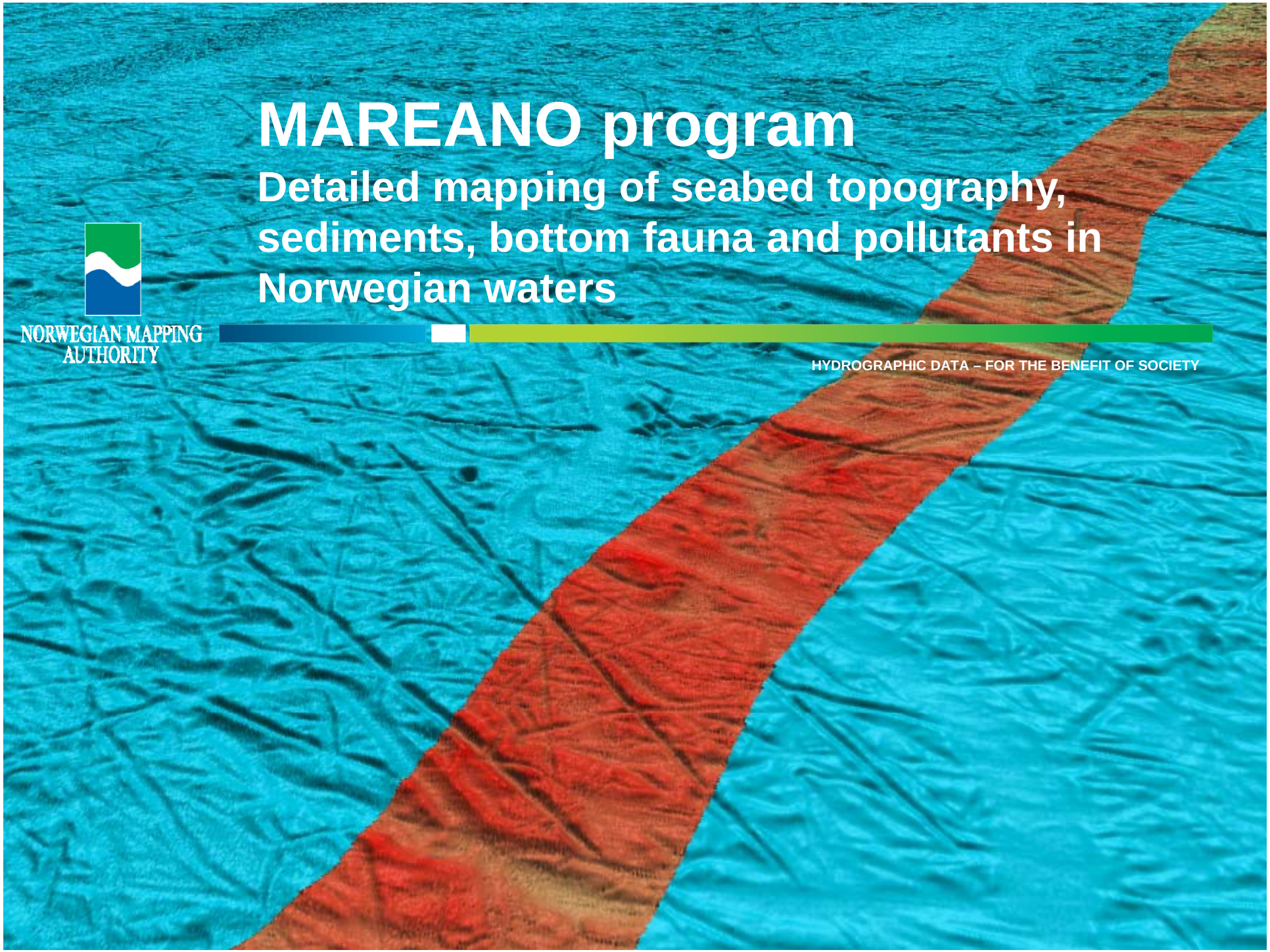
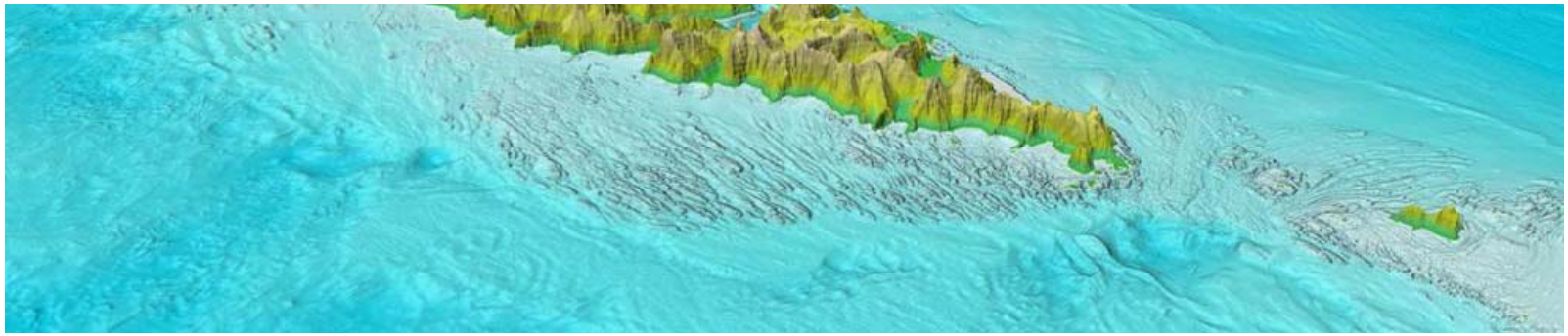

MAREANO program
Detailed mapping of seabed topography, sediments, bottom fauna and pollutants in Norwegian waters
NORWEGIAN MAPPING AUTHORITY
HYDROGRAPHIC DATA – FOR THE BENEFIT OF SOCIETY

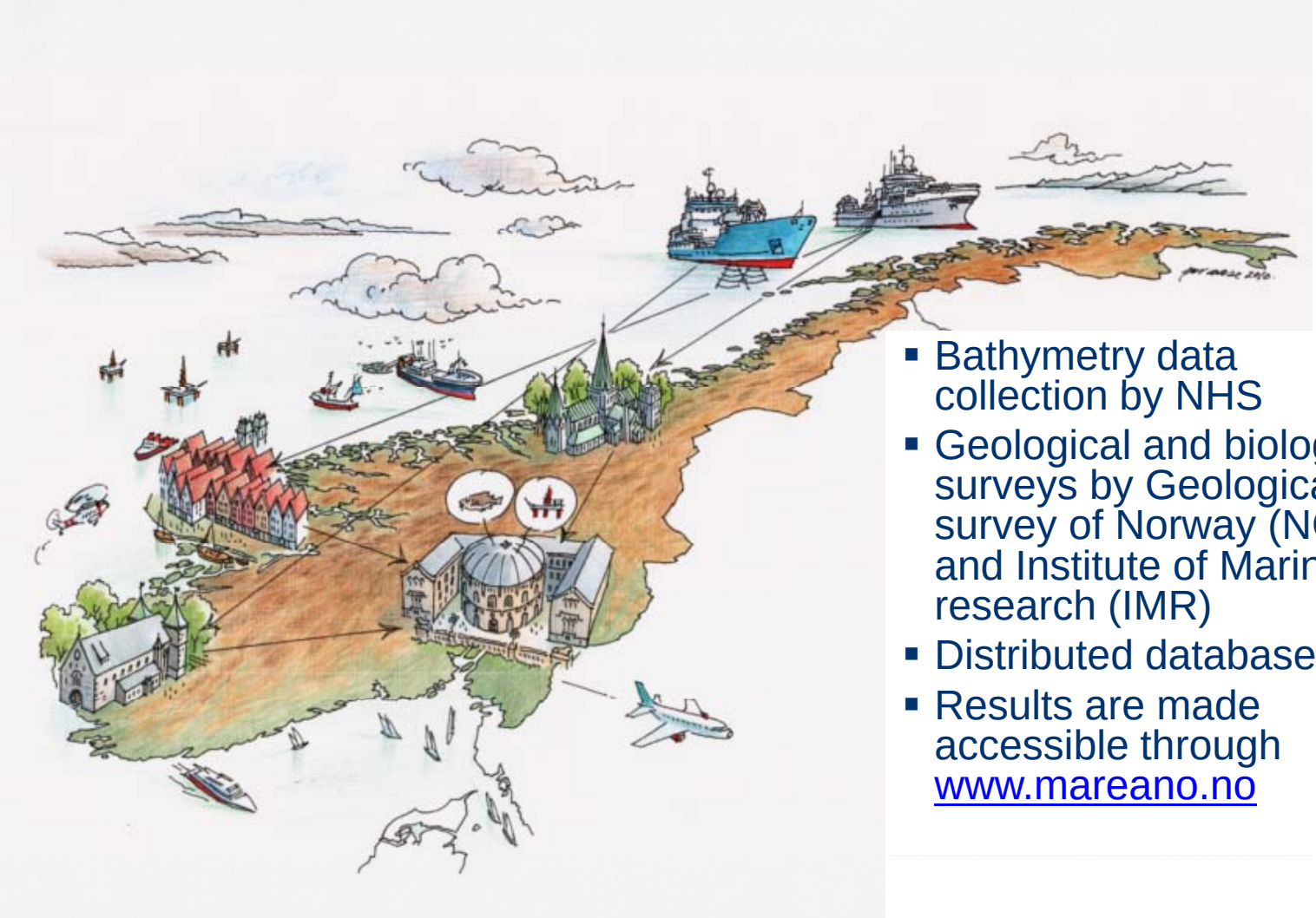
MAREANO program - Detailed mapping of seabed topography, sediments, bottom fauna and pollutants in Norwegian waters



Hanne Hodnesdal
Norwegian Mapping Authority Hydrographic Service (NHS)

Arctic-Antarctic Seafloor Mapping Meeting 2011
Stockholm 3 May 2011

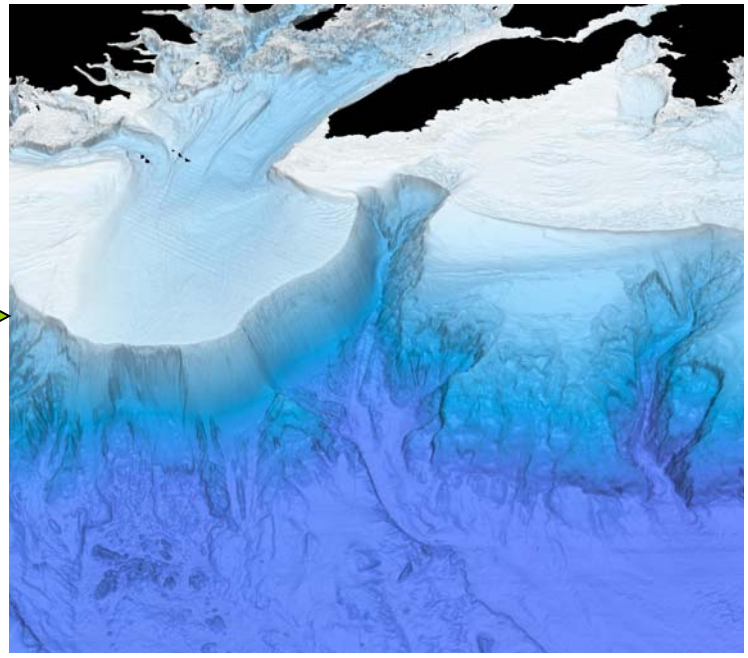
MAREANO – Dataflow



- Bathymetry data collection by NHS
- Geological and biological surveys by Geological survey of Norway (NGU) and Institute of Marine research (IMR)
- Distributed databases
- Results are made accessible through www.mareano.no

From bathymetry surveys to digital terrain models (DTM)

Bathymetry survey with multibeam echosounder



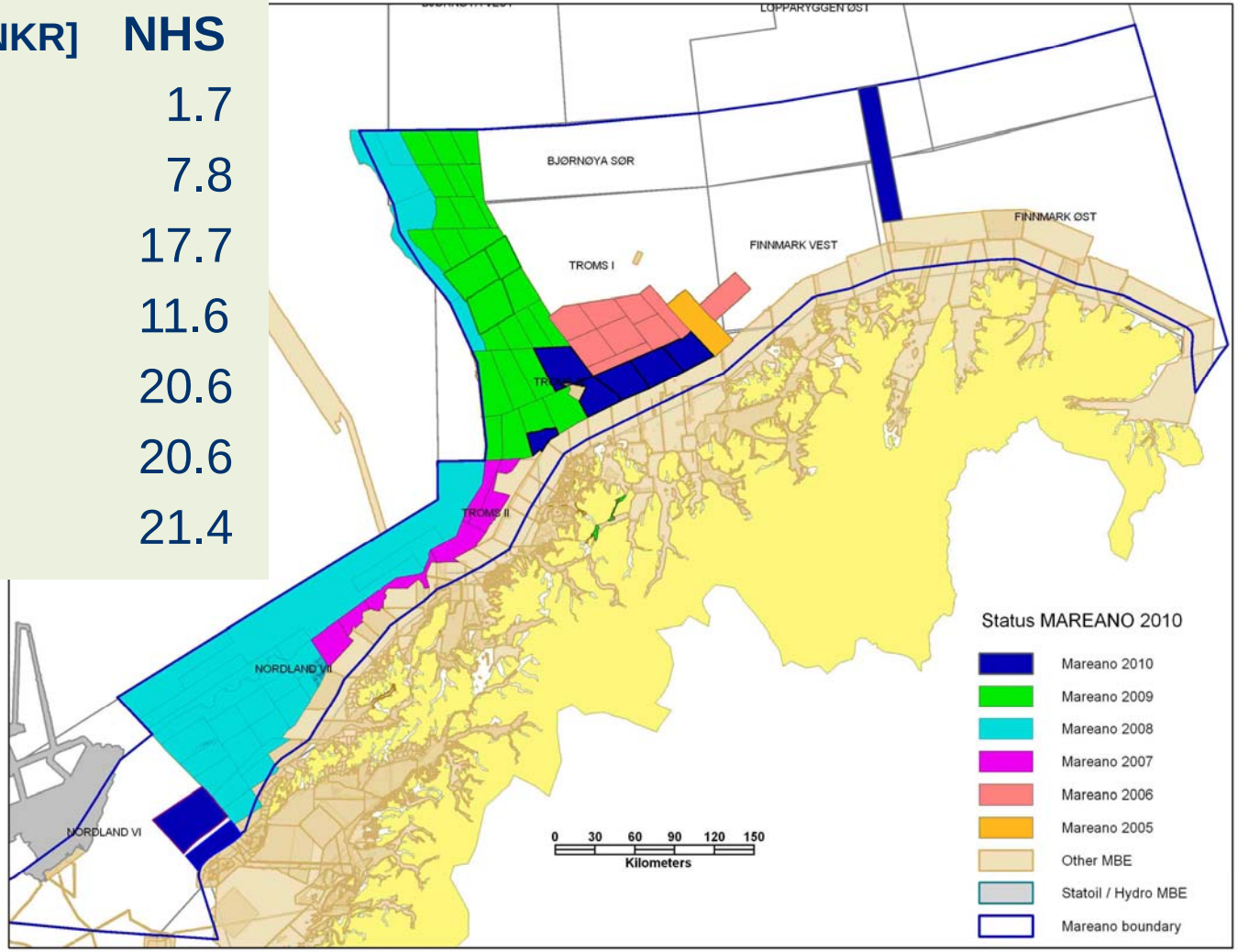
Additional acquisition:

- Backscatter (echosounder)
- Water column data (echosounder)
- Gravity (separate sensor)

Depth data from different sources: Defence, gas- and oil industri, other projects, own vessel and purchase of bathymetry surveys

FINANCING AND PROGRESS

Year	Granted [NKR]	NHS
2005	5.0 mill	1.7
2006	23.6 mill	7.8
2007	32.6 mill	17.7
2008	32.6 mill	11.6
2009	51.5 mill	20.6
2010	51.5 mill	20.6
2011	52.4 mill	21.4



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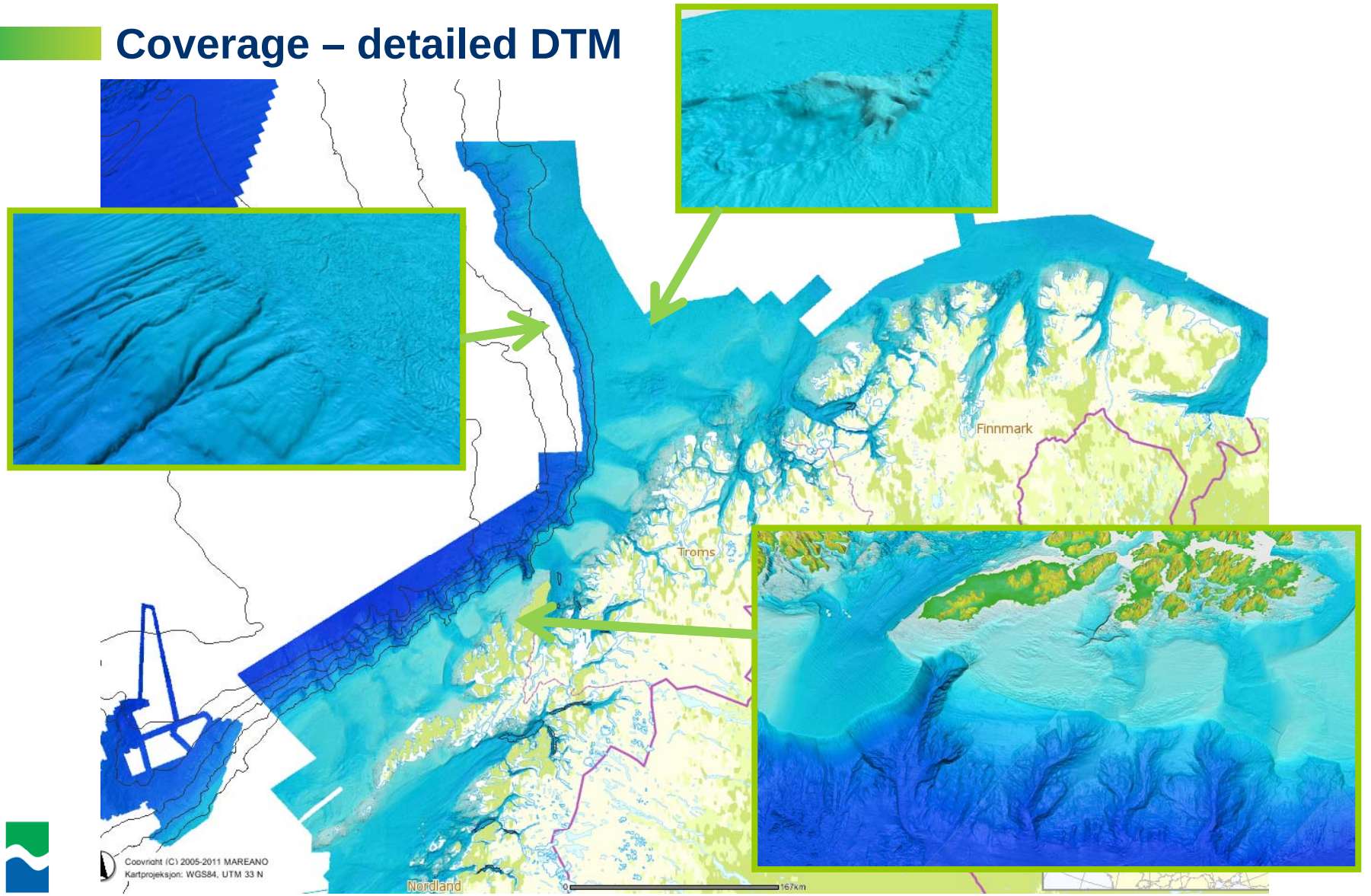
Coverage – detailed DTM



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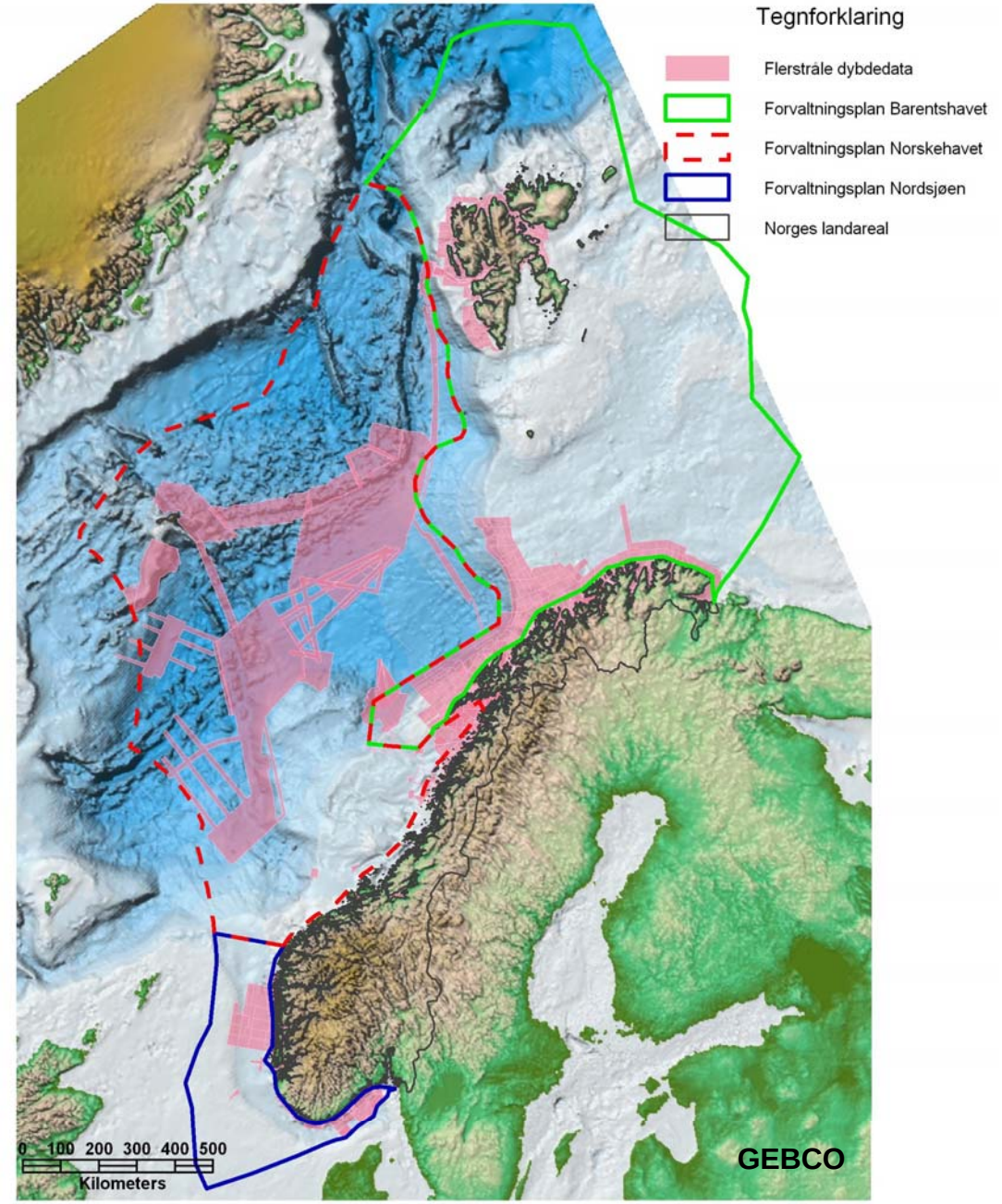
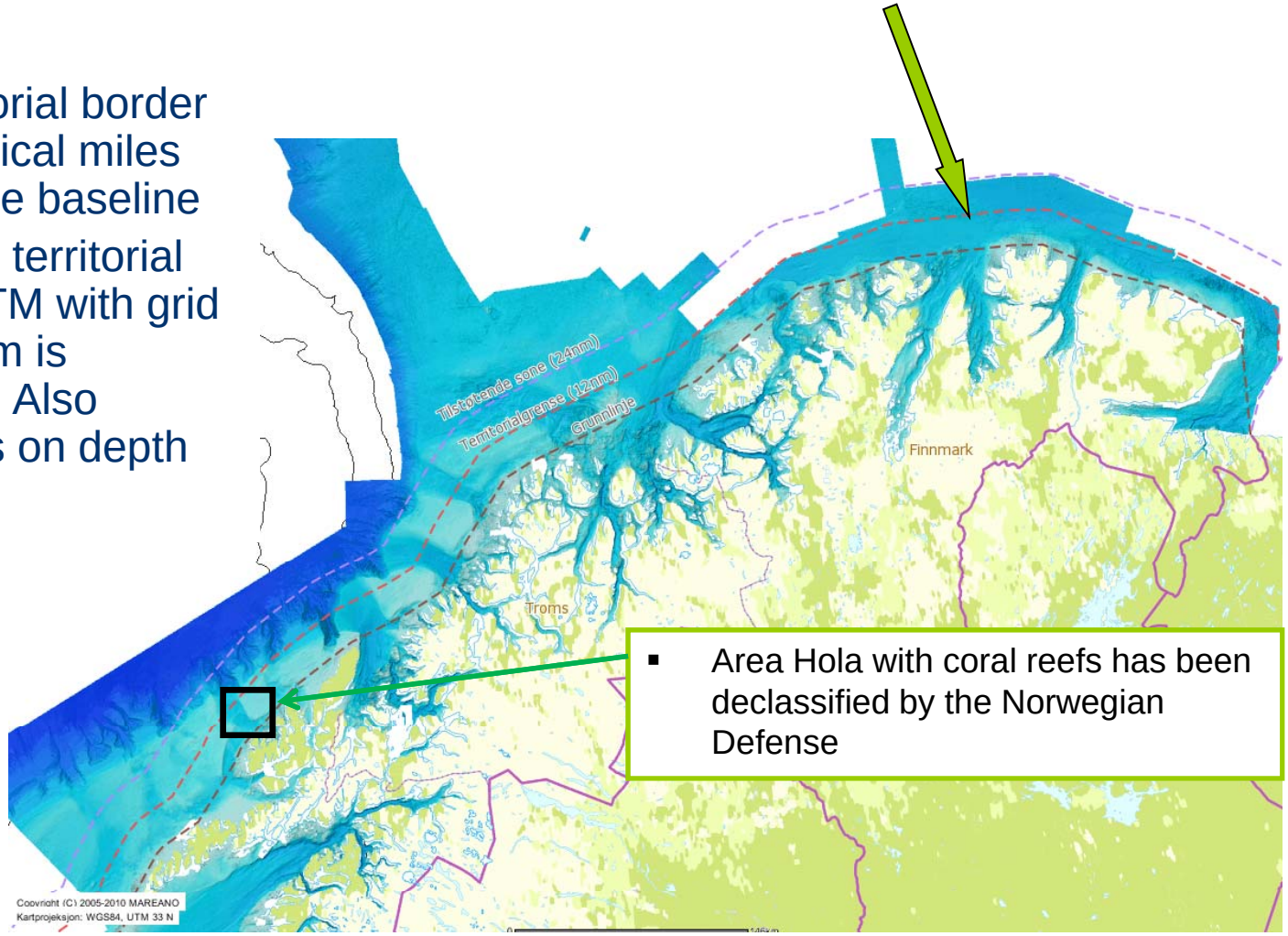
Norwegian sea areas

- Large areas (2.1 mill km^2)
- Only partly covered by MBE data
- Bathymetry data collection is expensive
- Important to use data from other sources: Defence, oil- and gas industry etc.



Detailed depth data are classified inside the territorial border

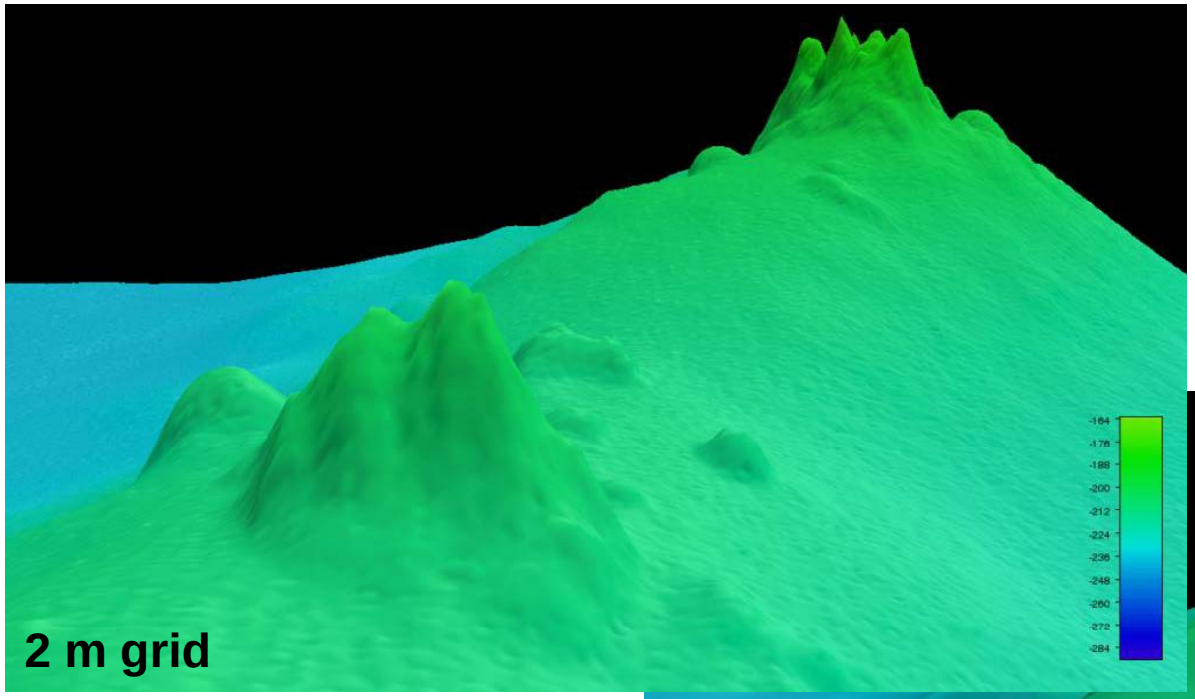
- The territorial border is 12 nautical miles outside the baseline
- Inside the territorial border DTM with grid size < 50m is classified. Also limitations on depth contours

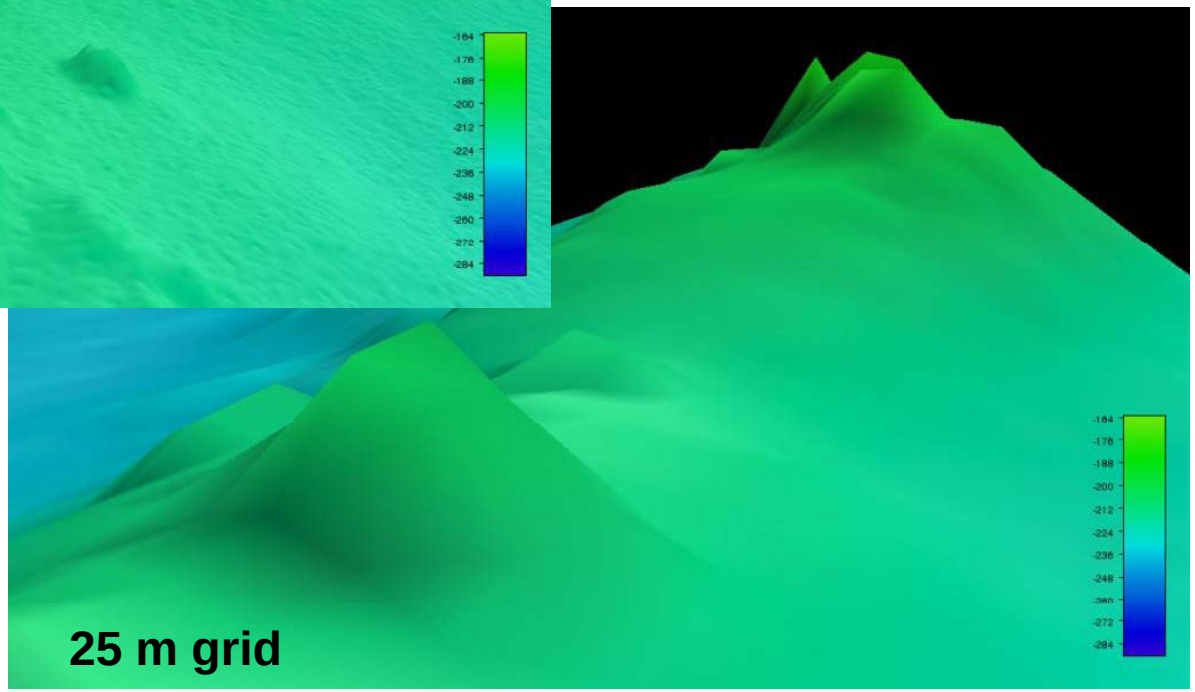


- Area Hola with coral reefs has been declassified by the Norwegian Defense

DIGITAL TERRAIN MODELS WITH DIFFERENT RESOLUTION

- Example: ca 200m depth, Norwegian Sea west of Lofoten





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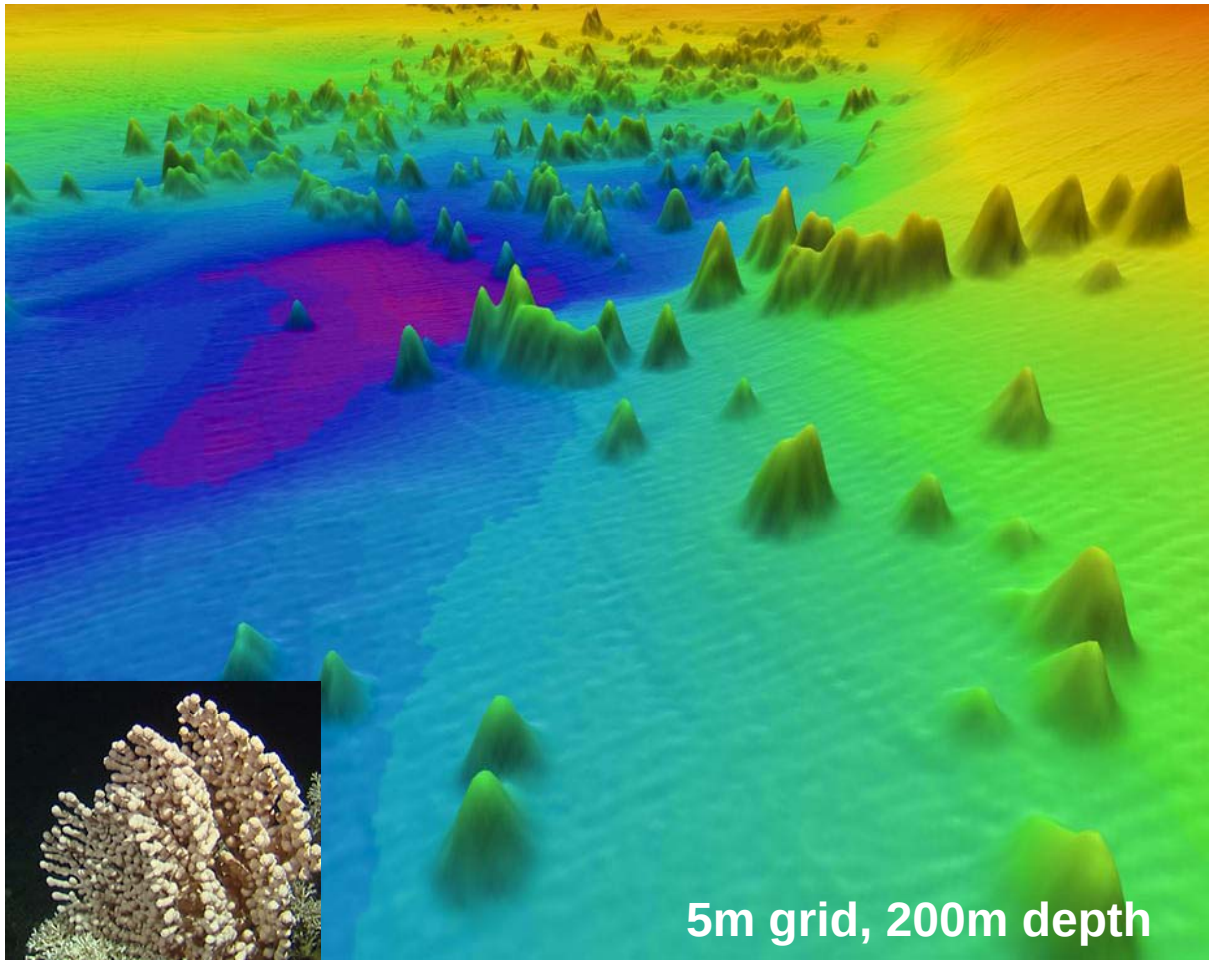
What we are looking for in the seabed topography

Corals

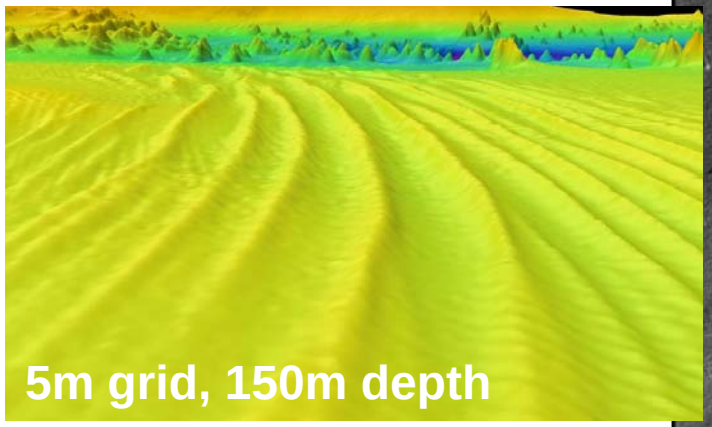
- Depth 40m to 450m
- Height up to 35m
- Reefs can be more than 100m long



What are we looking for in the seabed topography

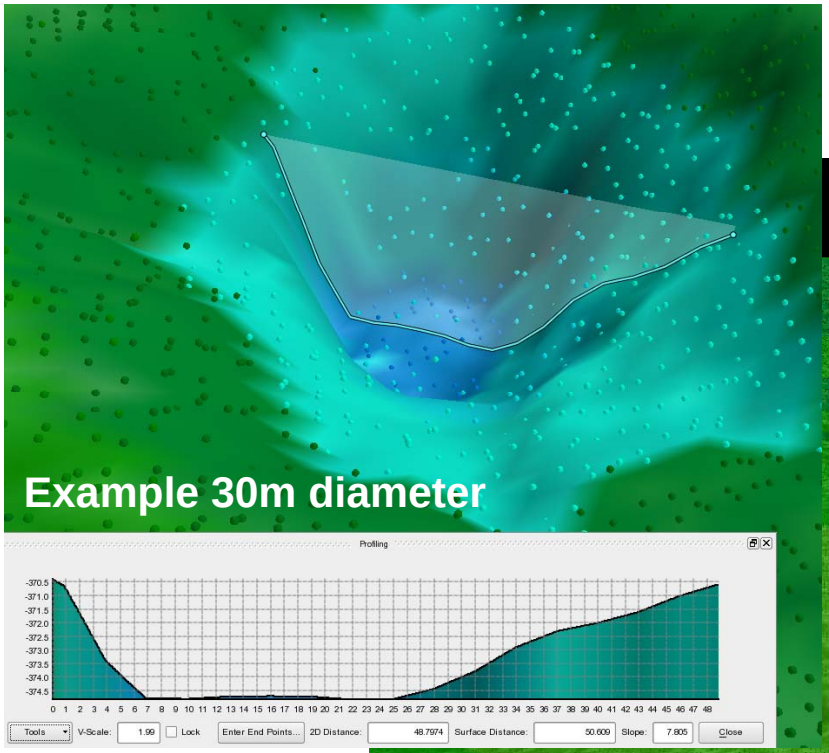
- Sand waves with different dimensions at varying depths
- There exist ripples with height 10 cm and large waves with height up to 7 m

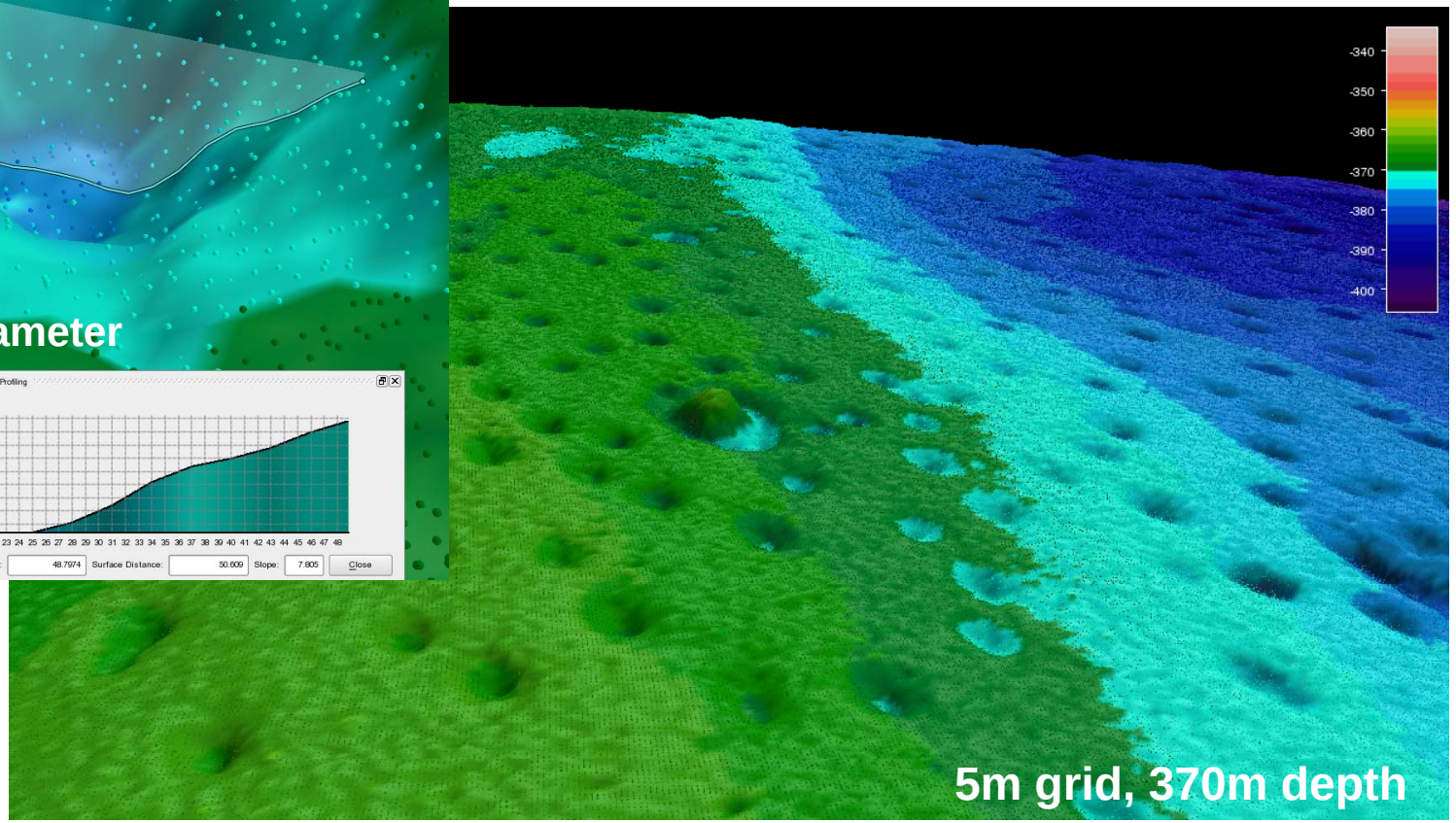
Sand waves



What are we looking for in the seabed topography

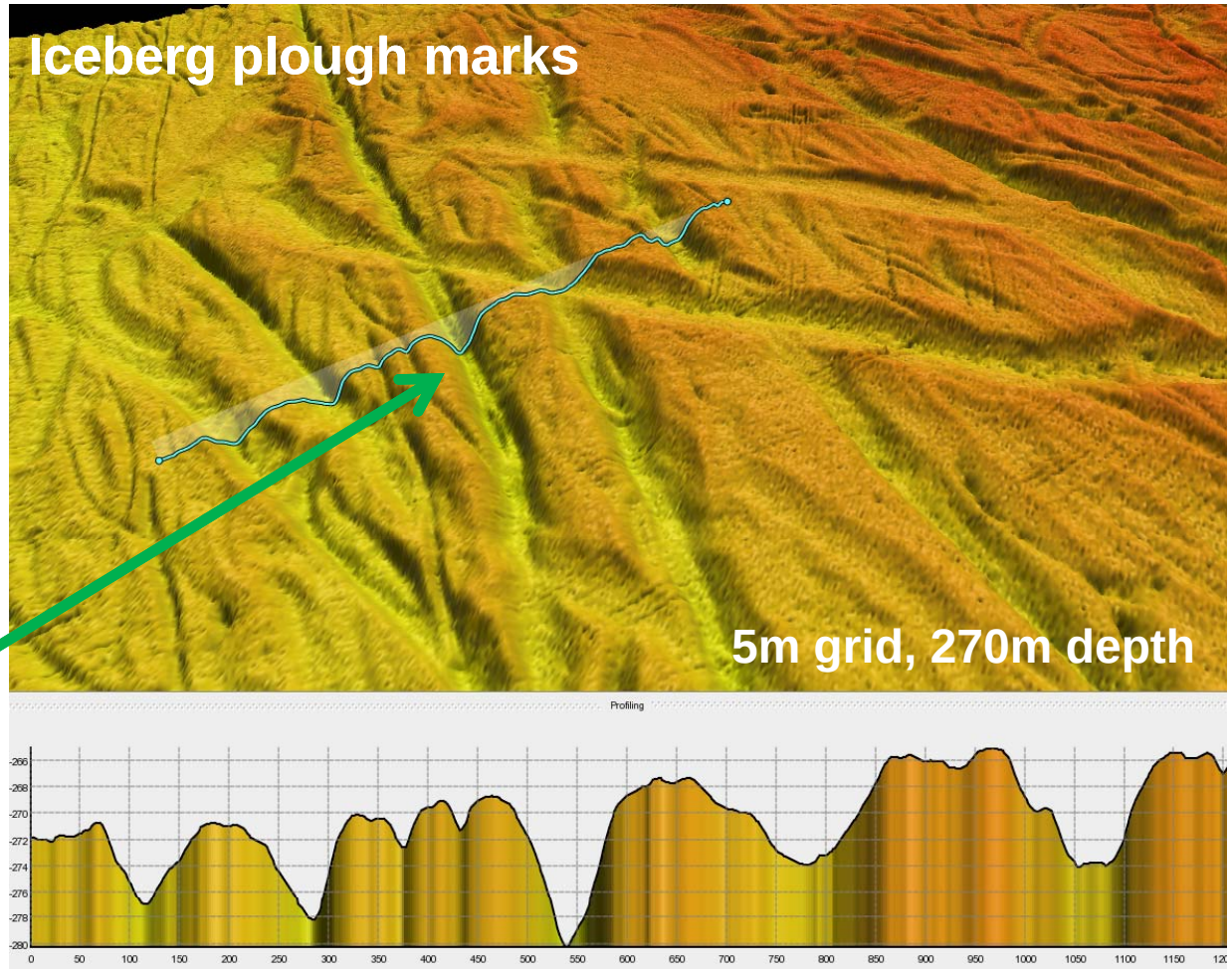
Pockmarks





What are we looking for in the seabed topography

- Iceberg plough marks
- Other terrain details ....
- General topography



Example 100m wide and 12 m deep

TECHNICAL SPECIFICATIONS FOR MAREANO SURVEYS

- Challenge
  - Cover as large area as possible
  - with as detailed data as possible
  - at the lowest cost as possible

→ Seeking the ideal compromise!

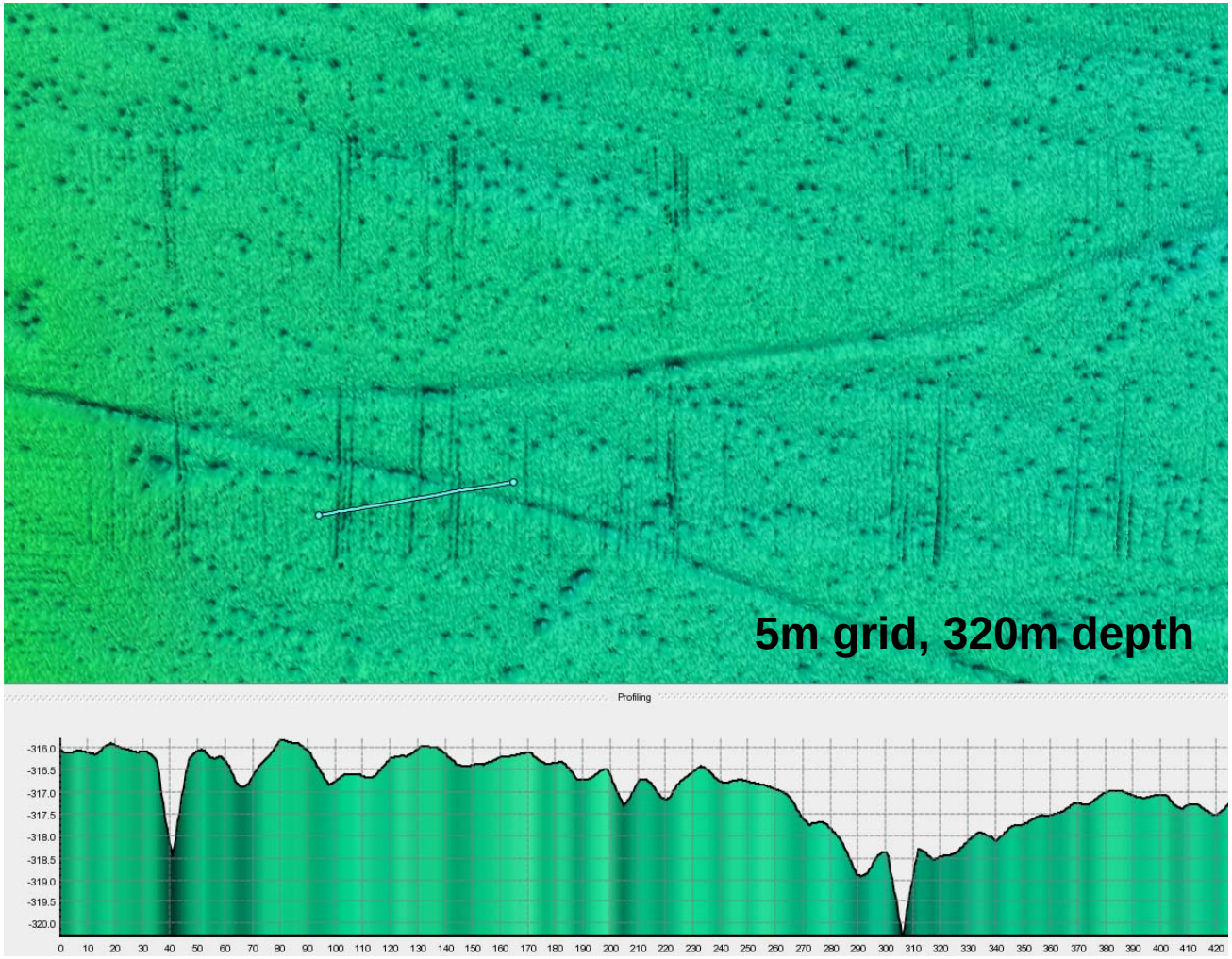
- Survey strategy
  - Surface vessel with multibeam echosounder

- The technical specification is available on

http://www.mareano.no/__data/page/9267/Appendix_B_-_Technical_Specifications.pdf

RESULTS – POCKMARKS, ICE BERG PLOUGH MARKS

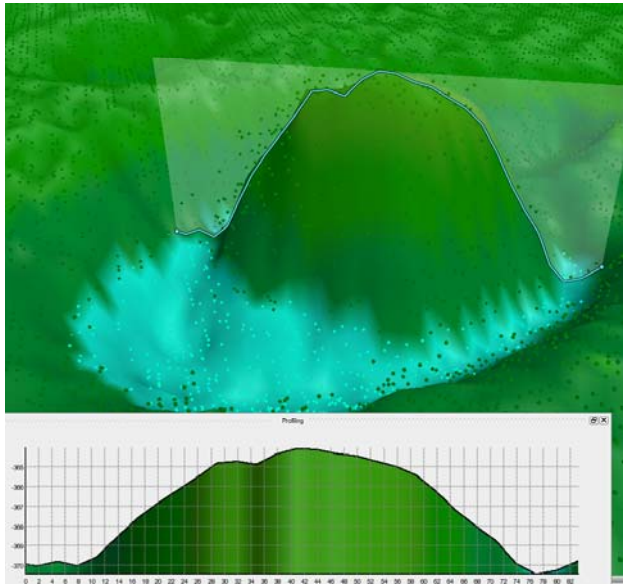
- Example from Barents sea
- Noisy data

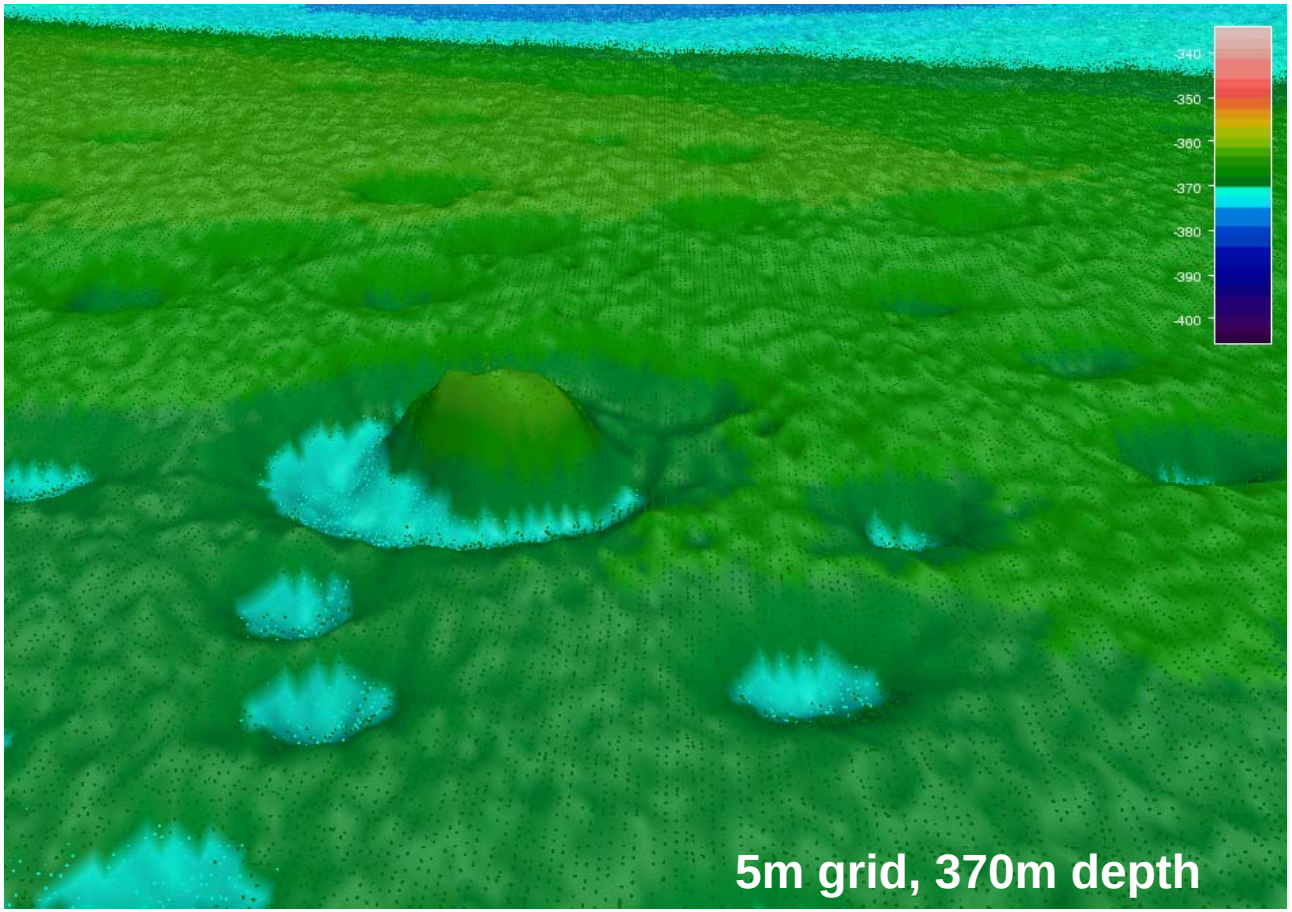


RESULTS – POCKMARK WITH AN “EYE”

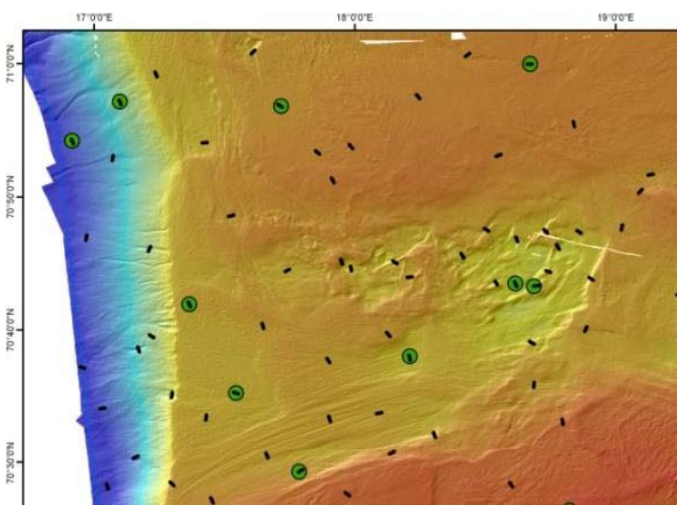
Example from Troms III

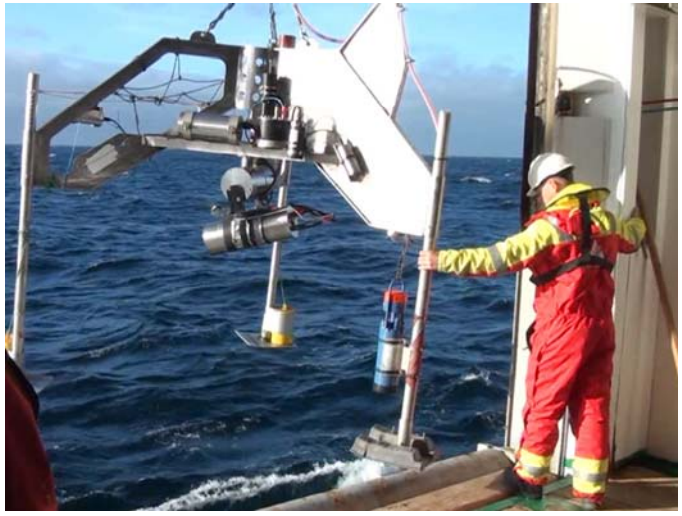
- “bump” in a pockmark
- 6m high
- 60m in diameter





GEOLOGICAL AND BIOLOGICAL SURVEYS





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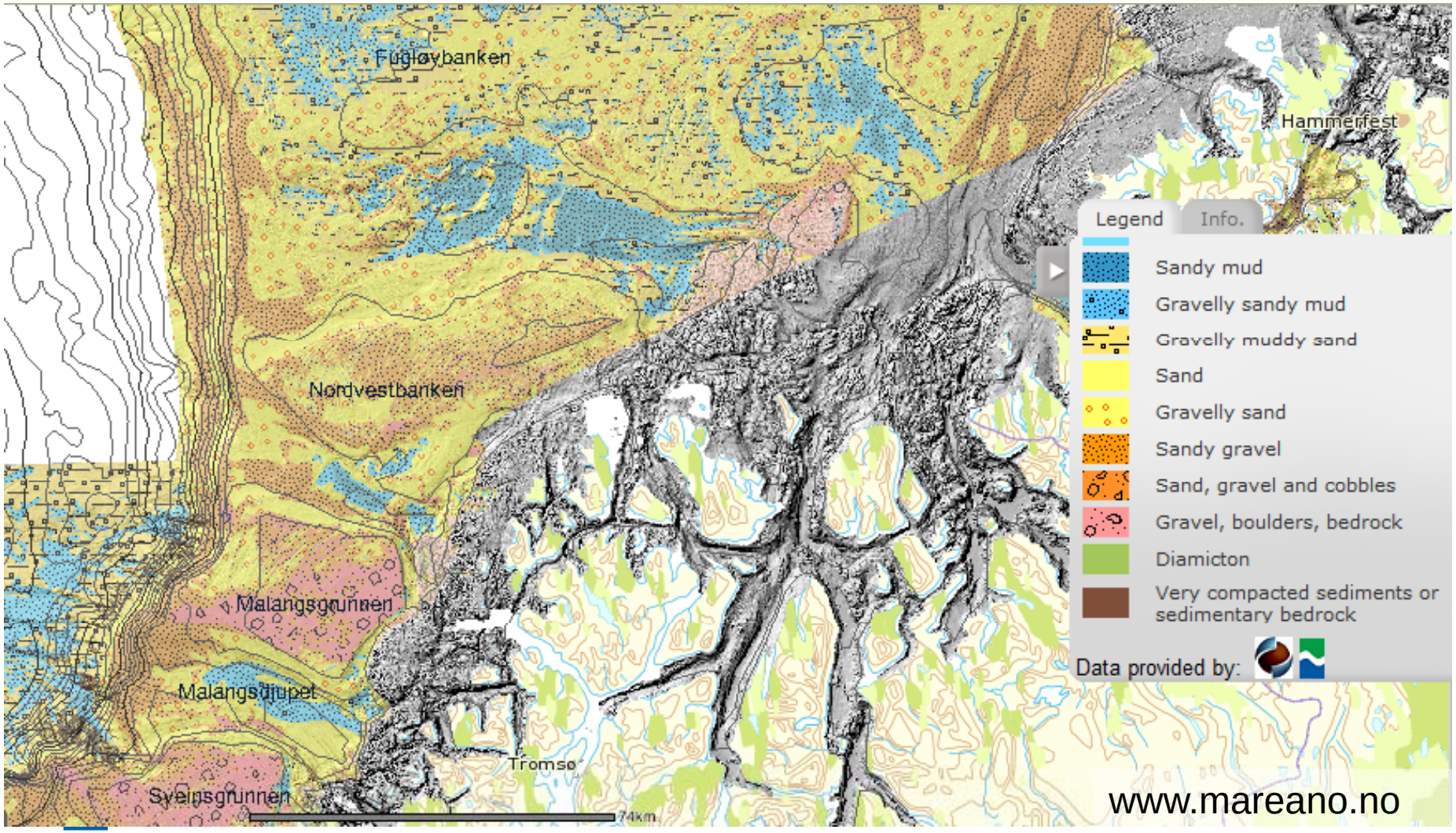
SEDIMENTS



MARINE HABITATS - TROMSØFLAKET

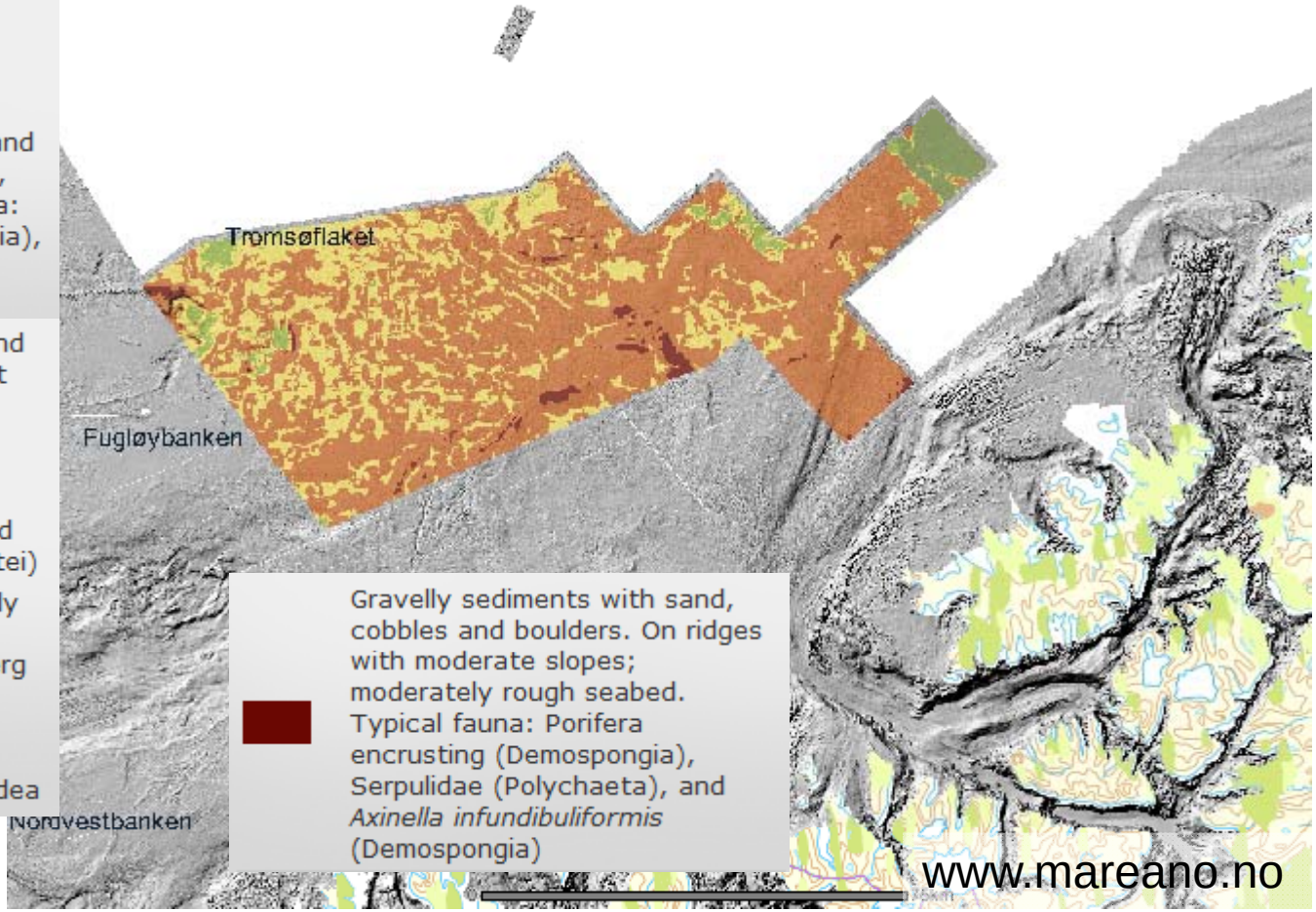
Marine Habitats - Video Analysis

Muddy sediments. Flat, smooth seabed with pockmarks. Typical fauna: *Pelosina arborecens* (foraminifera), Shrimps (Caridea), and *Asbestopluma pennatula* (Hexactinellida)

Muddy sediments with sand and gravel. In depressions on flat, smooth seabed. Typical fauna: *Aplysilla sulfurea* (demospongia), Calcareous foraminifera, and Geodia spp. (Demospongia)

Sandy sediments with mud and gravel. Moderately rough, flat seabed with iceberg ploughmarks. Typical fauna: *Stylocordyla borealis* (Hexactinellida), *Stichopus tremulus* (Holothuroidea), and *Trisopterus esmarkii* (Teleostei)

Various sediment types, sandy mud and coarser. Moderately rough, flat seabed with iceberg ploughmarks. Typical fauna: Tethya sp. (Demospongia), *Hymedesmia* cf. *paupertas* (Demospongia), and Ophiuroidea



Gravelly sediments with sand, cobbles and boulders. On ridges with moderate slopes; moderately rough seabed. Typical fauna: Porifera encrusting (Demospongia), Serpulidae (Polychaeta), and *Axinella infundibuliformis* (Demospongia)

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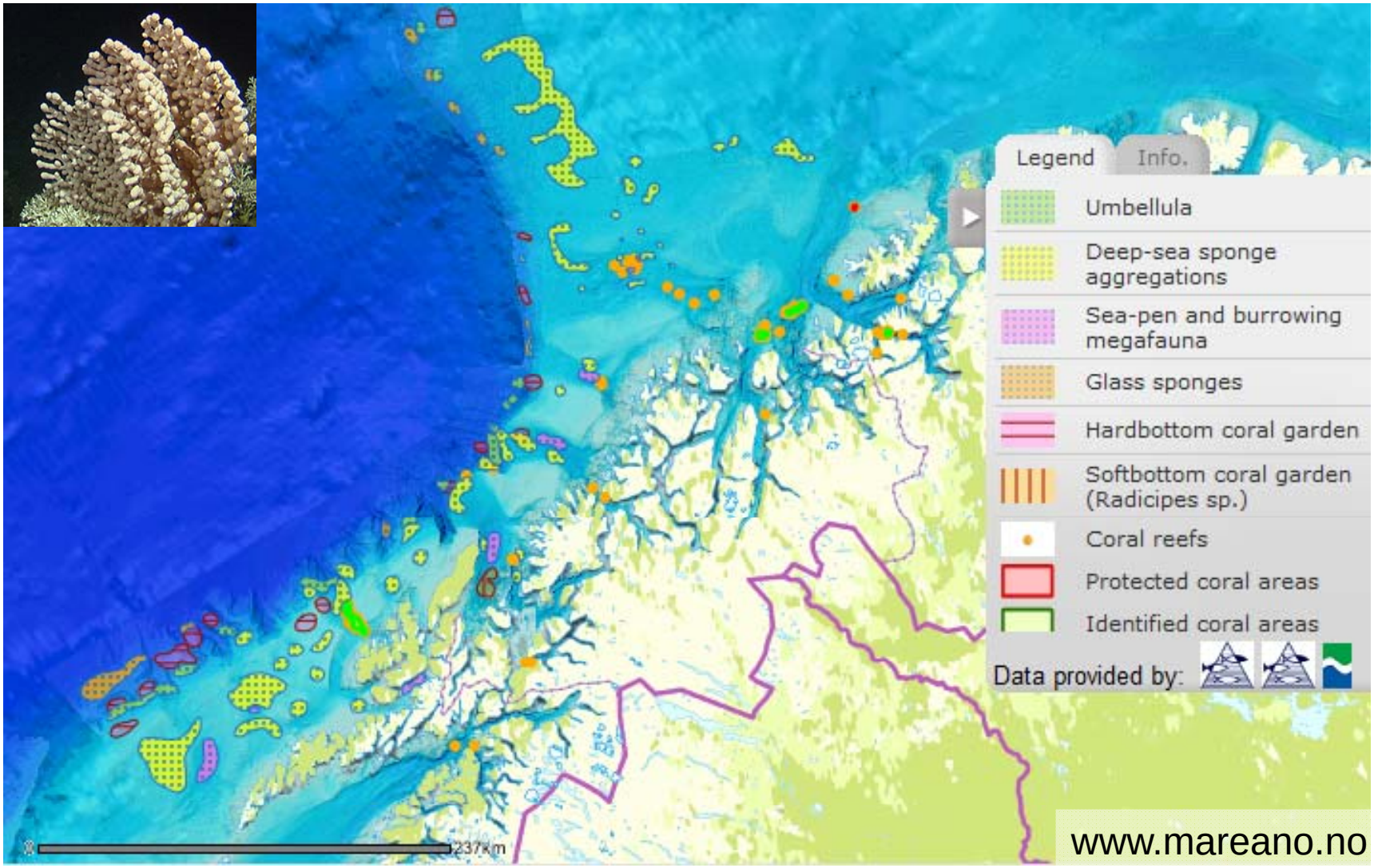
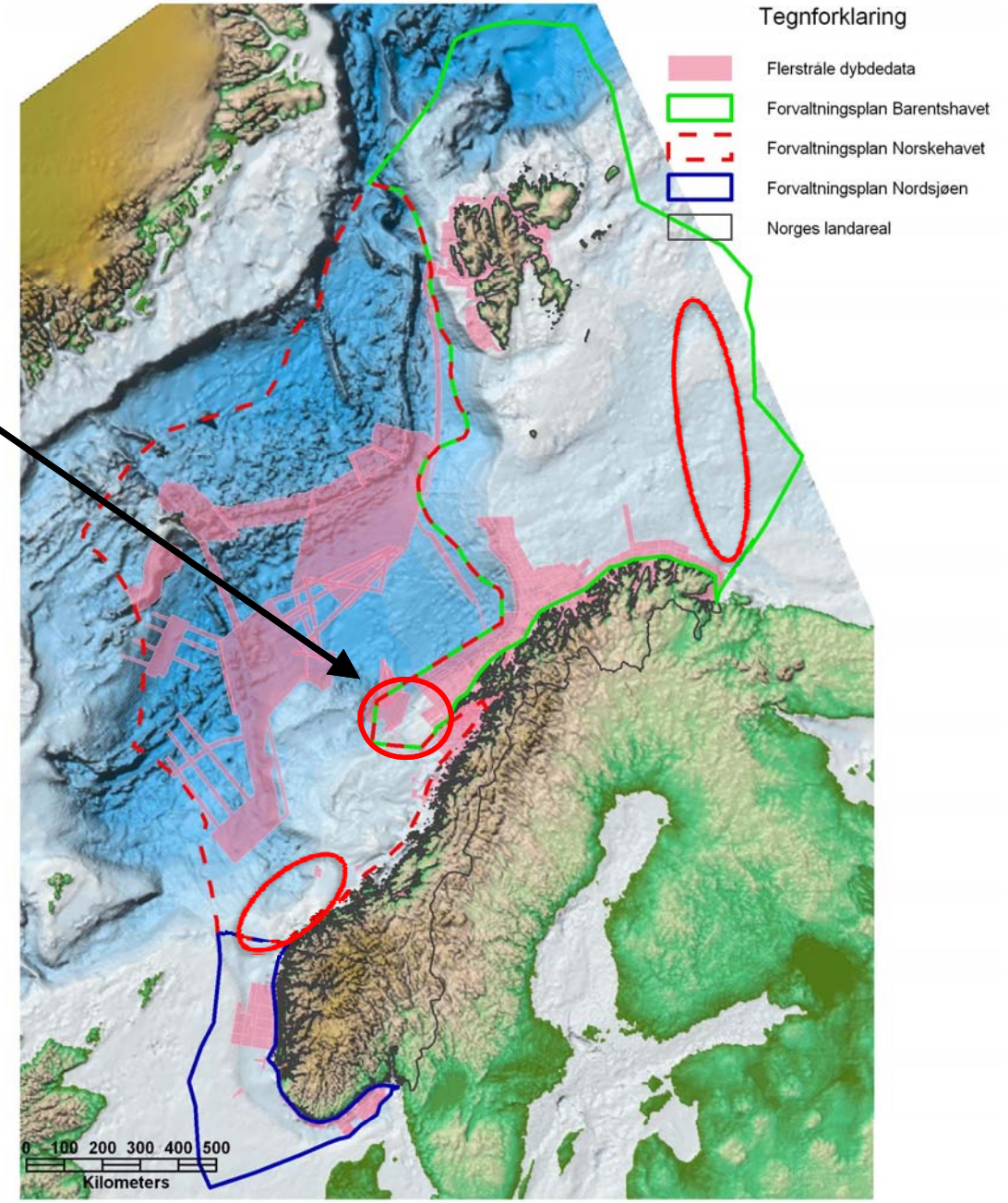
VULNERABLE AREAS



PLANS FOR FUTURE

- 2011: Nordland VI outside Lofoten
- Further areas in Barents sea and in Norwegian sea



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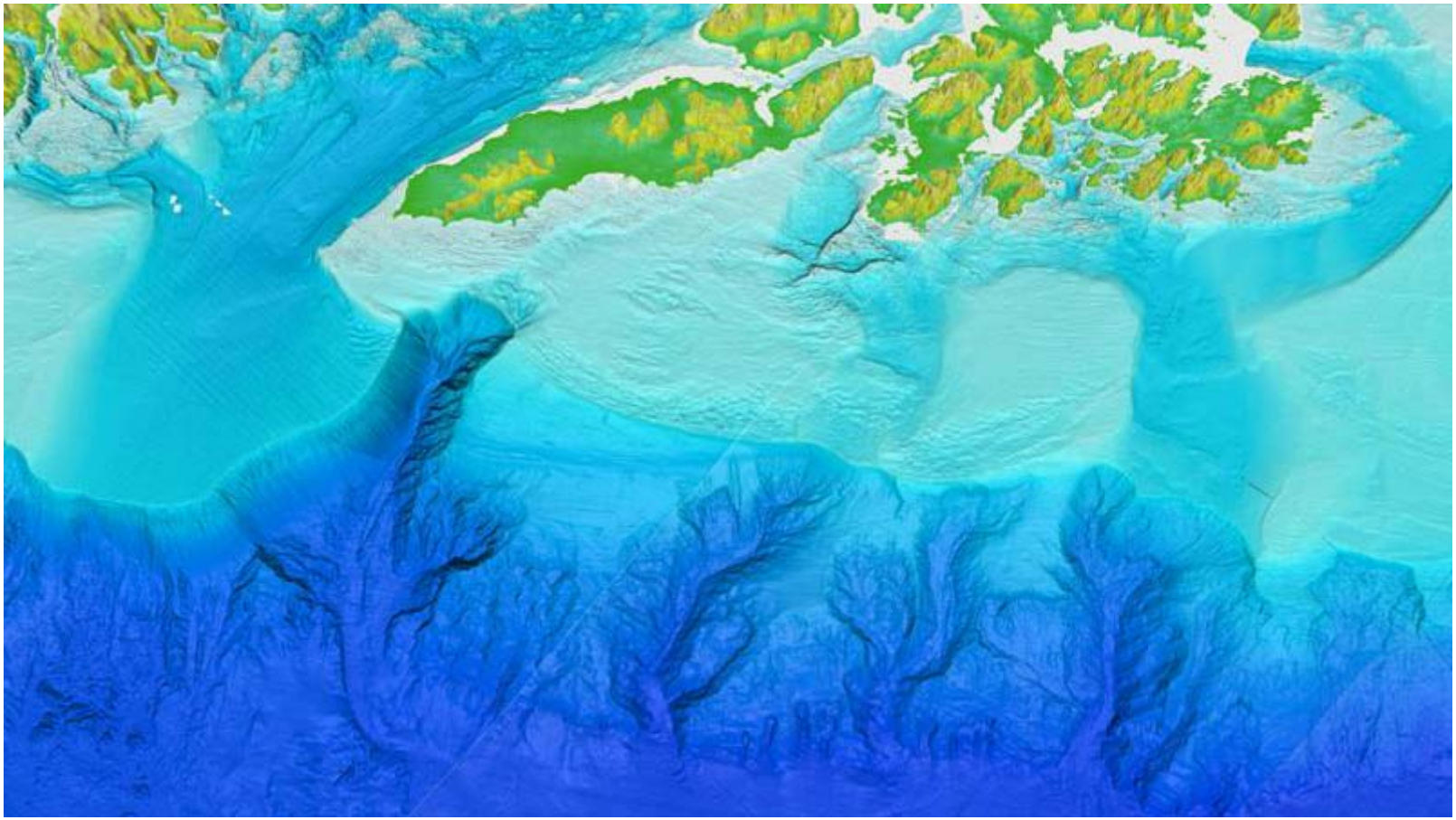
Questions?



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