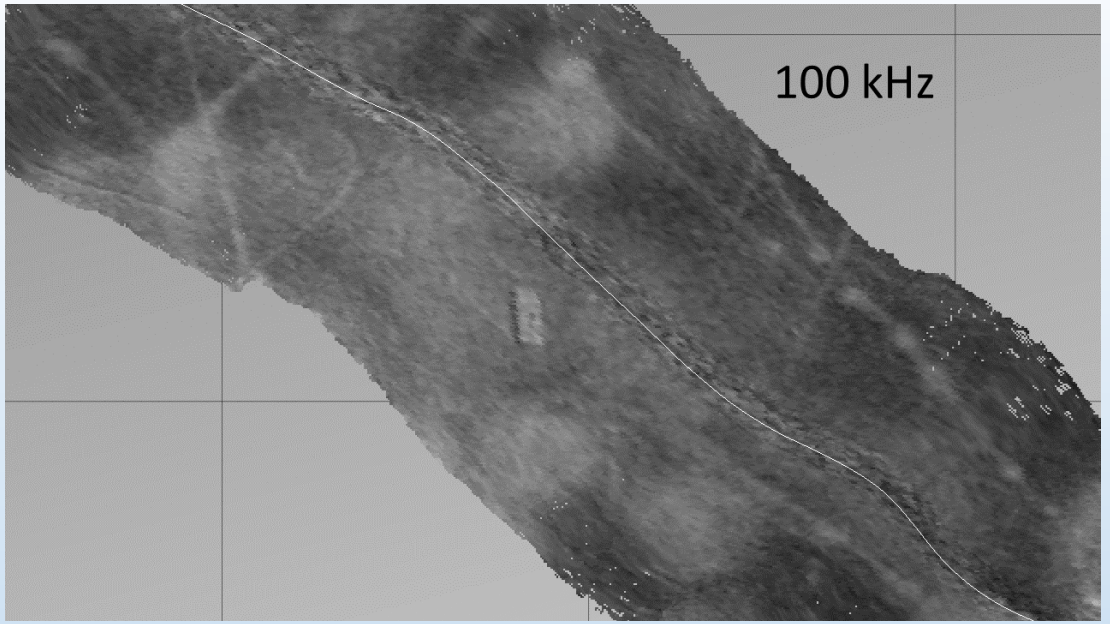



**Why is multi-spectral remote sensing important?**
It allows for increased discriminatory power in characterization and classification efforts for remotely sensed data.

# Multi-Spectral Multibeam: New Capabilities

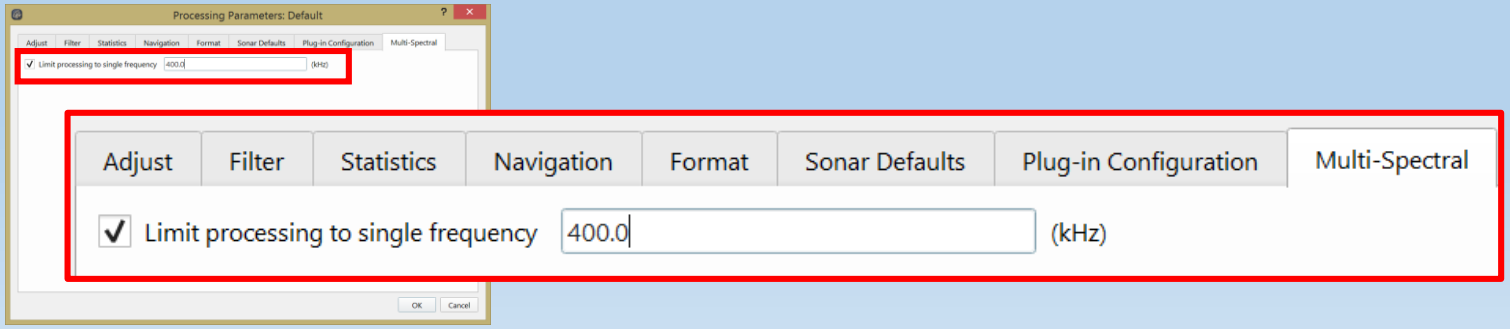
1. Need to unravel the frequency sequencing to allow frequency specific product preparation




2. Need to honour the physics, specifically frequency dependent radiometric and geometric corrections. FMGT has always done this.

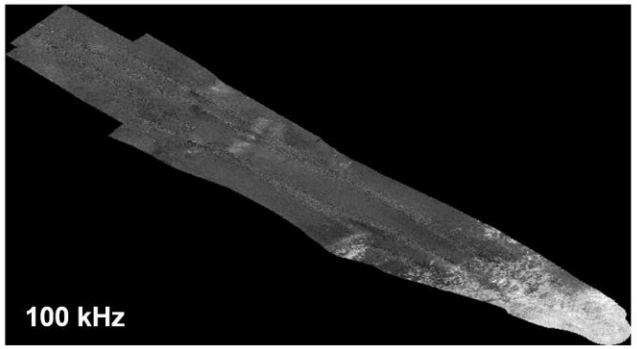
$$BS = EL - SL + 2TL - 10\log_{10}(A) + BP(\theta)$$

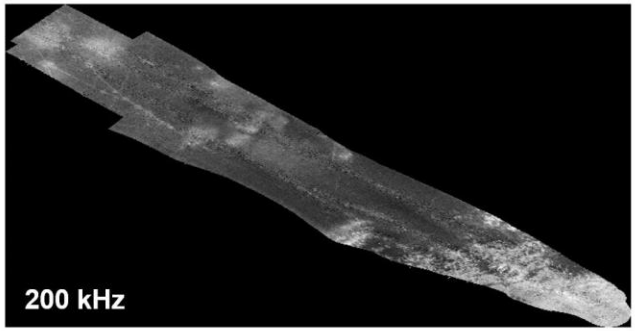


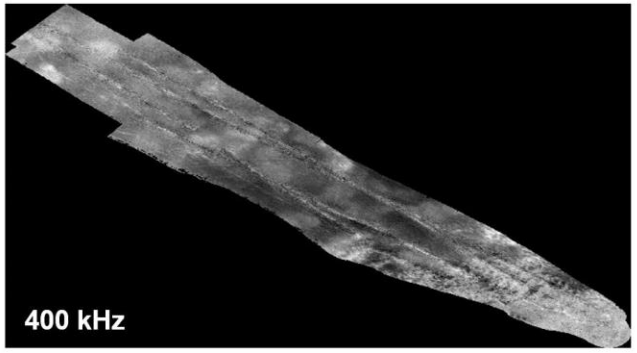

Frequency dependent ensonified area (A) can vary by factor of 4 to 16 (~6-12 dB), depending on beamwidth/pulsewidth limited regime

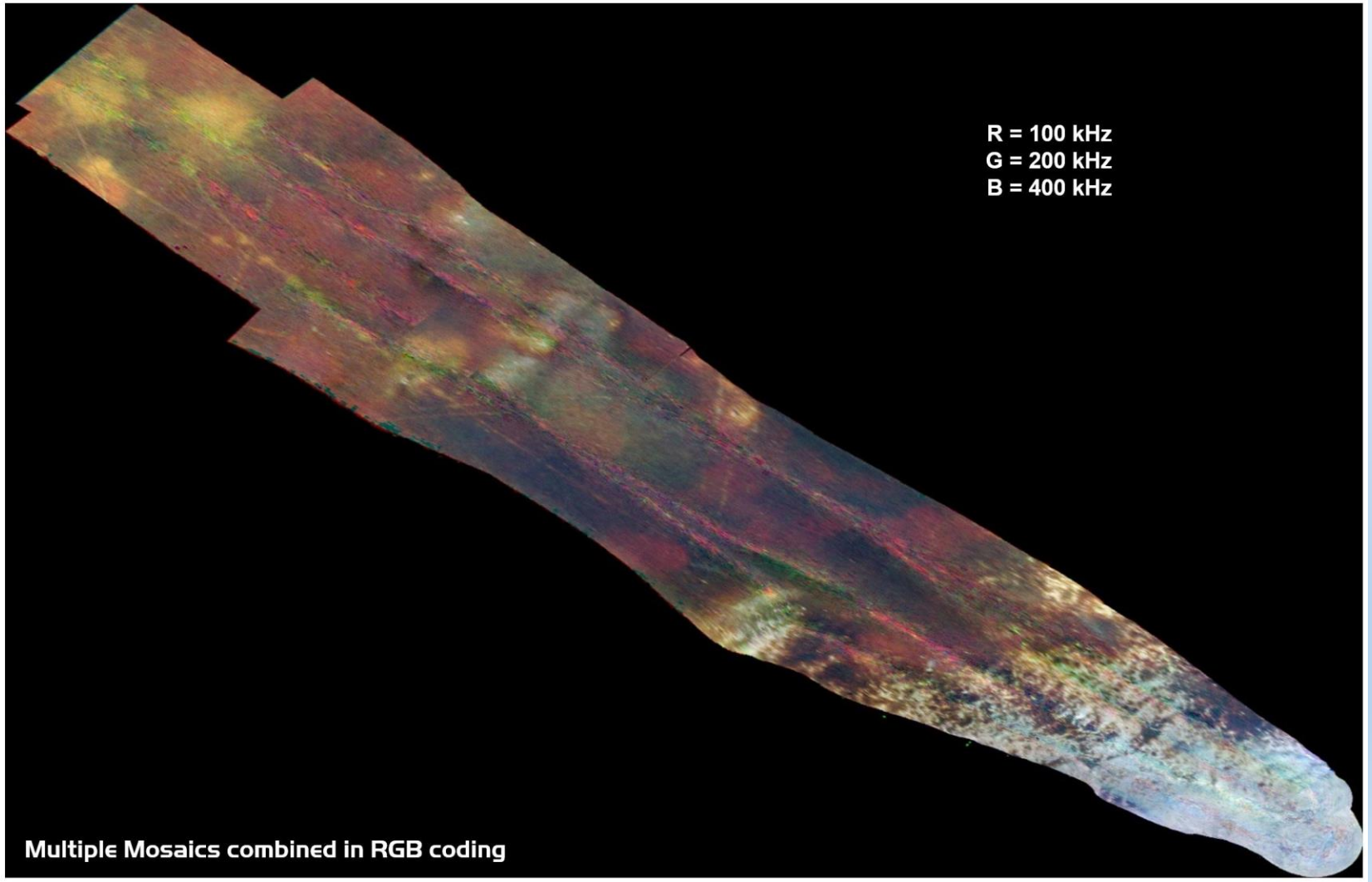
Frequency dependent attenuation (in TL) can vary by tens of dB, depending on water depth

# Multi-Spectral Multibeam

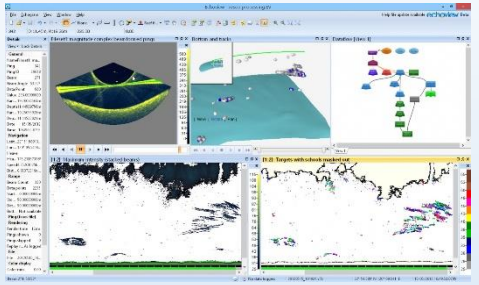


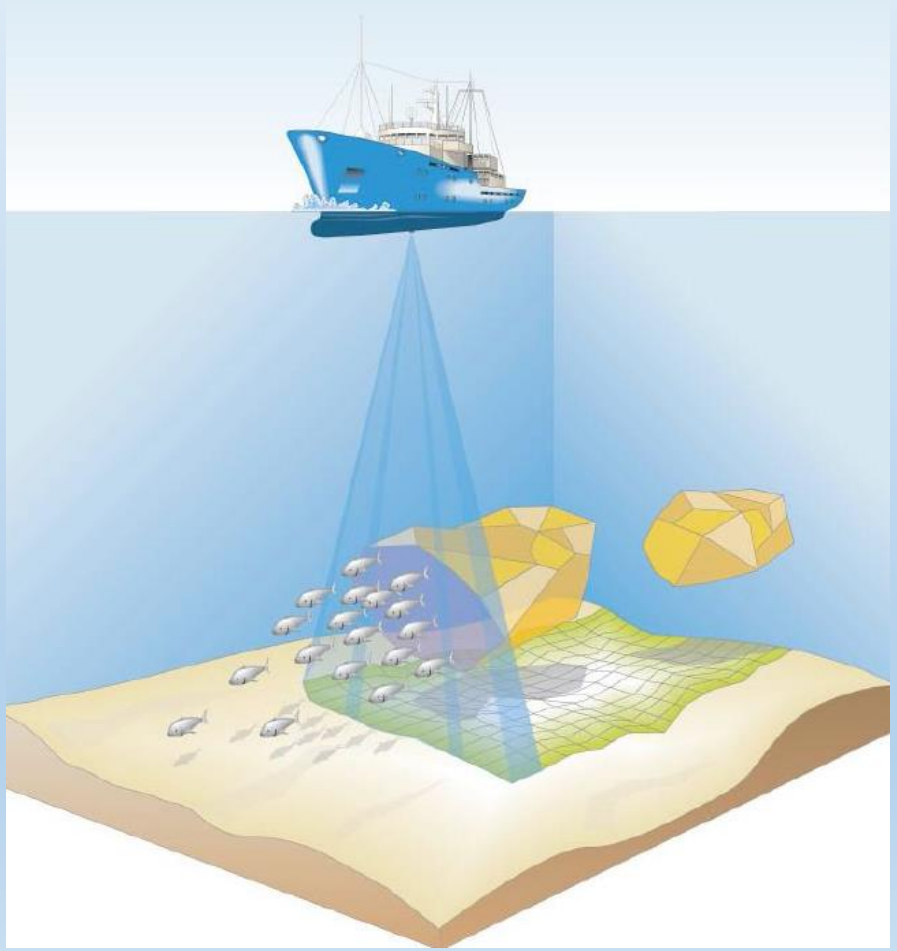



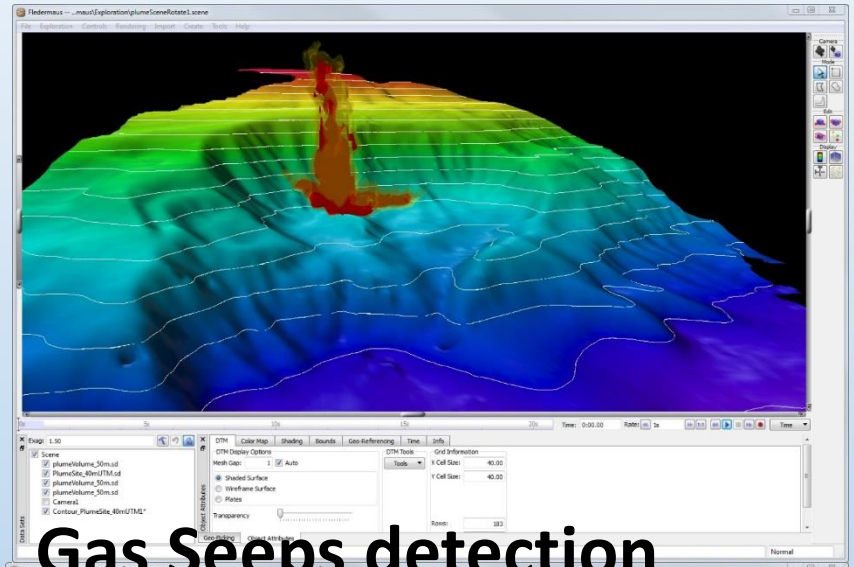
# MBES And Water Column Data



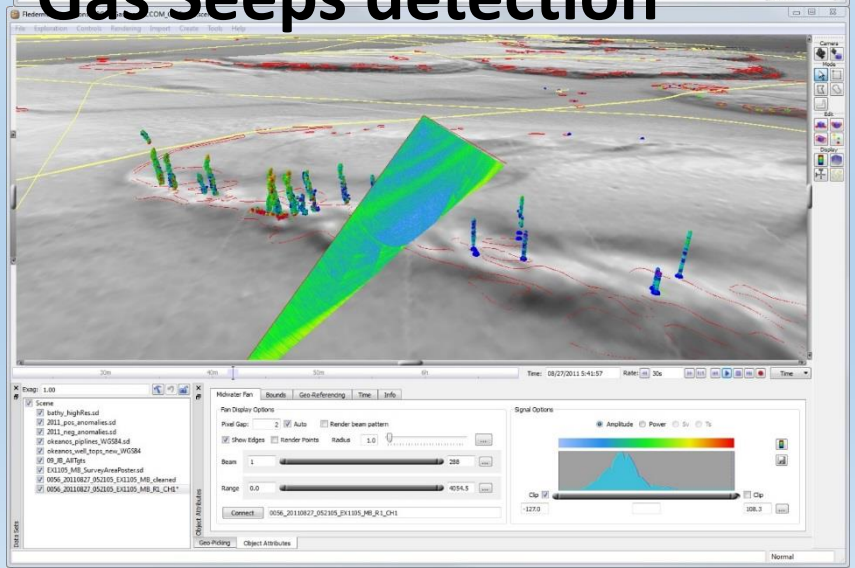
- Fish Stock Assessment
  - Schools and individual fish
  - Biomass and density
- Fish Behaviour & Ecology
  - Swimming movement
  - Fish size
  - Interactions
- Seabed Habitat Classification
  - Bottom feature calculations
  - Substrate classification (PCA; k-means)

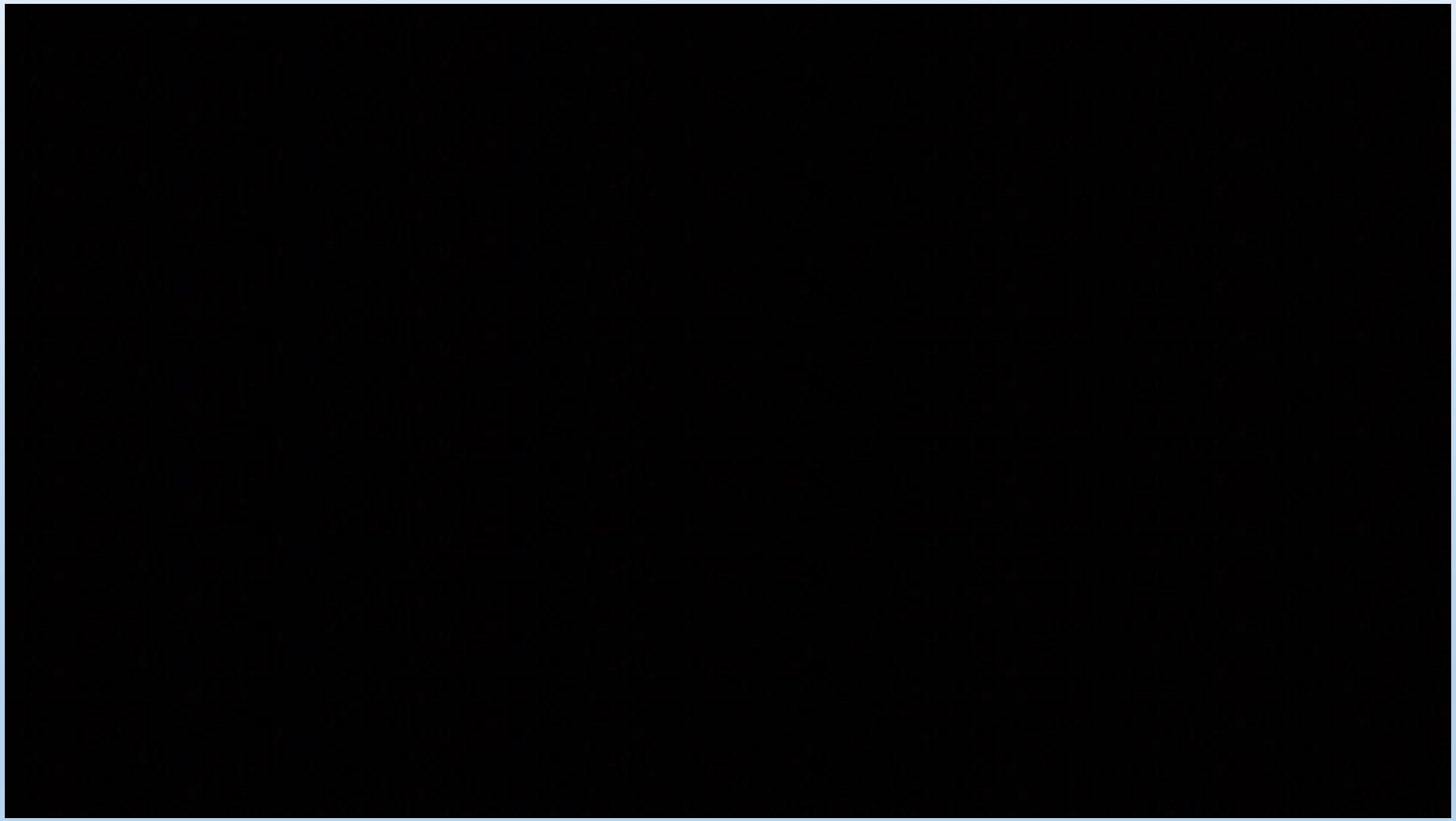


# MBES And Water Column Data

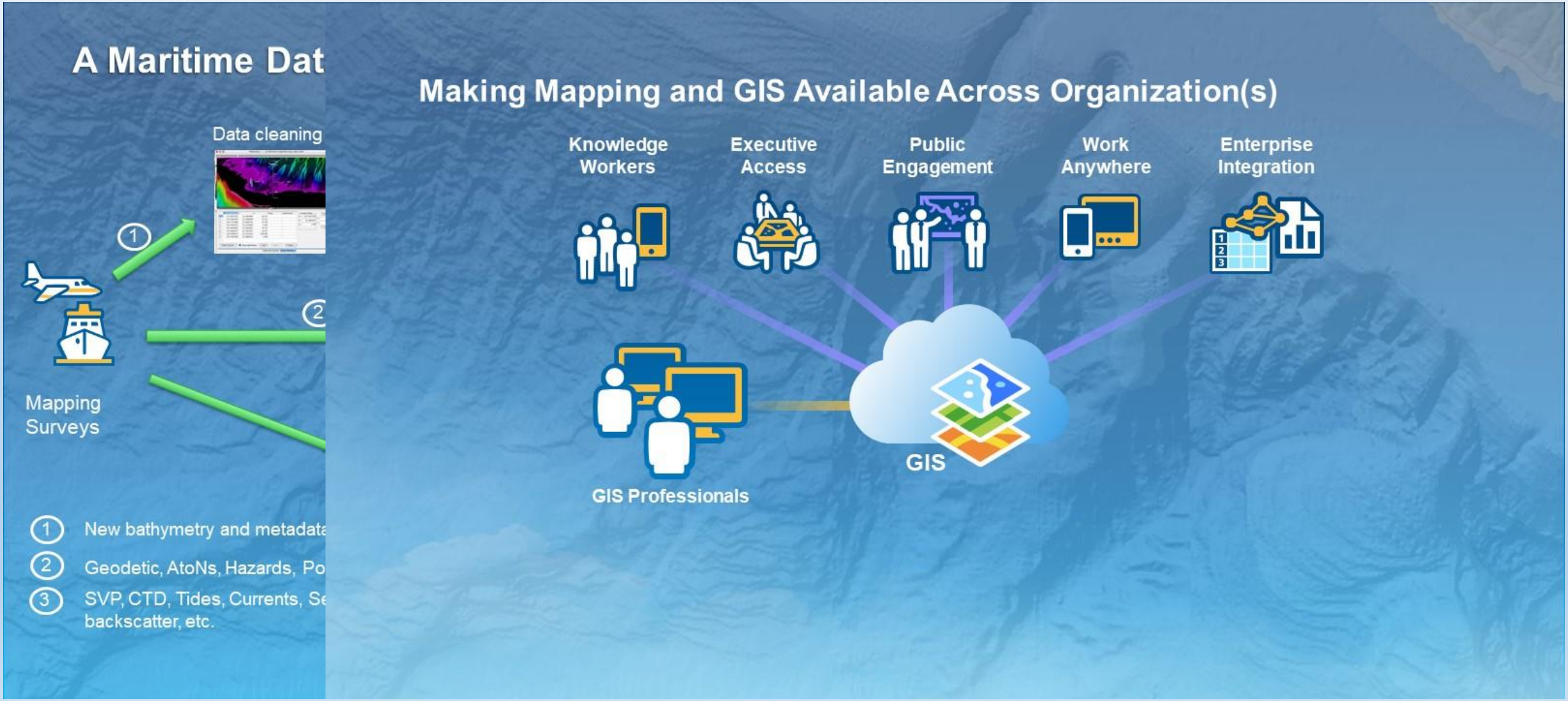


**Gas Seeps detection**





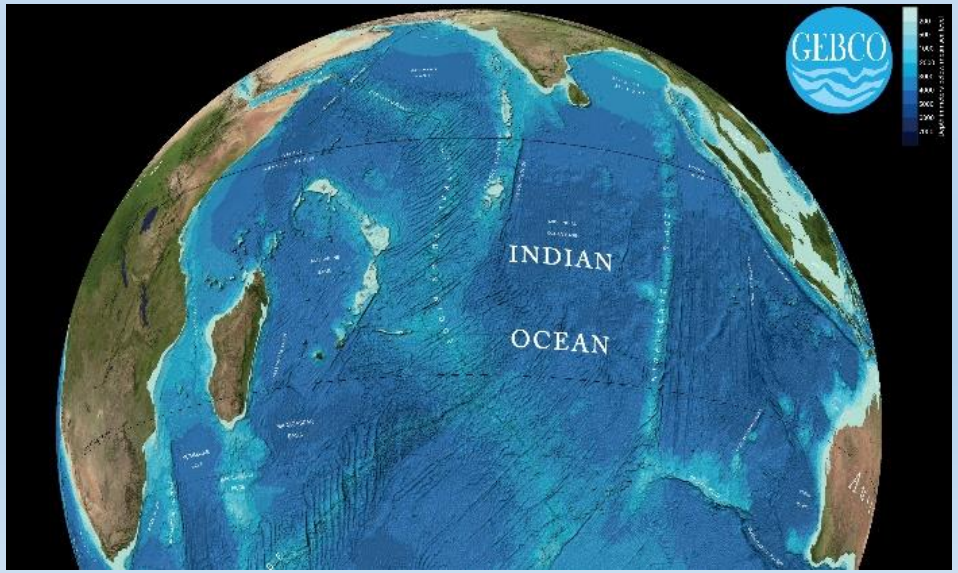
# GIS And Sharing Ocean Mapping Data

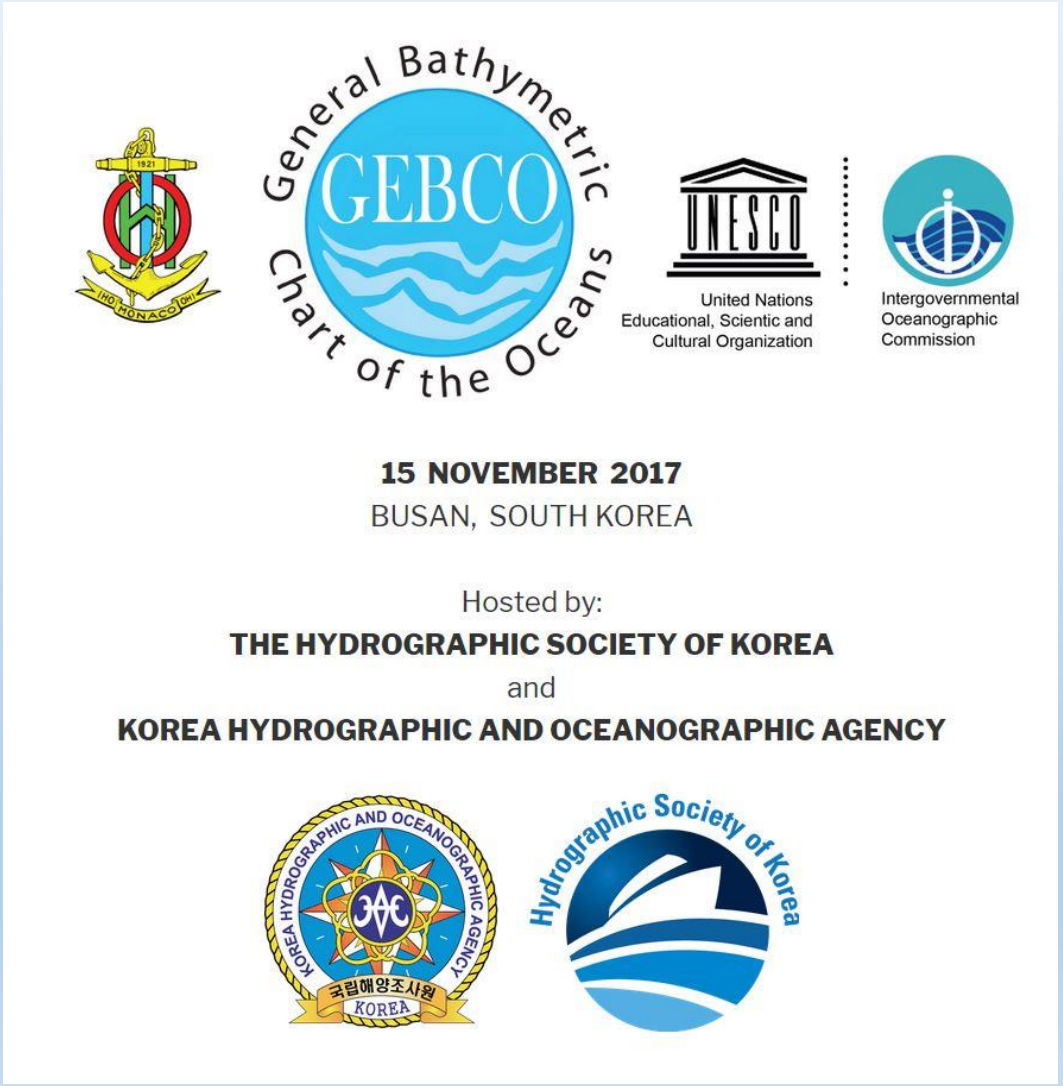


# Take Home Message:

- Ocean Mapping Is Exciting!

- **Collect once, use many times.**
  Other data than just bathymetry (physical nature of seabed), and other consumers (e.g. habitat mappers and ocean scientists).






# THANK YOU.

Email : sales@qps.nl
Marketing and Sales manager : Frans Nijsen