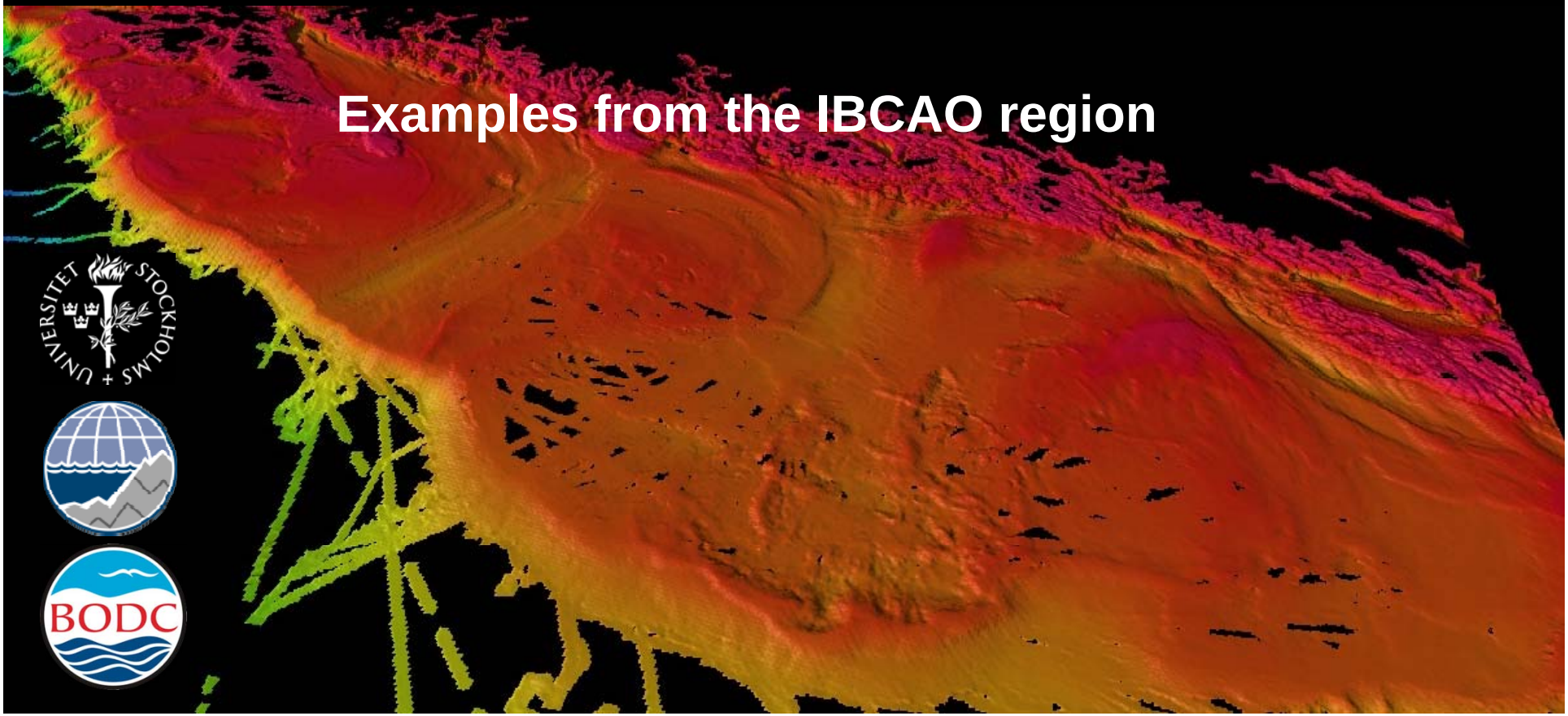
GEBCO Bathymetric Science Day 2009

Olex global sounding database:

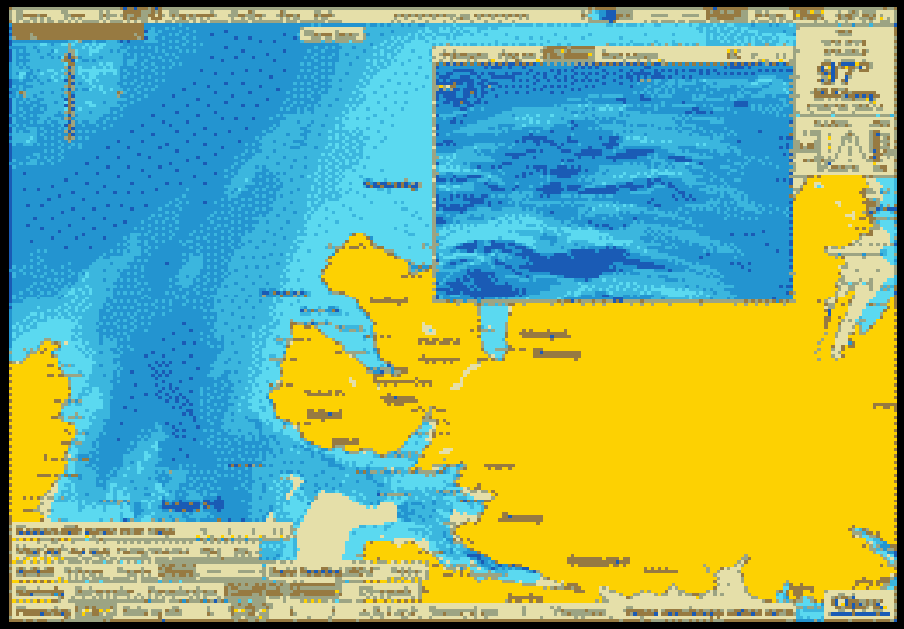
a phenomenal resource for regional bathymetric mapping projects

Colin Jacobs, Pauline Weatherall, Martin Jakobsson

Examples from the IBCAO region



Background



1. Olex is mapping and visualization software widely used within the fishing industry
2. The concept builds on that the sounding data collected by fishing vessels from all oceans of the world are sent back to Olex to continuously update their database, which then is redistributed to the users
3. Olex processes and quality controls all data before it incorporated into their mapping and visualization software

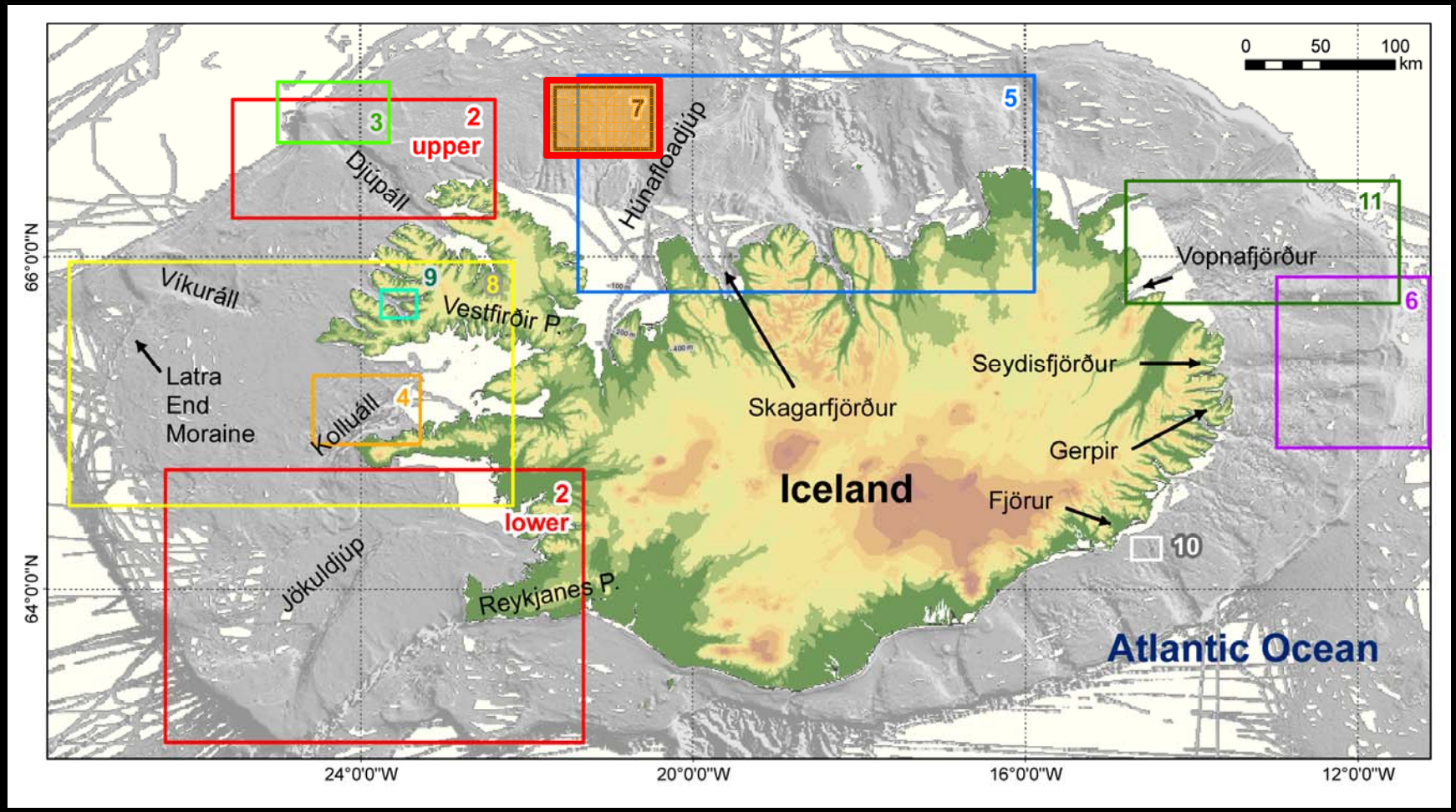
Olex data has been used in several sea floor morphological studies

One example from Journal of Maps 2009:

A geomorphological overview of glacial landforms on the Icelandic continental shelf

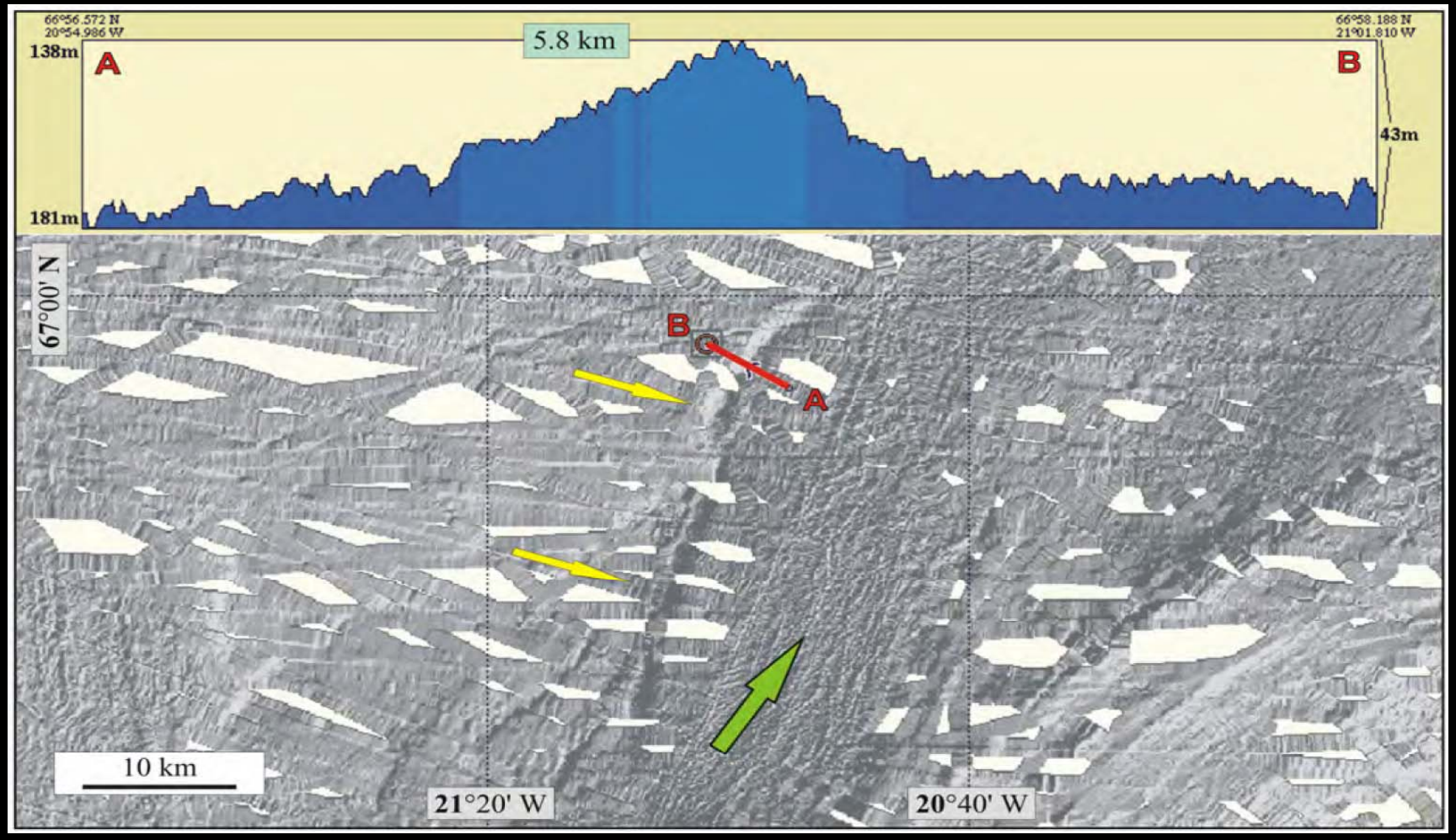
MATTEO SPAGNOLO and CHRIS D. CLARK

The Olex database covers about 80% of the Icelandic shelf. Spagnolo and Clark made use of this data to produce a geomorphological map of the glacial landforms.



From Spagnolo and Clark, 2009

A lateral moraine complex (yellow arrows) is visible. The iceflow direction inferred by the authors based on the Olex data is marked by a green arrow.



From Spagnolo and Clark, 2009

What can we do with the Olex data on a broader scale?

We received a global snapshot of the Olex database at a resolution of 400x400 m grid cells.

This Olex gridded data is here compared with the International Bathymetric Chart of the Arctic Ocean (IBCAO)

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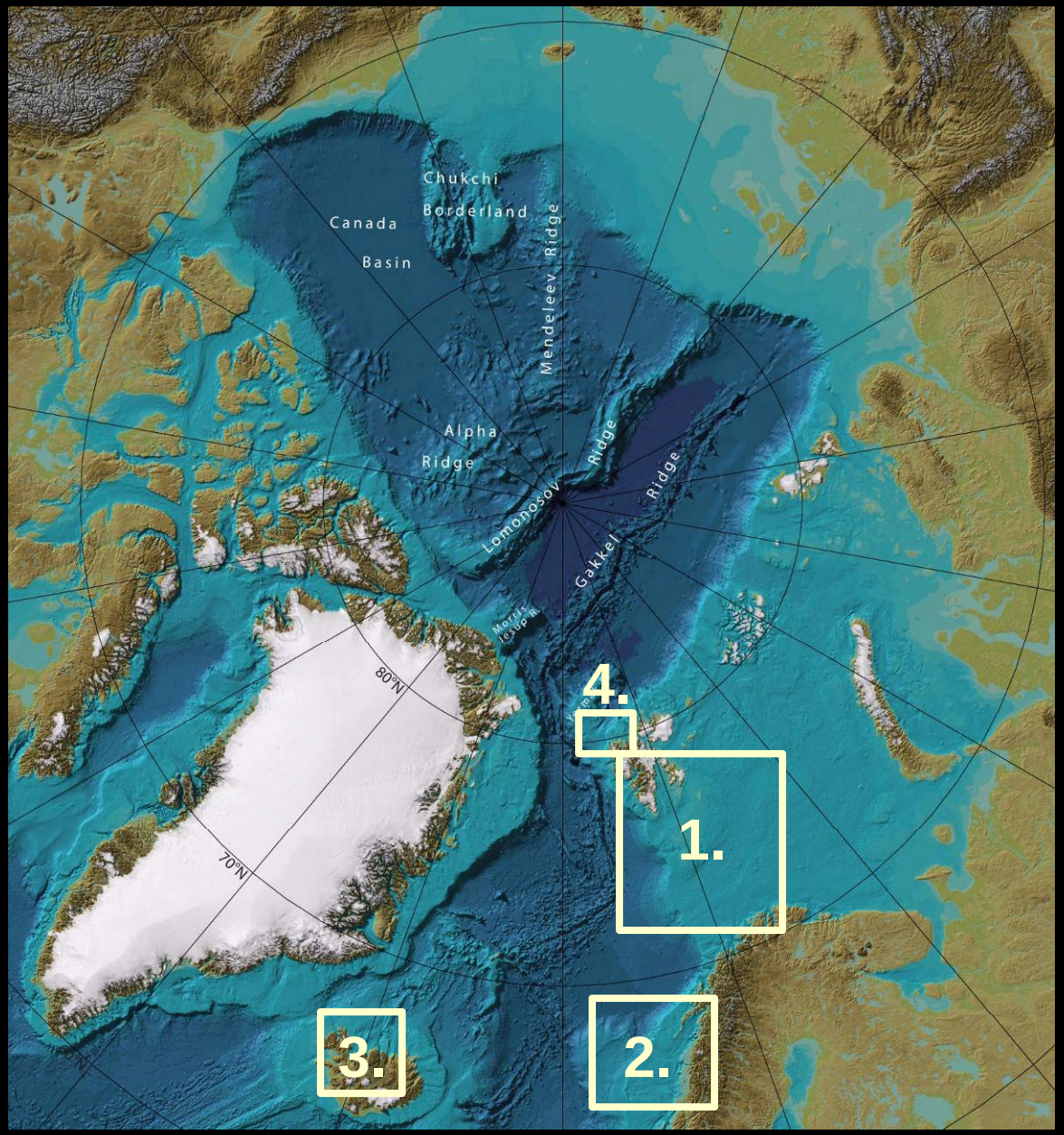

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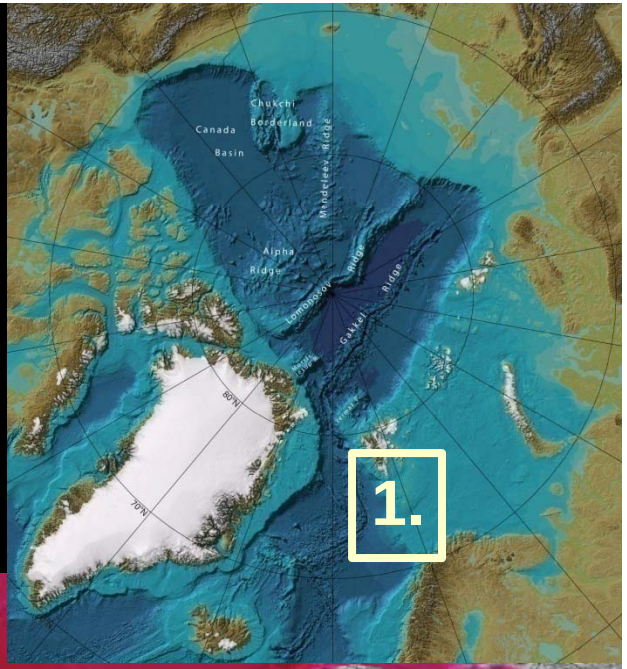
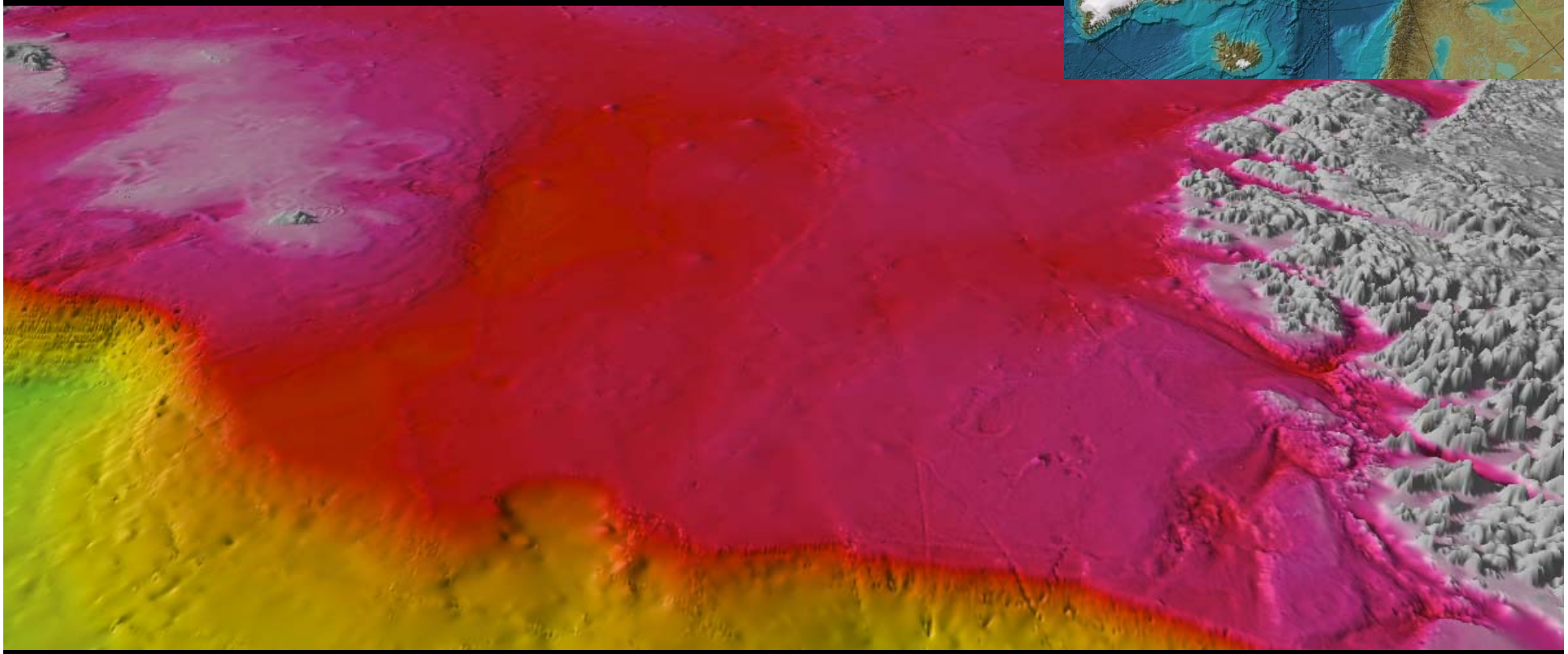
Bear Island Trough





IBCAO Ver 2.25 1 km grid cells

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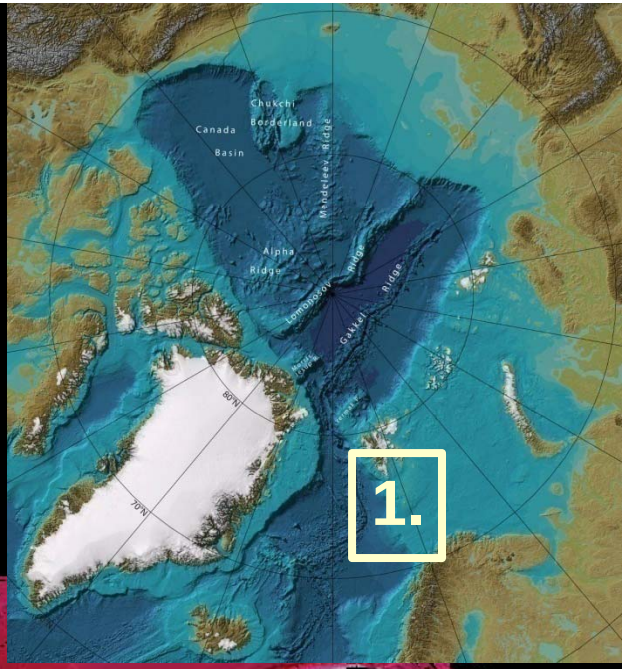
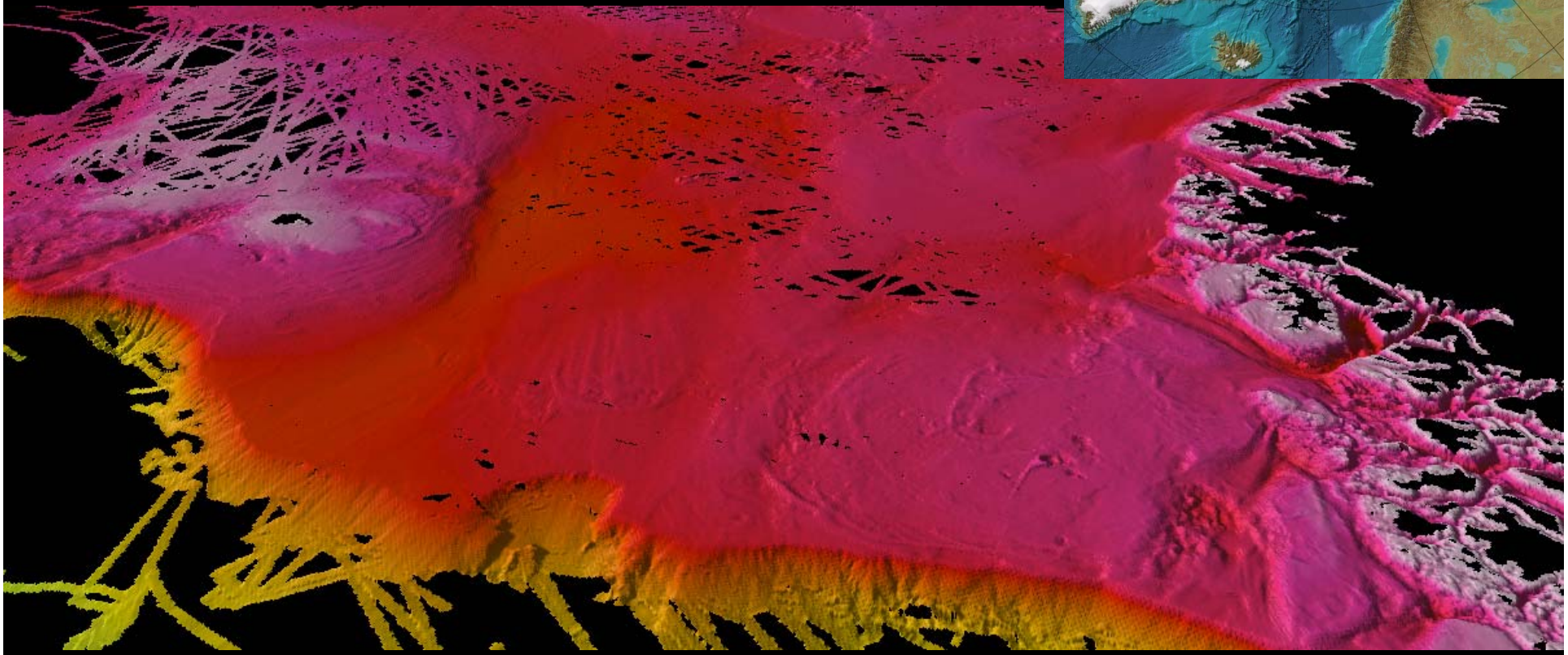


Bear Island Trough



Olex 400 m grid cells

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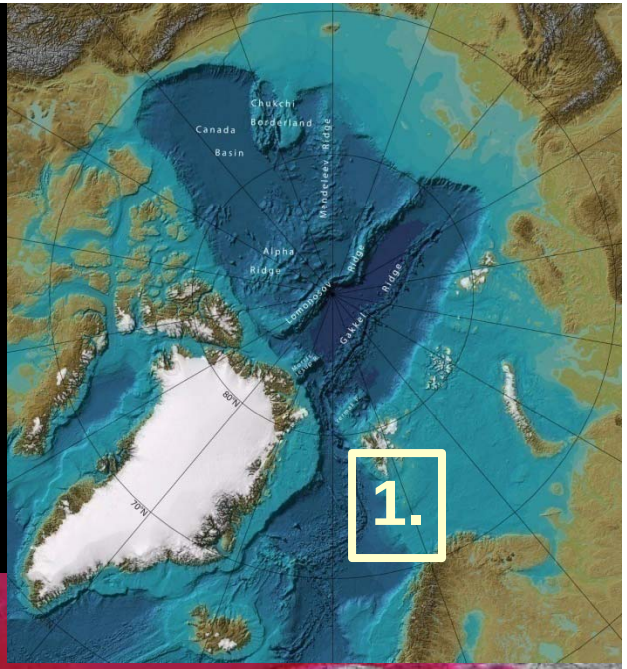
Not only to throw in the data and grid!

Bear Island Trough



Artefacts from contours

IBCAO updated with Olex, 1 km grid cells

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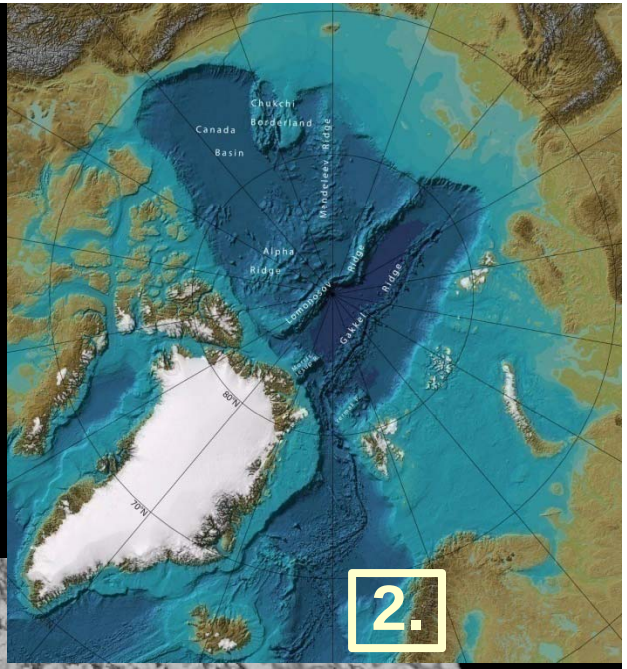

Norwegian Continental Shelf

IBCAO Ver 2.25 1 km grid cells

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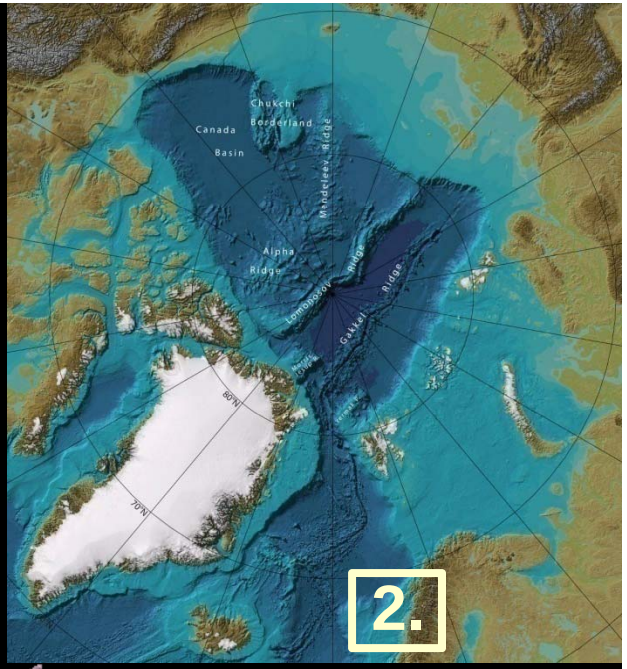

Norwegian Continental Shelf

Olex 400 m grid cells

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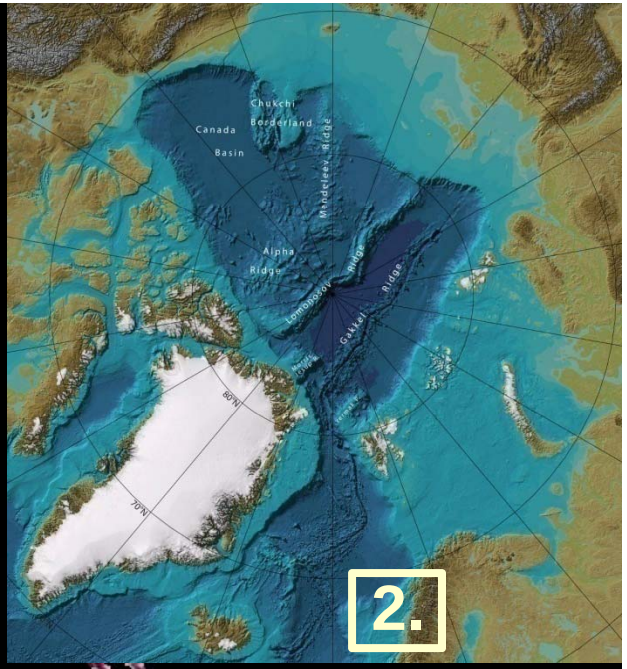

Norwegian Continental Shelf

Lateral morains

Mega scale glacial lineations

Olex 400 m grid cells

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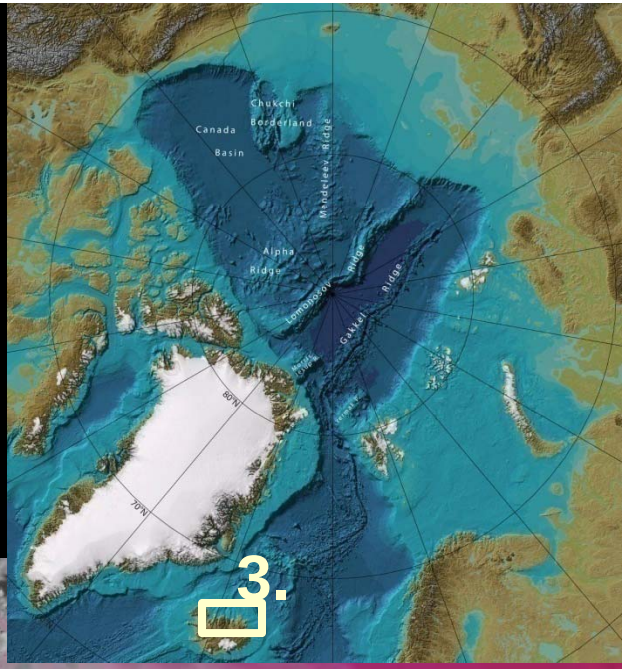
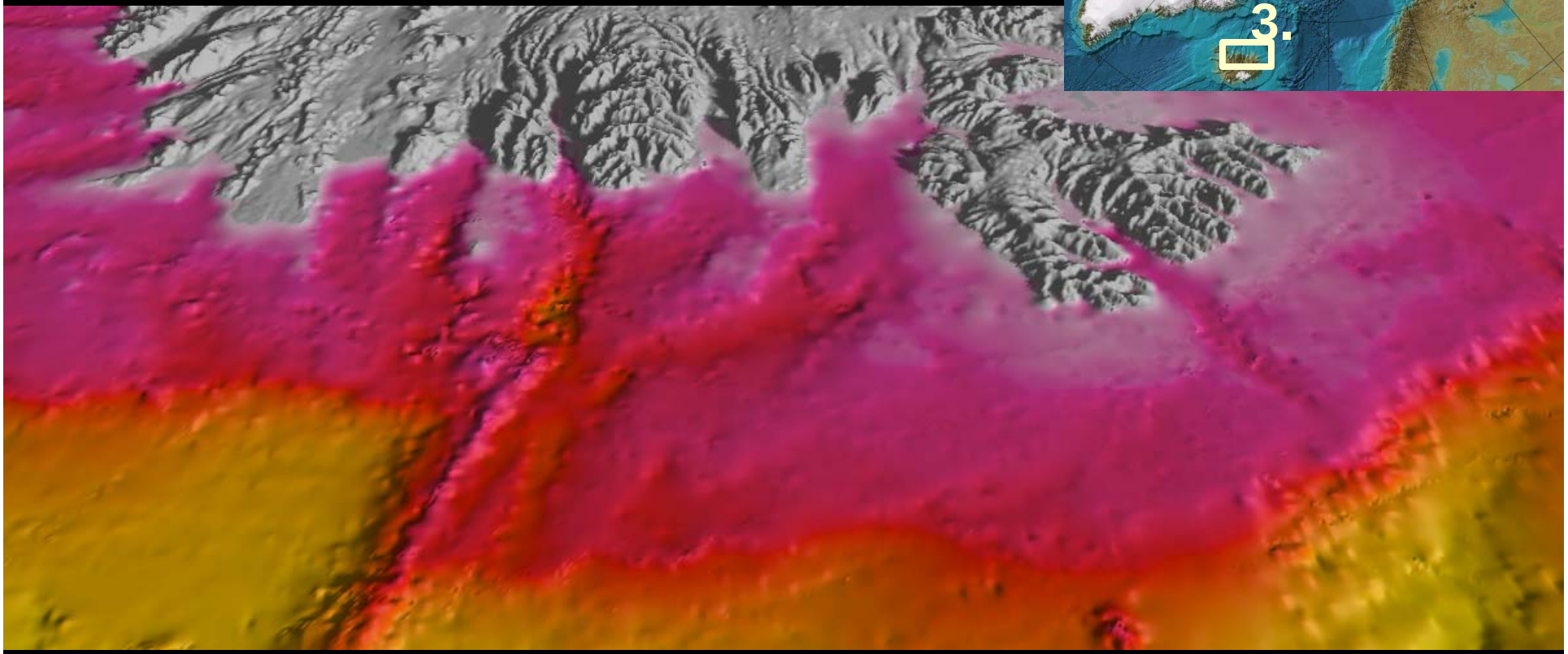
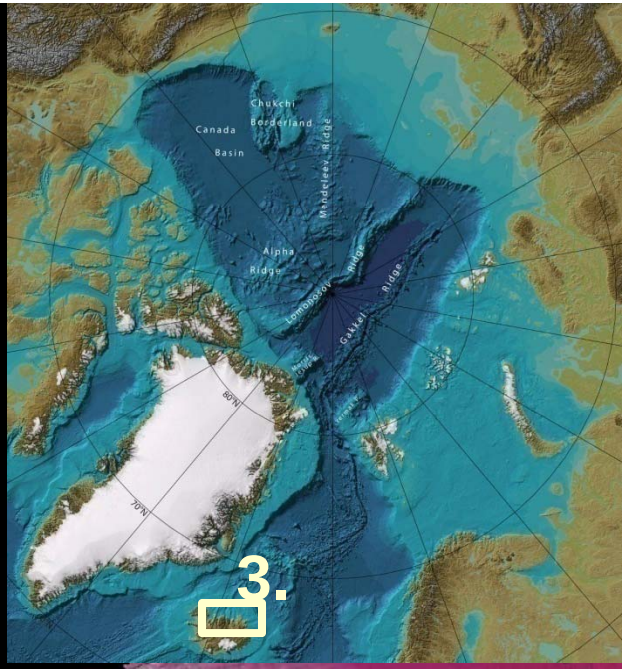
Iceland (view from North)





IBCAO Ver 2.25 1km grid cells

GEBCO Bathymetric Science Day 2009



Iceland (view from North)

Olex 400 m grid cells

More Iceland with Fledermaus!

Questions

What are the depths in the Olex database referred to, MSL, MLLW, MLW ??

Is there any information available on sound velocity correction?

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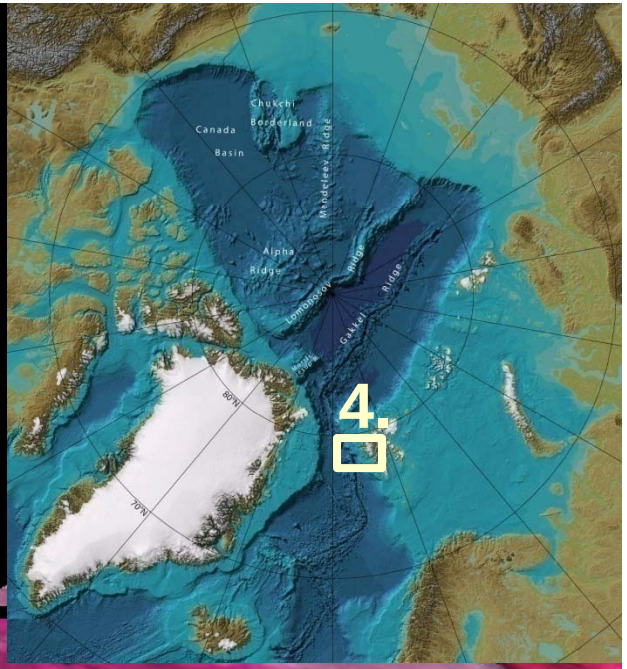
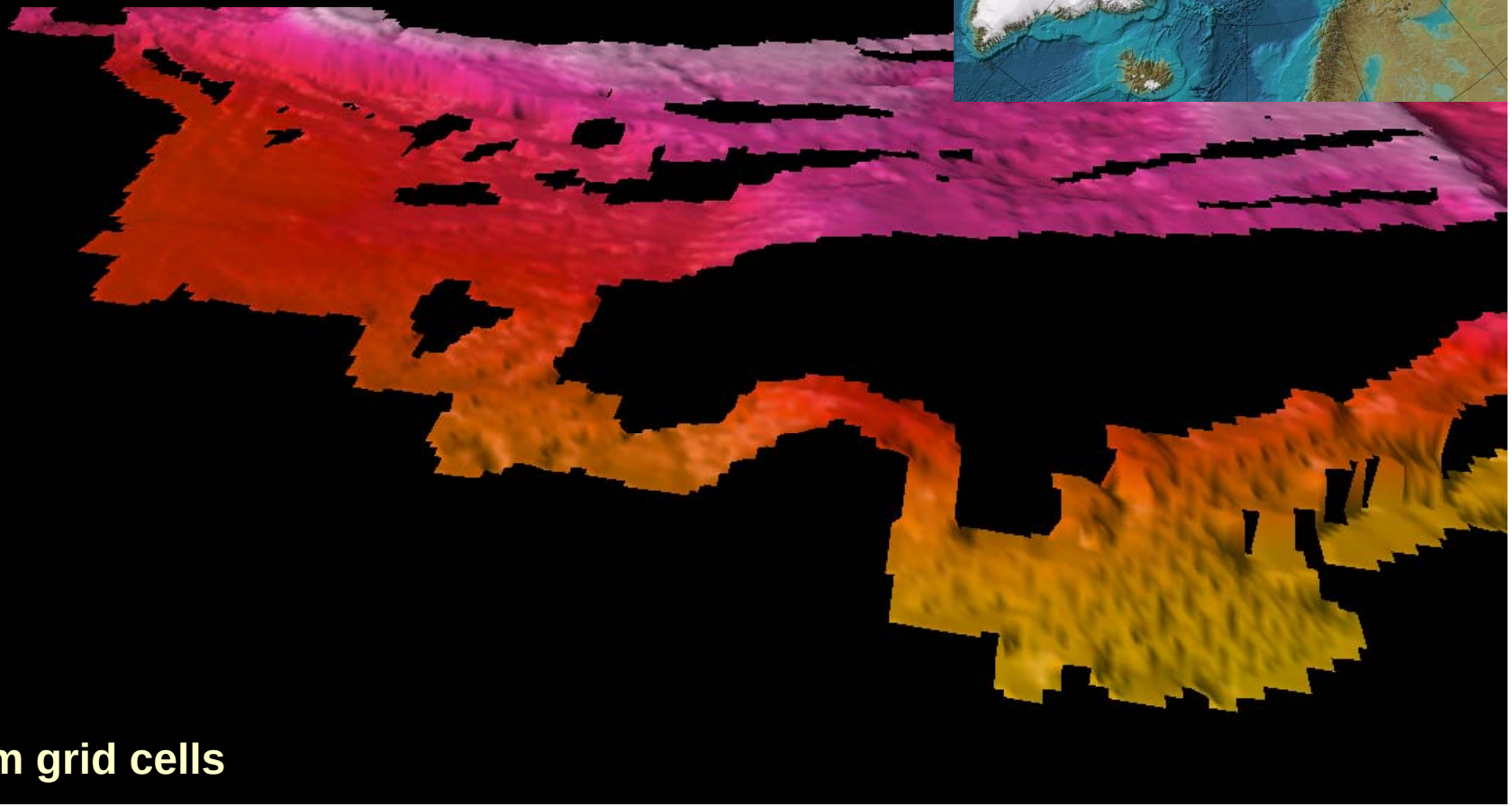
Comparing Olex with Oden EM122 data off Svalbard





Olex 400 m grid cells

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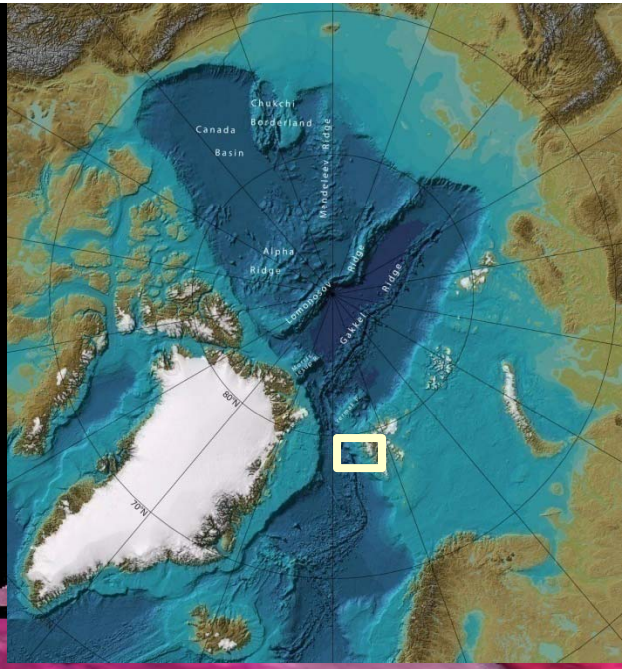

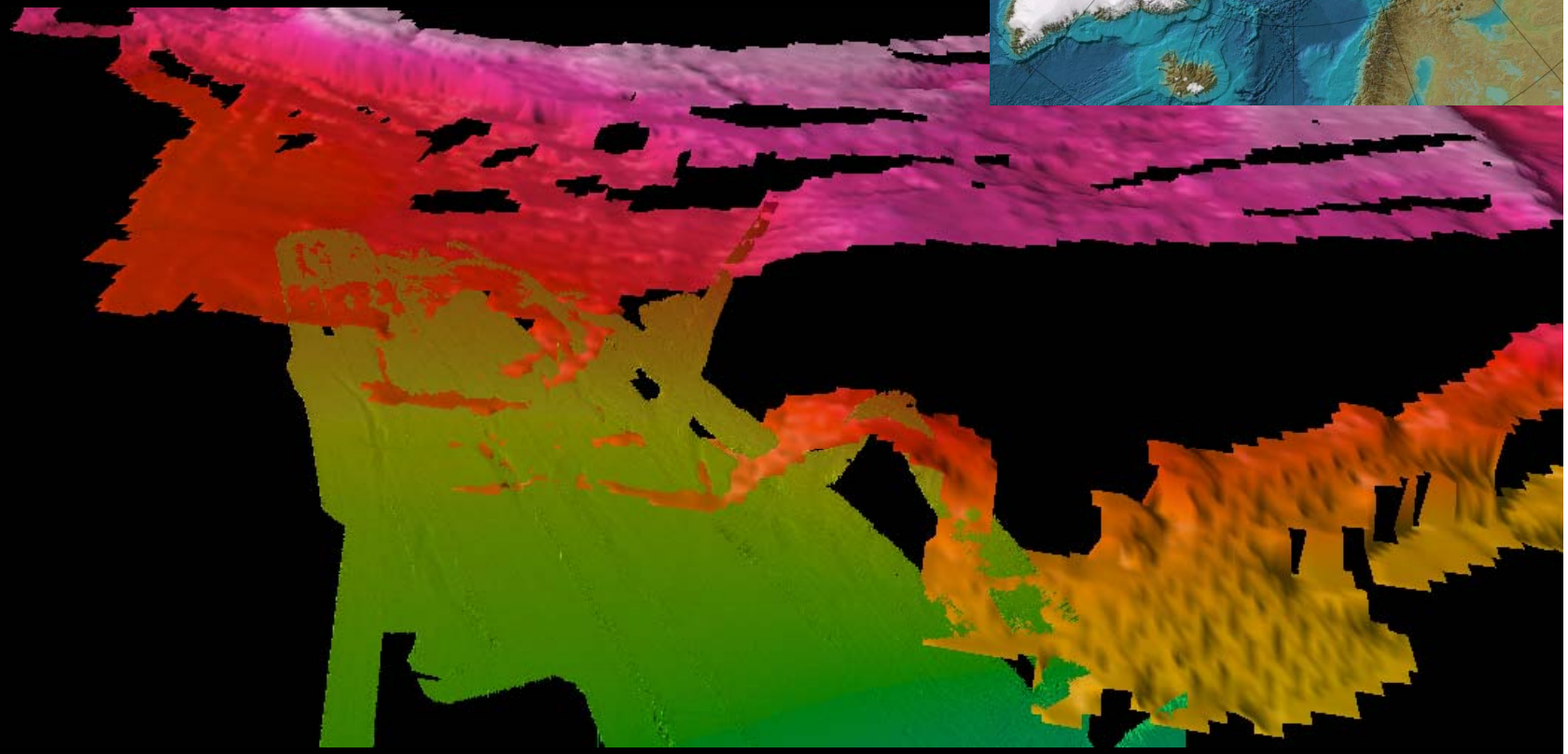

Olex 400 m grid cells versus Oden 20 m grid cells

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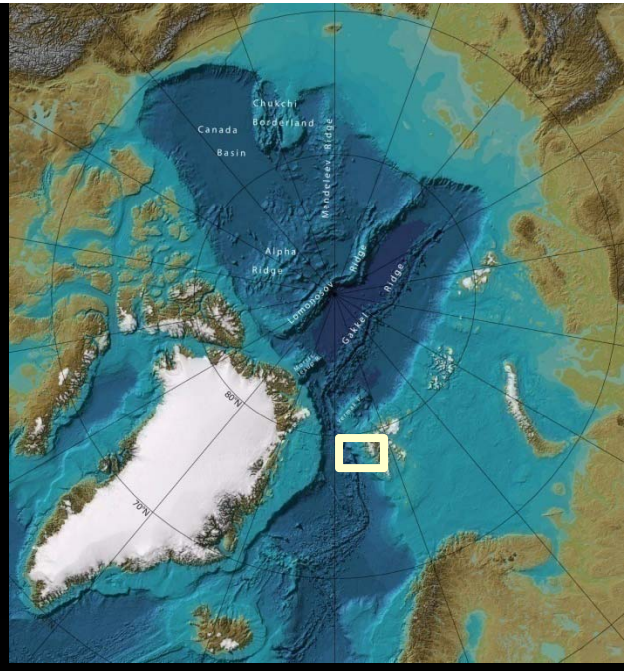
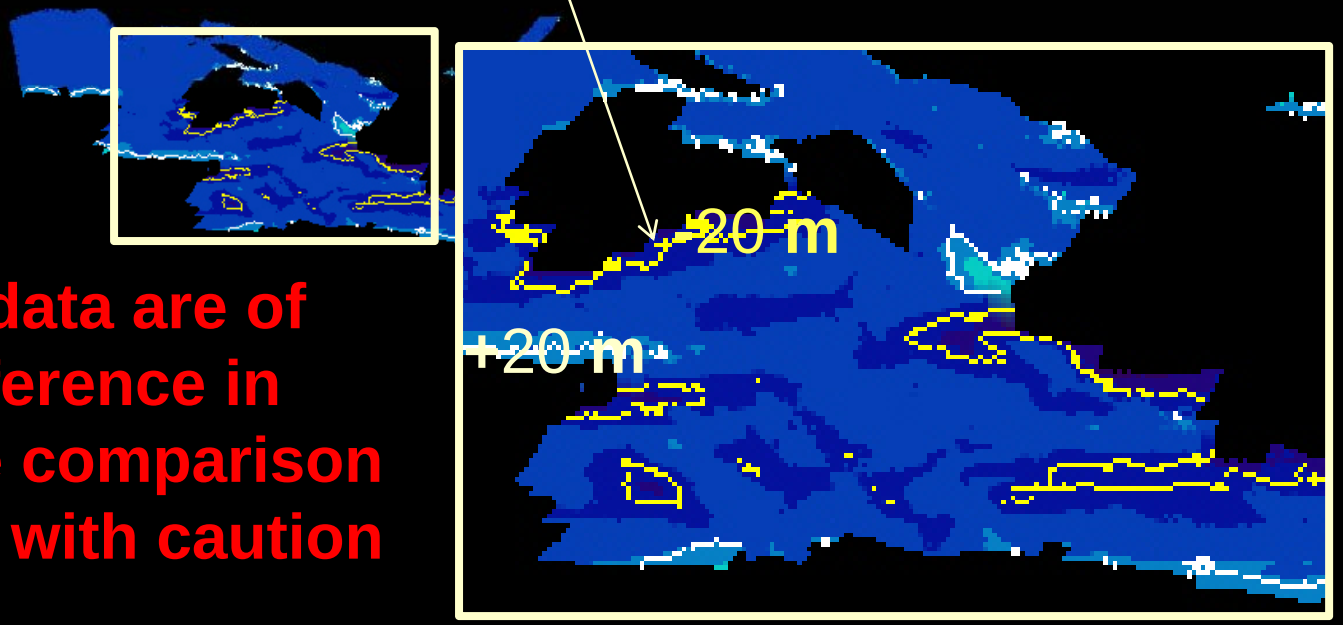
Comparing Olex with Oden EM122 data off Svalbard



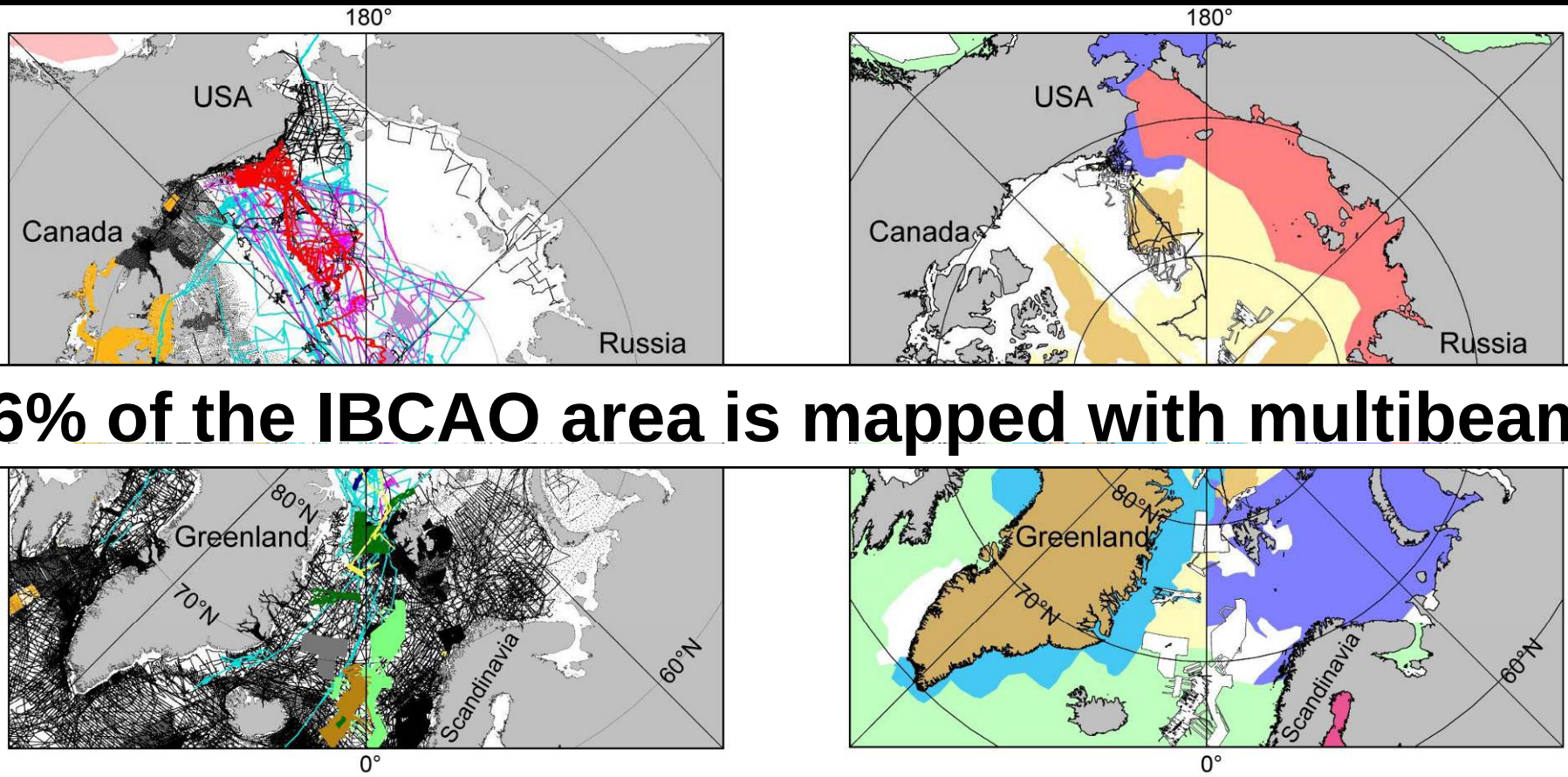
570 m water depth
(3.5 % difference)



But since the data are of such large difference in resolution, the comparison must be taken with caution

Olex 400 m grid cells versus Oden 20 m grid cells

IBCAO Version 2.0: Source Data



6% of the IBCAO area is mapped with multibeam

Multibeam Sources

- *USCGC Healy, R/V Nathaniel B Palmer*
- *R/V Polarstern*
- *I/B Oden*
- *Norwegian Petroleum Directorate*
- *AMORE (Healy and Polarstern)*
- *SCICEX 1999*
- *US Naval Research Laboratory (NRL)*
- *US Law of the Sea mapping by the Center for Coastal and Ocean Mapping/ Joint Hydrographic Center**

Single Beam Sources

- *US and Brittish Royal Navy submarine cruises (1958-1992)*
- *SCICEX cruises (1993-1999)*
- *Norwegian Hydrographic Service survey*
- *Soundings from Canadian Hydrographic Service surveys not included in earlier IBCAOs*
- *Soundings collected by various surface vessels and ice drift stations. Five major archives have been included:*
  1. *US National Geophysical Data Center (NGDC)*
  2. *US Naval Reserach Laboratory (NRL)*
  3. *US Geological Survey (USGS)*
  4. *Norwegian Hydrographic Service*
  5. *Royal Danish Administration of Navigation and Hydrography*

Maps and Regional Grids

- IBCAO drawn contours
- IBCAO drawn contours based on soundings from charts published by the Russian Federation's Department of Navigation and Oceanography (DNO)
- 1:5 000 000 scale DNO map of the Arctic Ocean (Naryshkin, 1999)
- 1:2 500 000 scale DNO map of the Arctic Ocean (Naryshkin, 2001)
- Charts published by NRL (Perry et al., 1986; Cherkis et al., 1991; Matishov et al., 1995)
- Contours retrieved from the GEBCO Digital Atlas (GDA) 2003.
- Bathymetry in the Gulf of Bothnia from a digital grid by Siefert et al. (2001)
- Greenland DTM by the Danish Cadaster and Mapping Agency (Ekholm, 1996)
- GTOPO30 topographic model (U.S. Geological Survey, 1997)

Raw data

Data processing
(sound velocity correction, outlier removal etc.)

Processed data

Olex

Olex

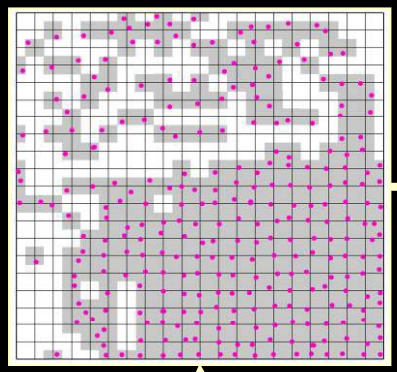
Database

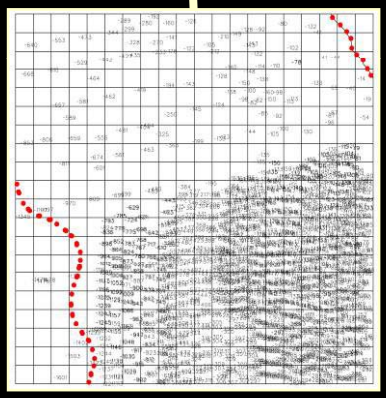
Error correction
(data flagging)

Olex

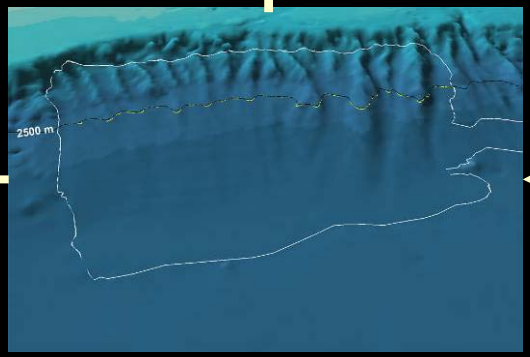
Data mining
(cross track analyzes, contour splicing etc.)

Block median filtering





Visualization and inspection



Gridding (Continuous curvature splines in tension algorithm, GMT algorithm: Smith & Wessel, 1990)

Thanks for listening!