Tidal work at the Norwegian Hydrographic Service

1st meeting in IHO-TWLWG

Rio de Janeiro 2009

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Norwegian Mapping Authority

Hydrograpic Service

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How we are organised

- *The Norwegian Hydrographic Service (NHS) is a division in the Norwegian Mapping Authority.*
- *Other divisions are the Geodetic Institute and the Land Mapping Service.*

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Tidal work in the NHS

- ***Run a network of 23 tide gauges***
- ***Quality control of the data***
- ***Drifting a tidal database***
- ***Analyse the data***
- ***Calculate tidal predictions and produce tide tables***
- ***Distribute tidal data and tidal information***

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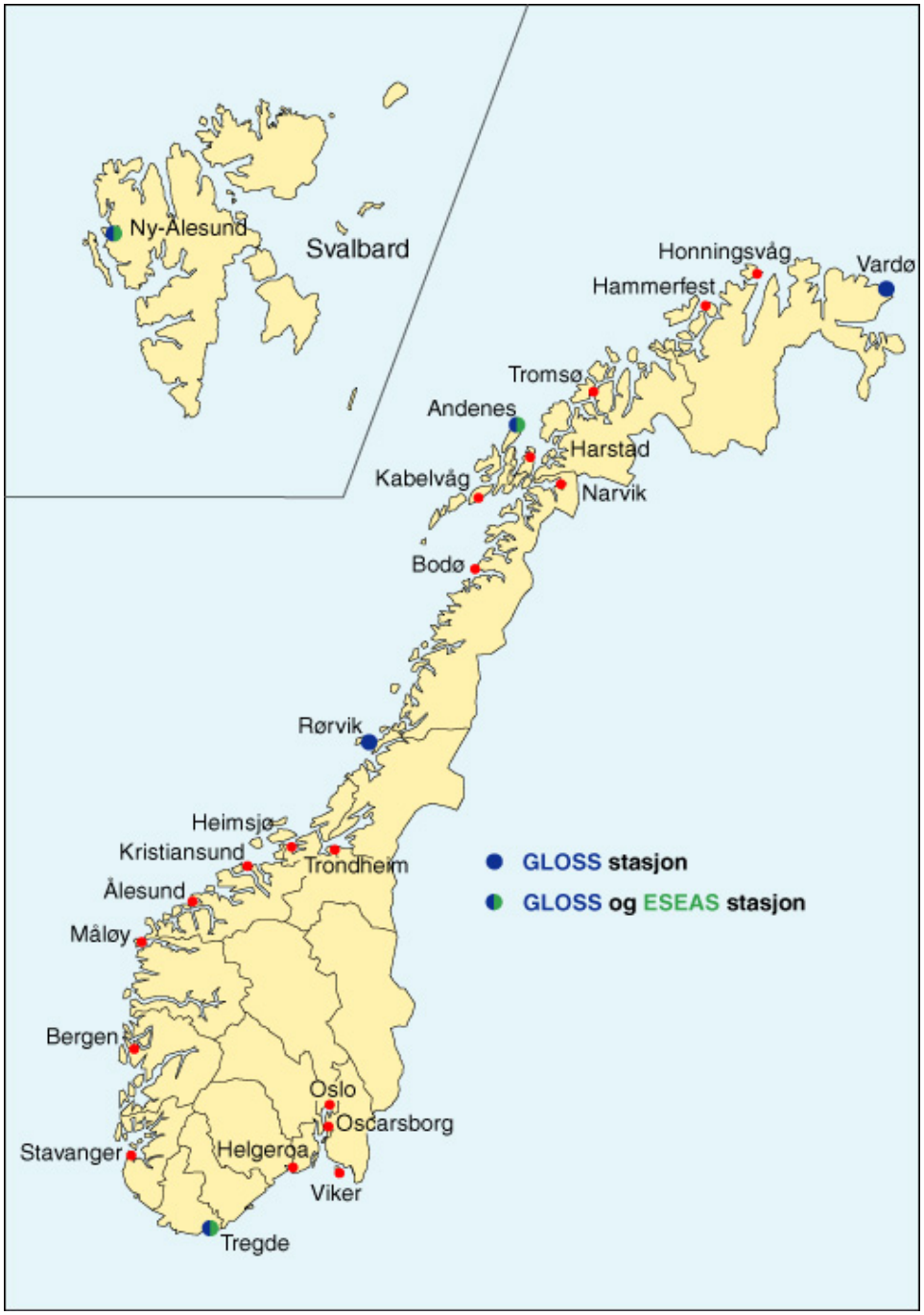
The Norwegian tide gauge network



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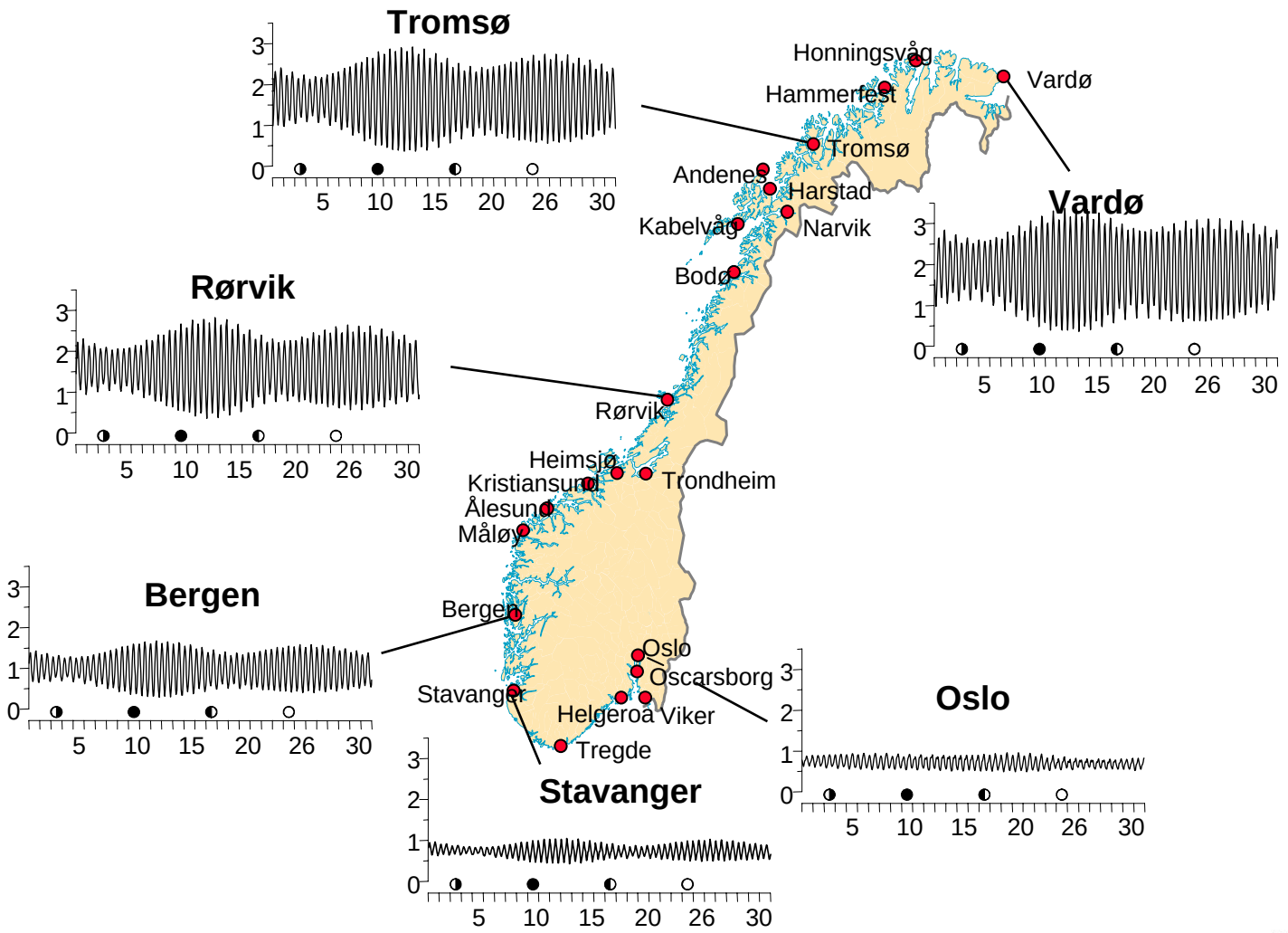
Differences in tidal range



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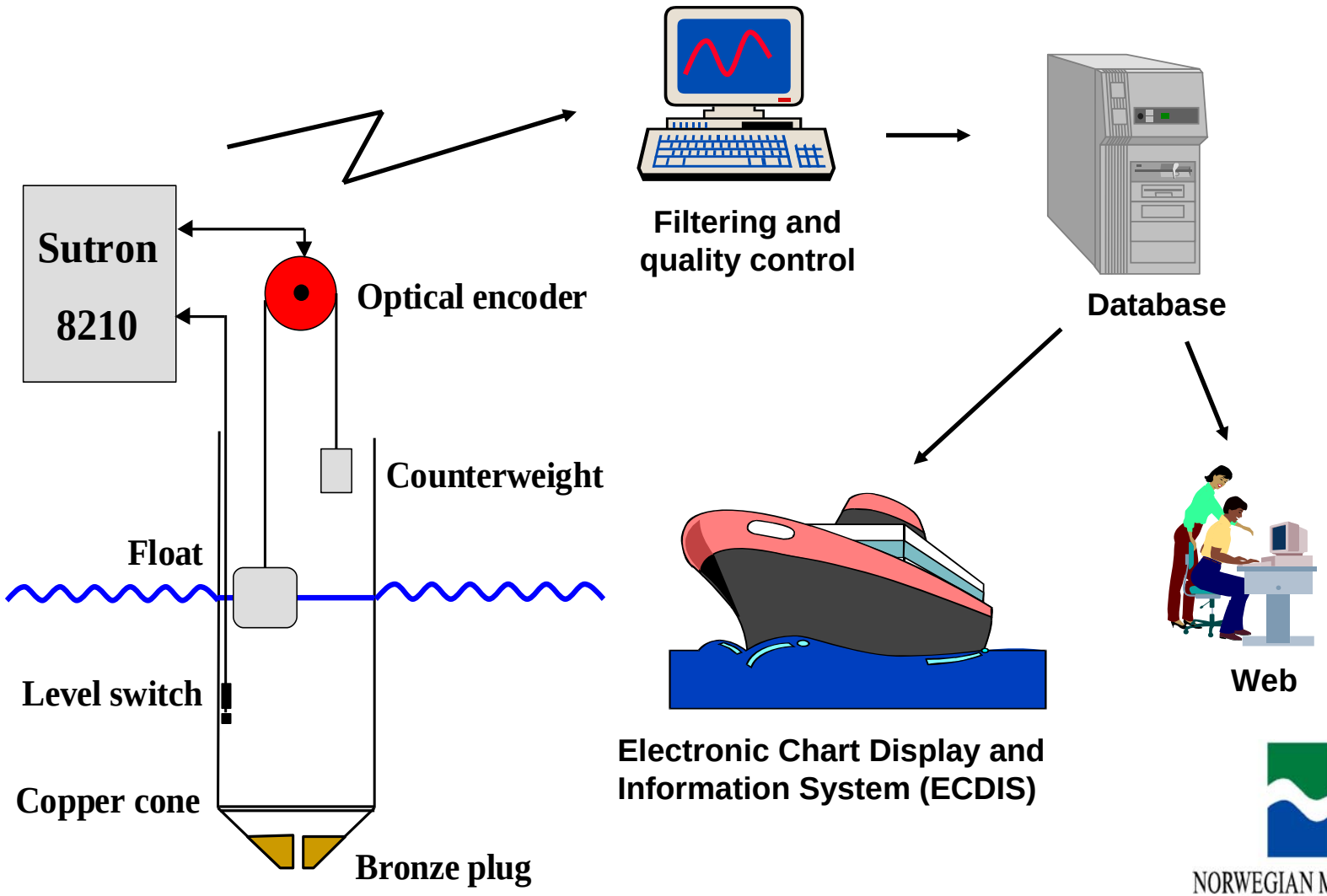
Data flow



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Tide gauge at Tregde

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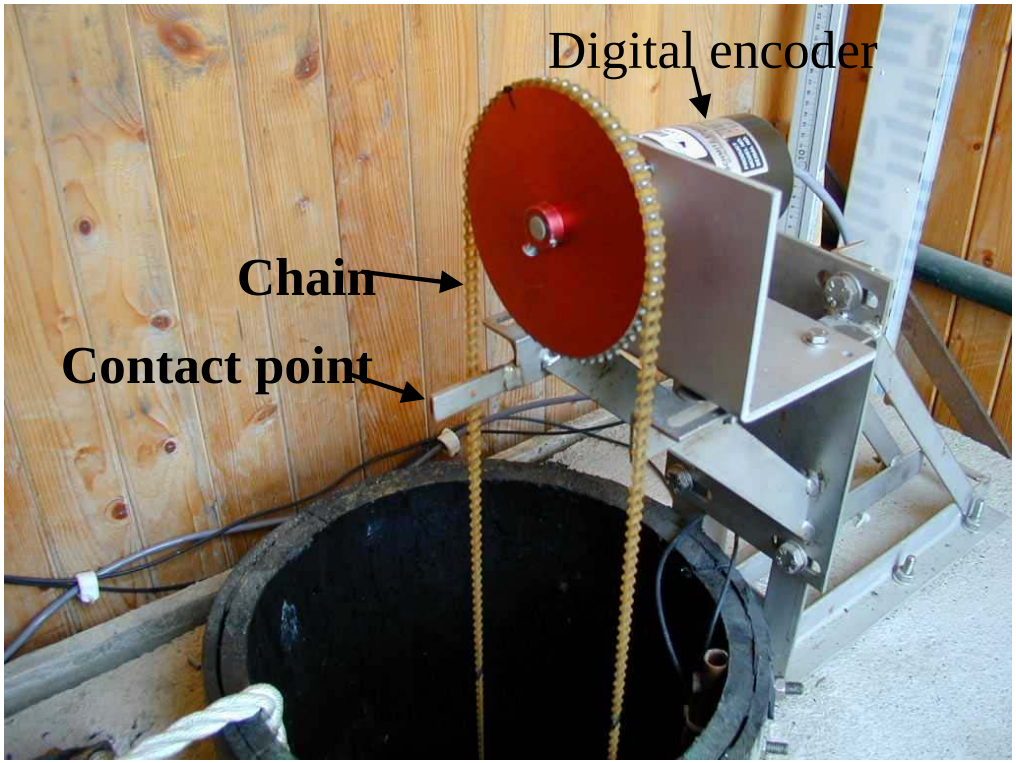
Stilling well and data logger



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Radar Tide Gauge

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Old and new system

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Projects

- *Automatic quality control of water level data*
- *Mean Sea Surface at the Norwegian Coast.*
- *Tidal model for the North Sea, the Norwegian Sea and the Barents Sea.*
- *Improving the web-pages http://vannstand.statkart.no*
- *Mareano*

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Automatic Quality control

- *Is required if the data will be used in near real time.*
- *The program must be able to find constant values, gaps, spikes and jumps.*
- *False values must be removed and gaps interpolated (if possible).*
- *Changes made to the data must be “flagged”.*
- *Bad data must not be published.*

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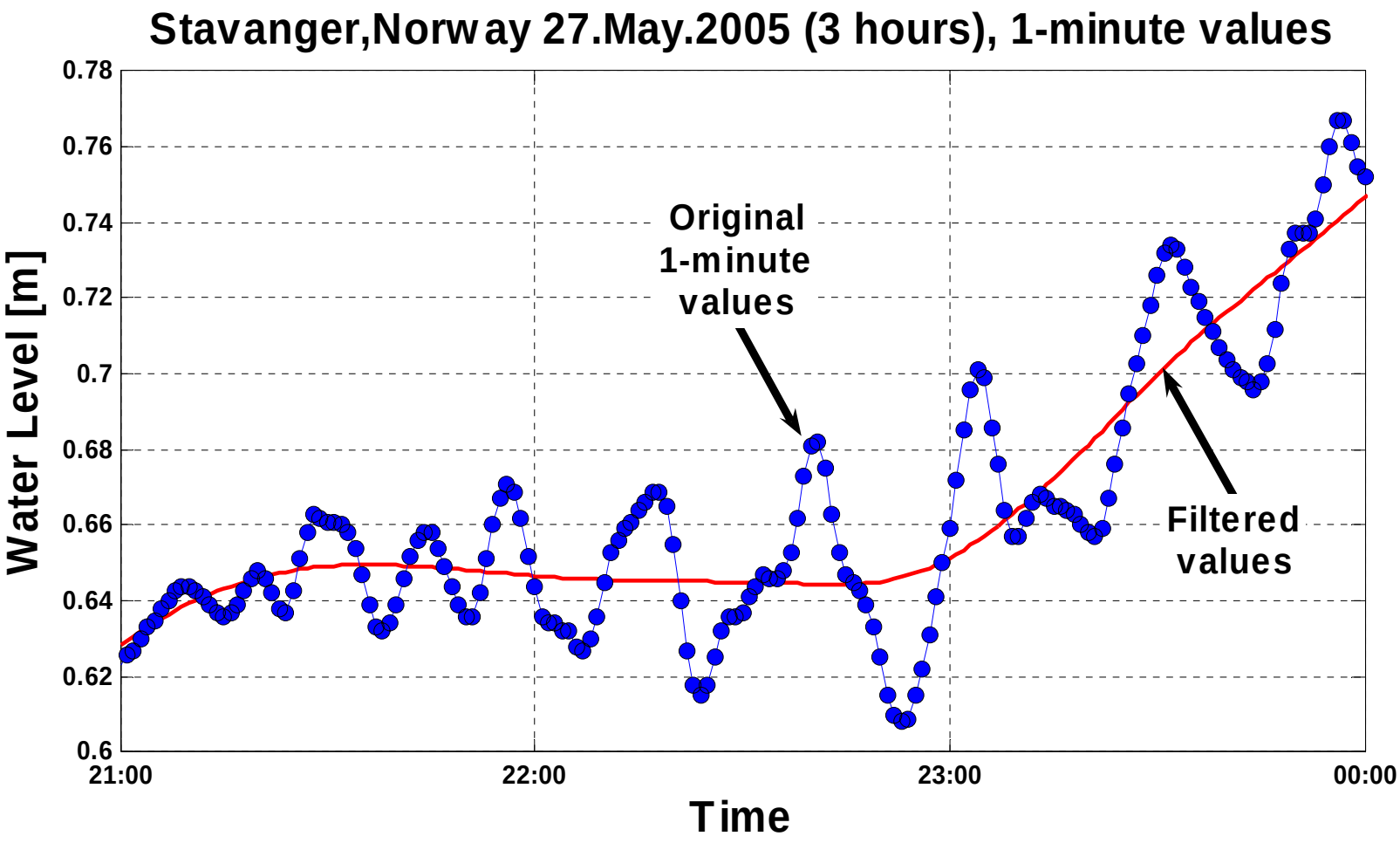
Close up of part of the series



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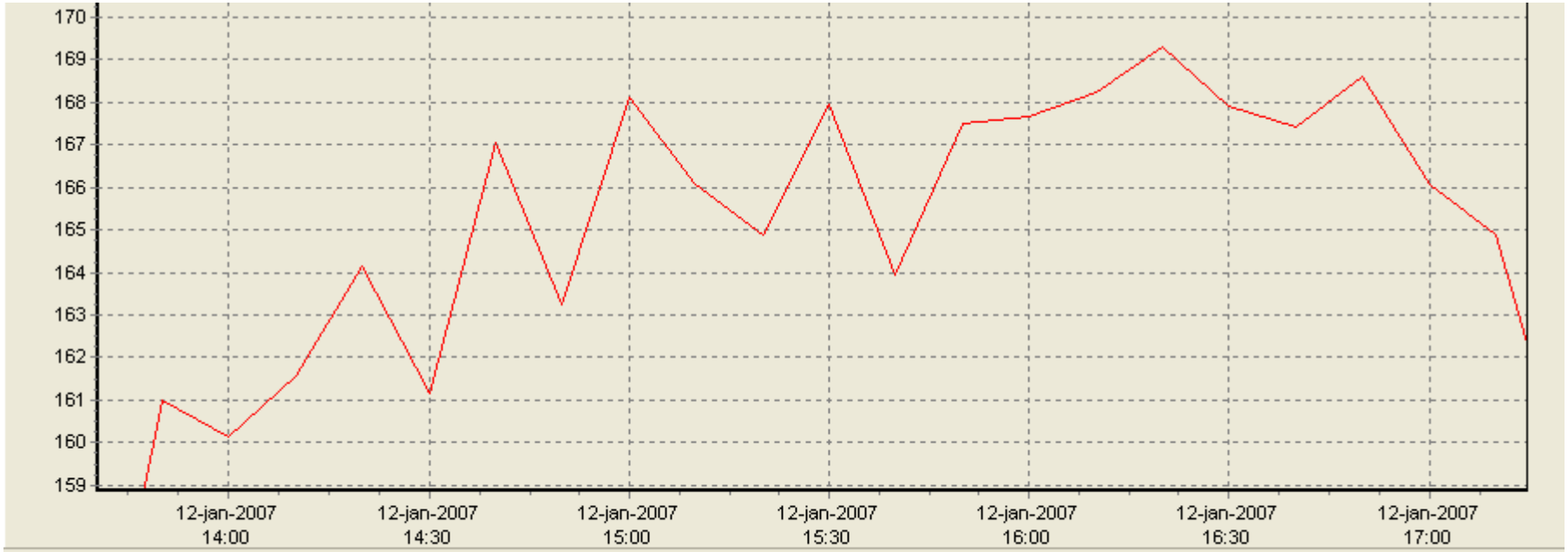
Water level observations with 10 minute intervals



Serie	Farge	Synlig	Y-akse	Strek
STAVANGER (12000),MDS (8), Posisjon: 58°58' N 05°44' E, rel. sjøkartnull i gr. 108,intervall 10 minutter.		JA	Venstre	1

The sensor is sampled every second for three minutes and the average is calculated.

We see a lot of noise, but is it noise?.

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Water level observations with 1 and 10 minute intervals

Serie	Farge	Synlig	Y-akse	Strek
STAVANGER (12000),MDS (8), Posisjon: 58°58' N 05°44' E, rel. sjøkartnull i gr. 108,intervall 10 minutter.		JA	Venstre	1
STAVANGER (12000),MDS_TEST (917), Posisjon: 58°58' N 05°44' E, rel. sjøkartnull i gr. 108,intervall 1 minutter.		JA	Venstre	1

The 1 minute data are an average of 1 second samples for 60 seconds.

We see that the ”noise” is nice oscillations with a period of approximately 20 minutes. The oscillations are probably only found in the harbour where the tide gauge is located.

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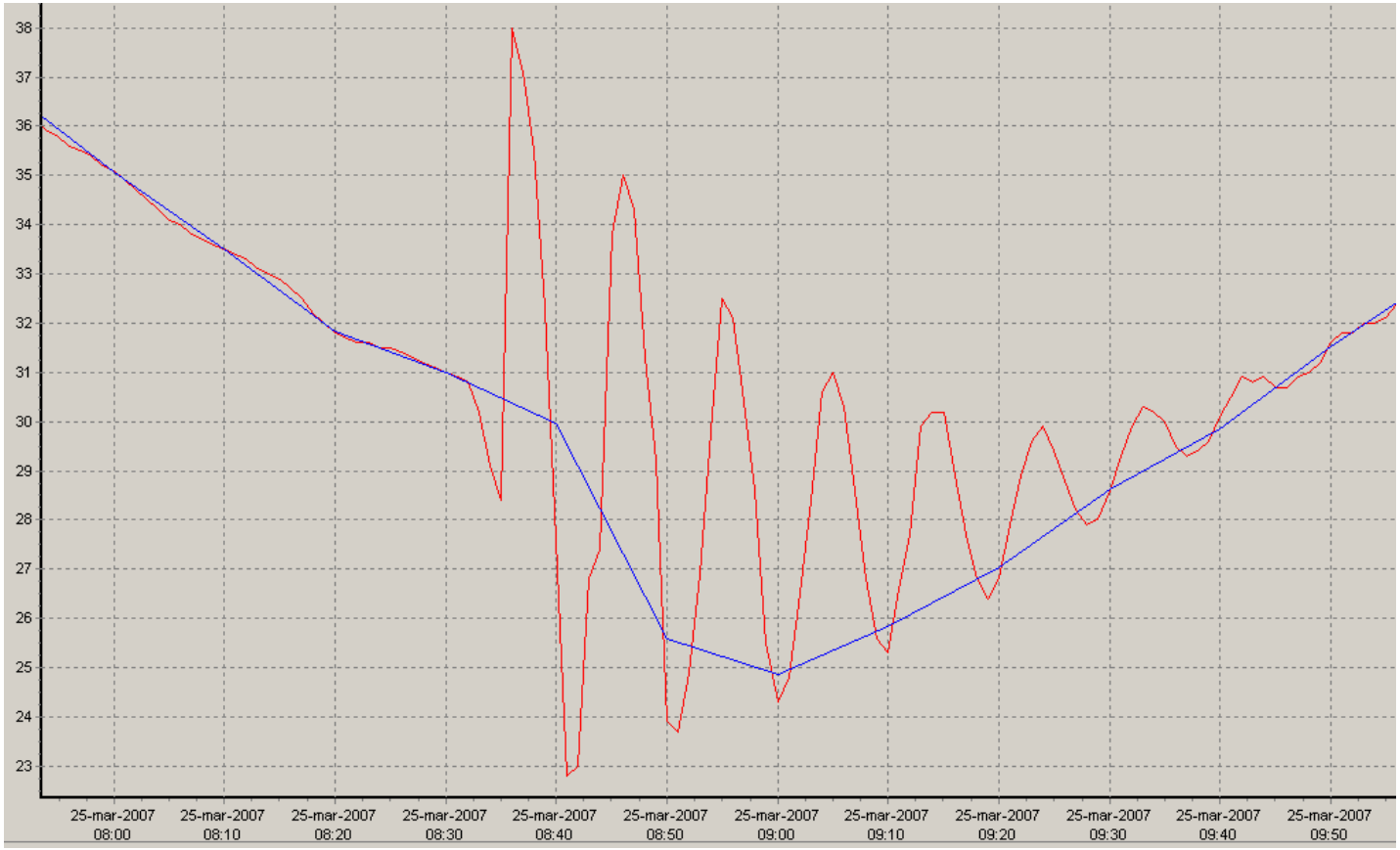
Water level observations from Bergen



Red line is 1-minute observations, blue line is 10-minutes observations.

A big ship is leaving the harbour. It creates oscillations at about 10 minutes and the 10-minute values shows to low water level.

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Mean Sea Level at the Norwegian Coast

- ***We want find a LAT surface relative to the ellipsoid inshore***
- ***From our primary and secondary harbours we know “a lot” about LAT relative to the MSL***
- ***We need the MSL relative to the ellipsoid, and this is our first and most difficult problem***
- ***Our plan is to use cheap pressure gauges in the vicinity of the primary stations and “transfer” MSL to the measuring sites***
- ***We must also measure with a GPS at each site***

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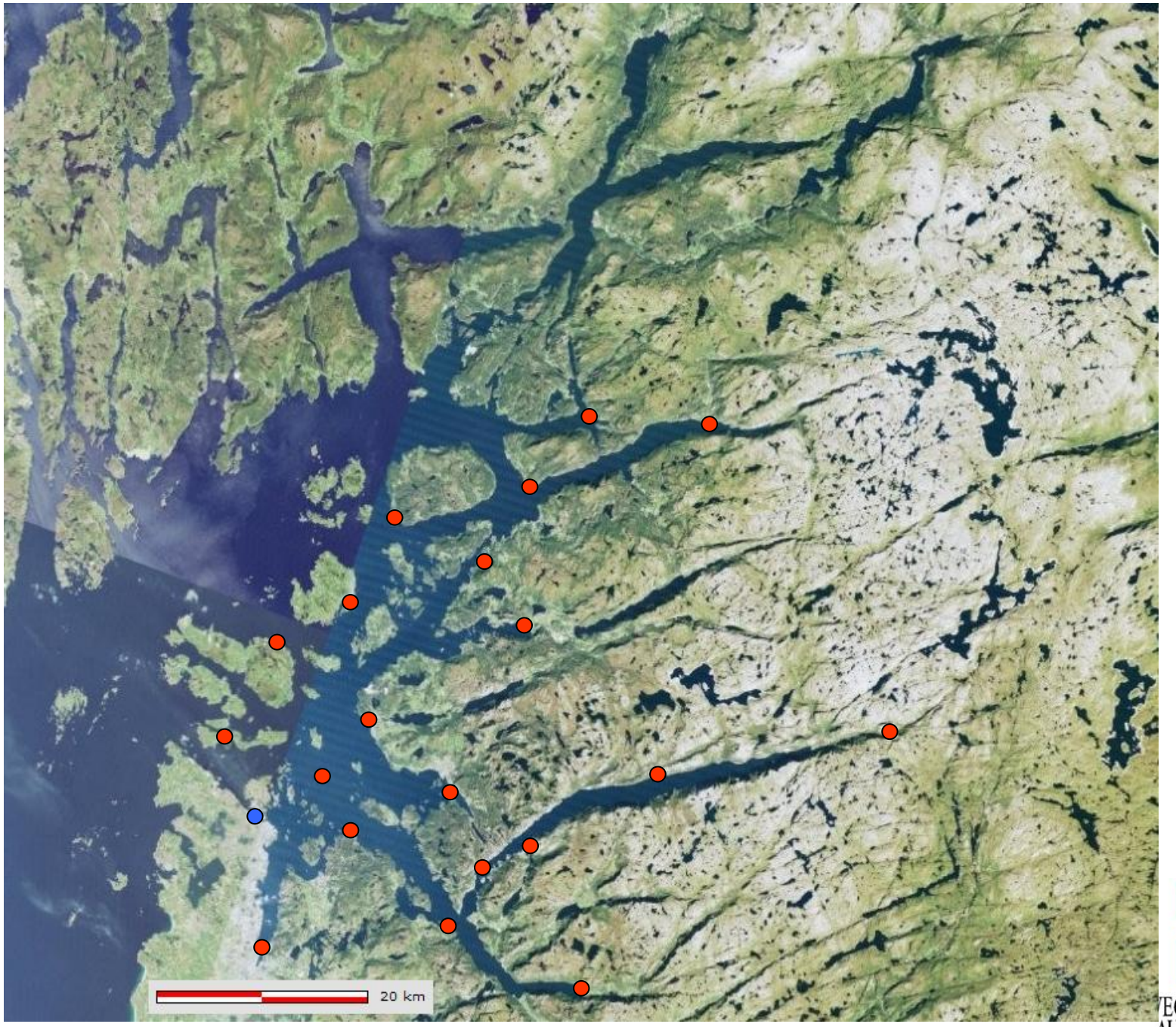

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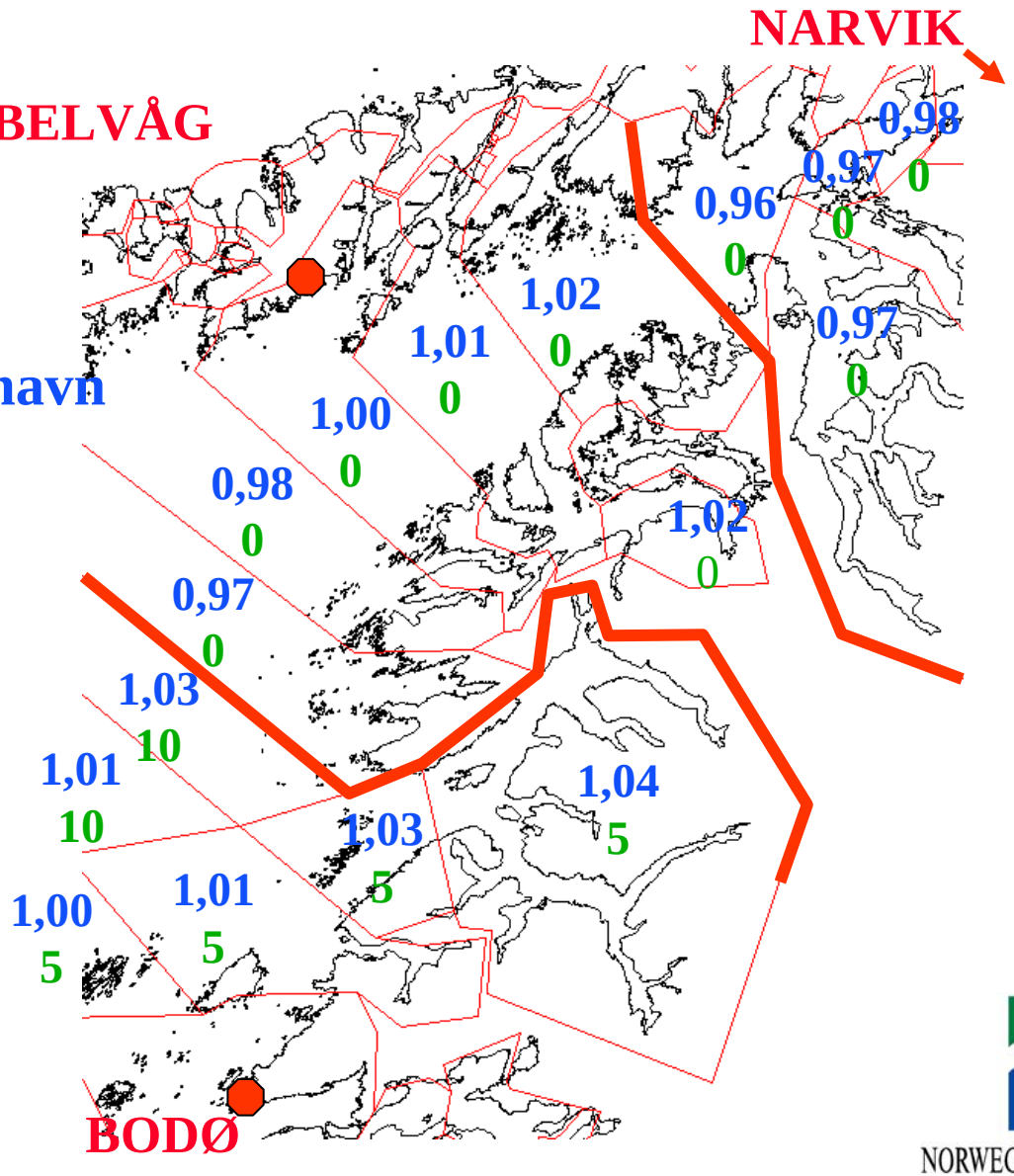
Tidal zones

Blå tall:
Høydekorreksjonsfaktor relativt nærmeste primærhavn

Grønne tall:
Tidskorreksjon relativt nærmeste primærhavn



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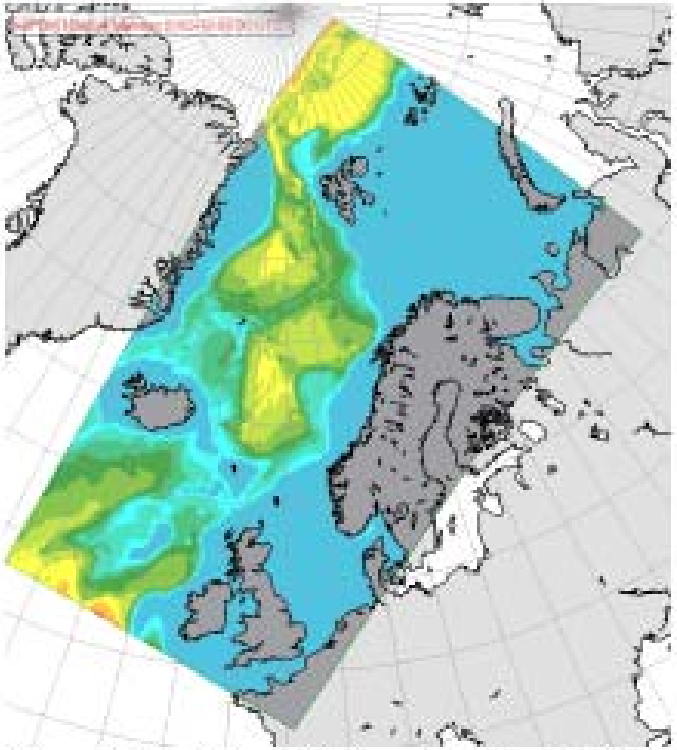
The model area



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MAREANO
Background

- *The Barents Sea is getting more important (because of oil, gas and politics)*
- *A mapping project has started where the Norwegian Hydrographic Service does the hydrographic work and other institutions examine the geology and life on the bottom.*
- *The ellipsoide is used as the reference level and the GPS is used to find the water level.*

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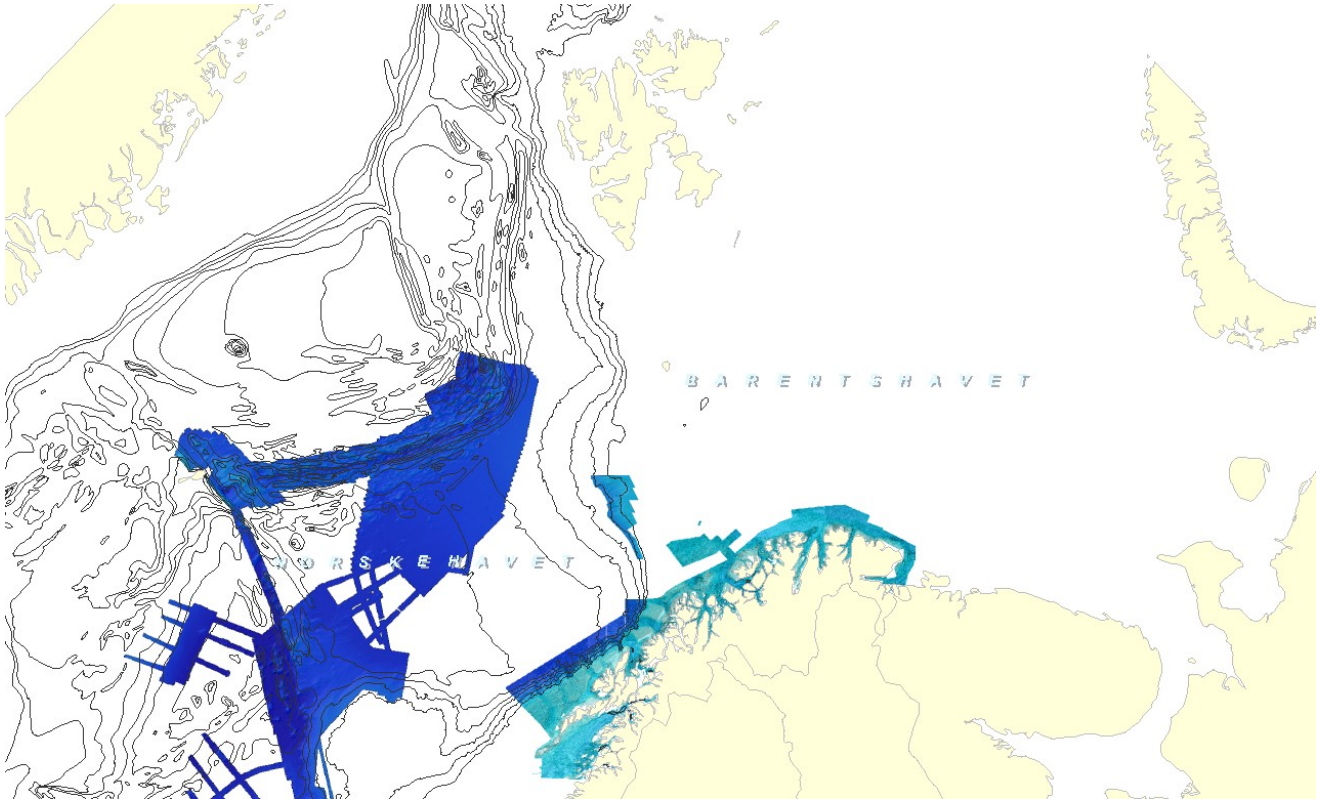

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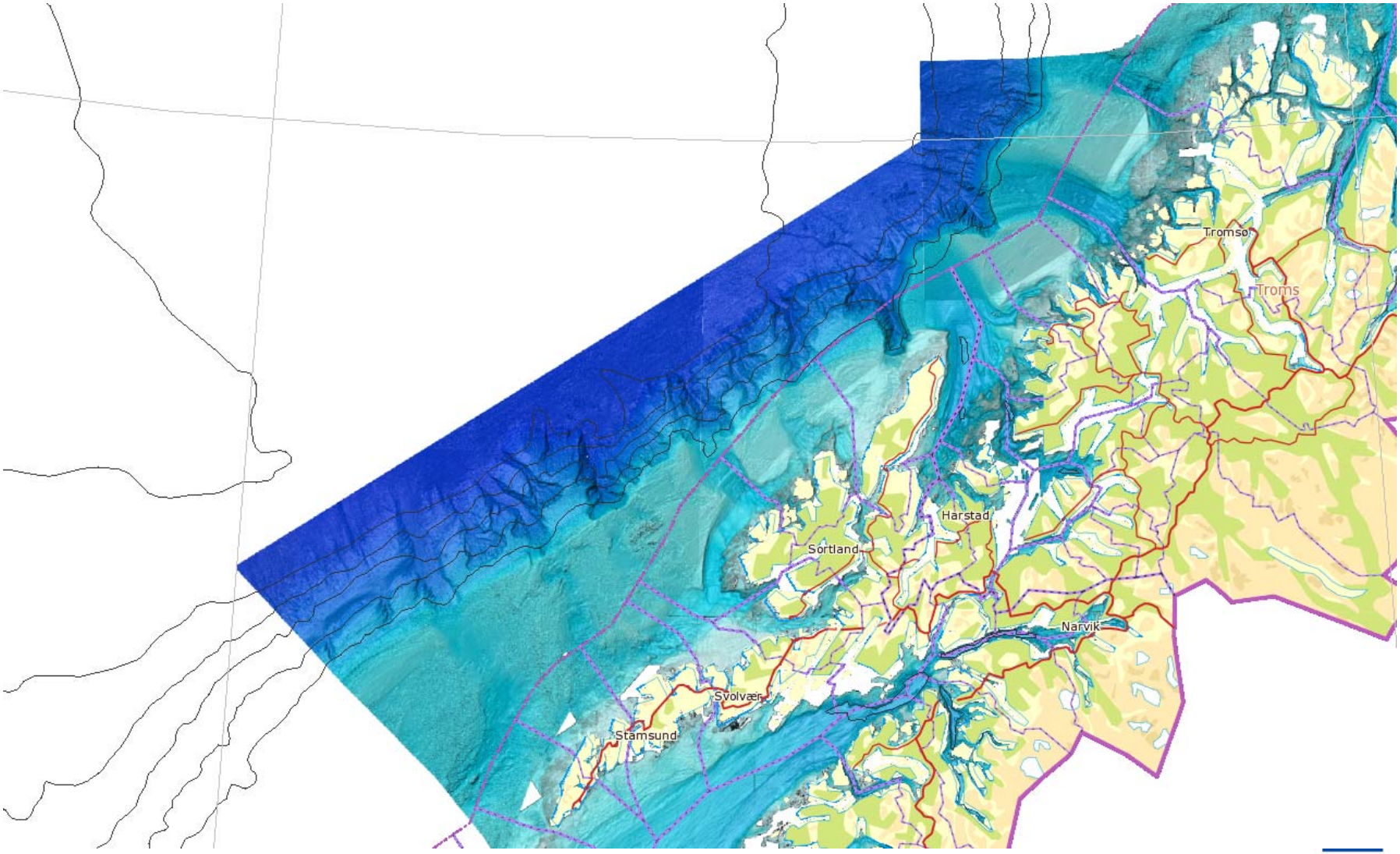

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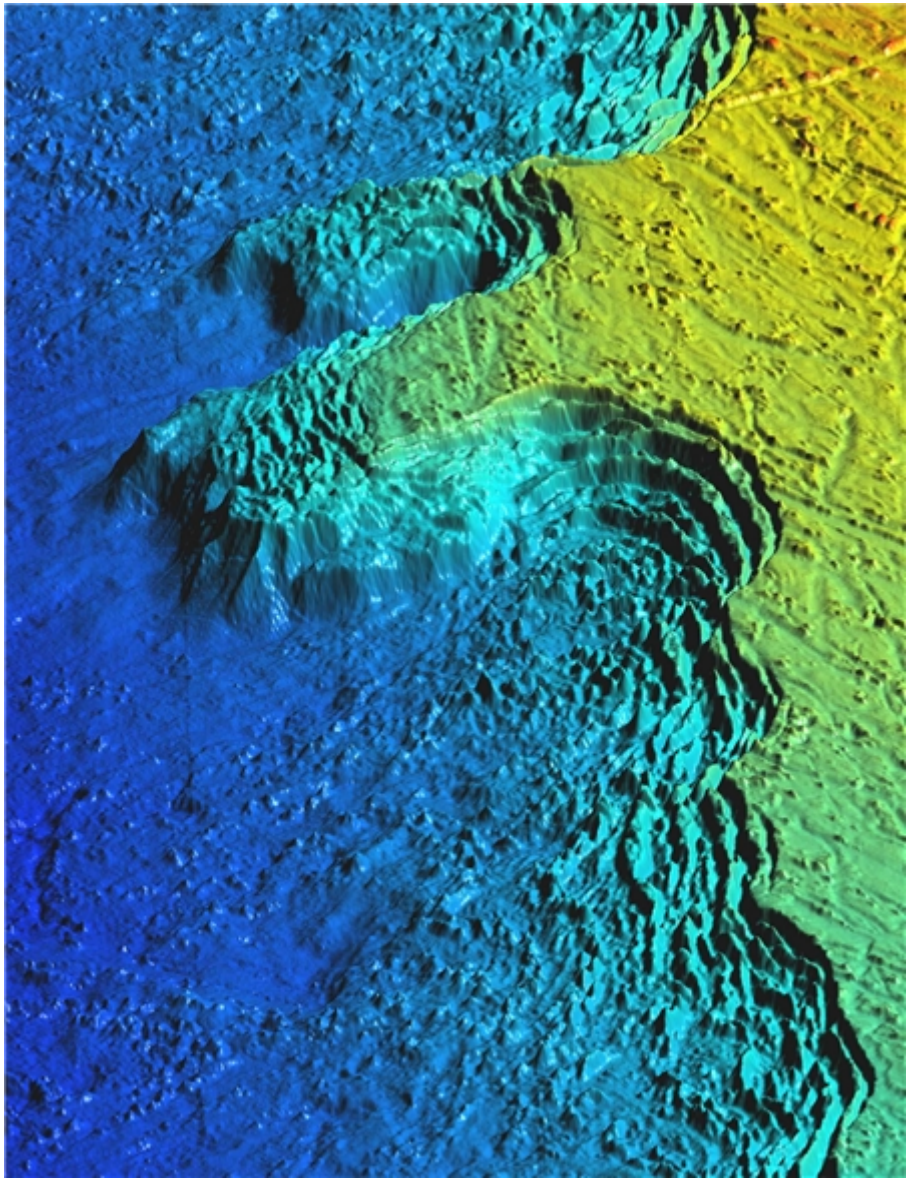

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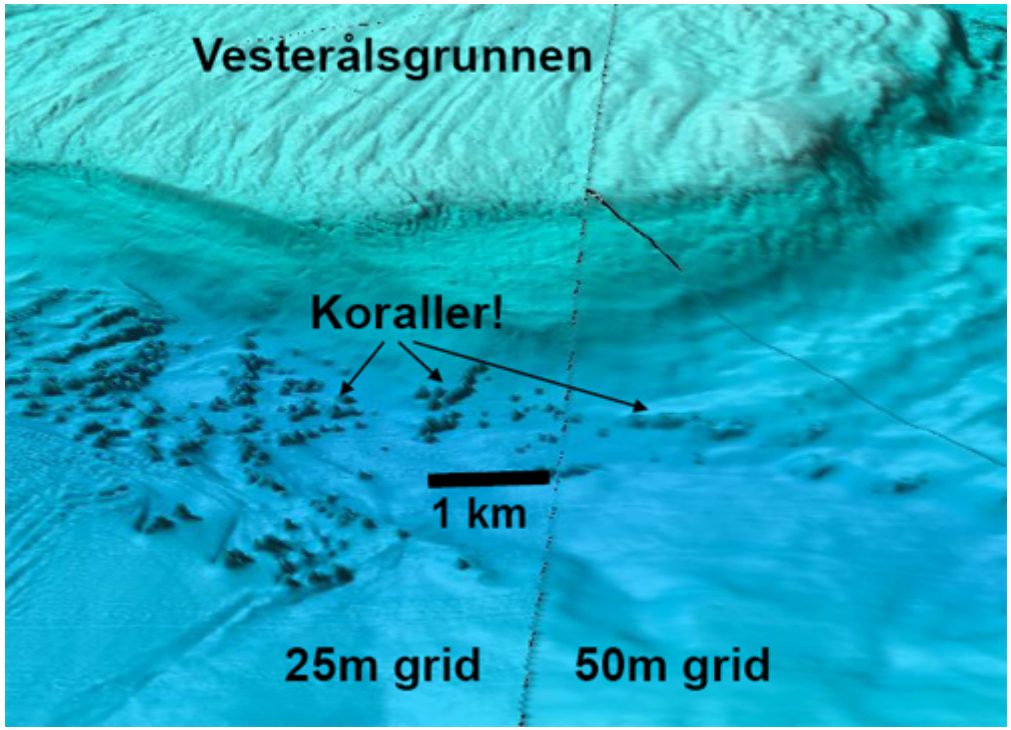

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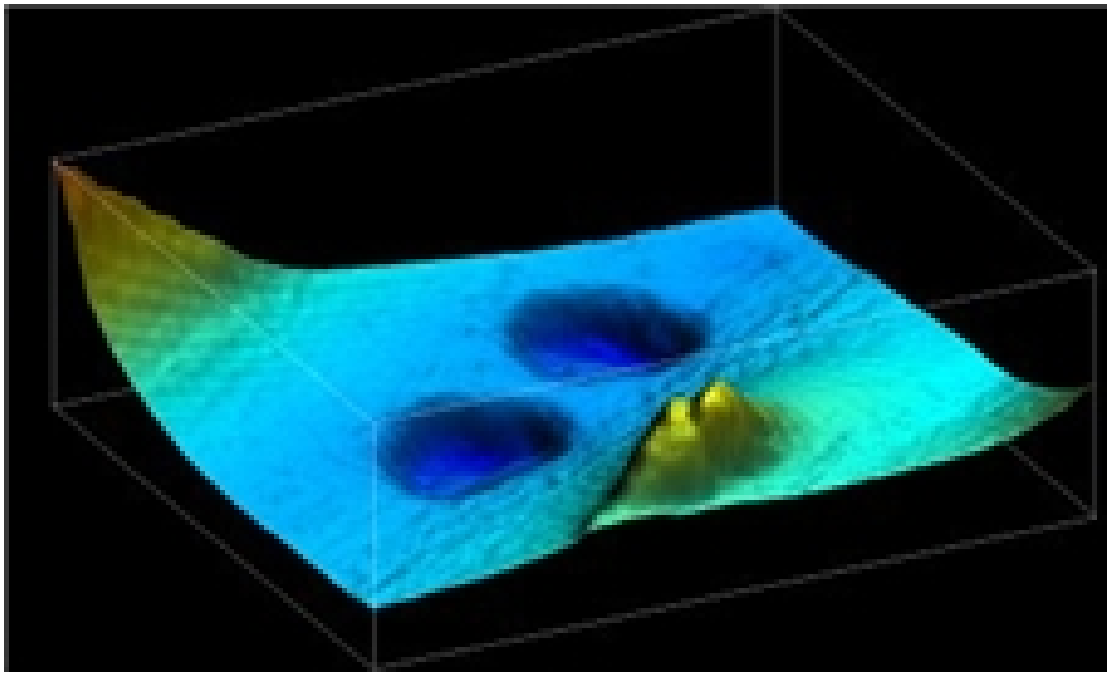

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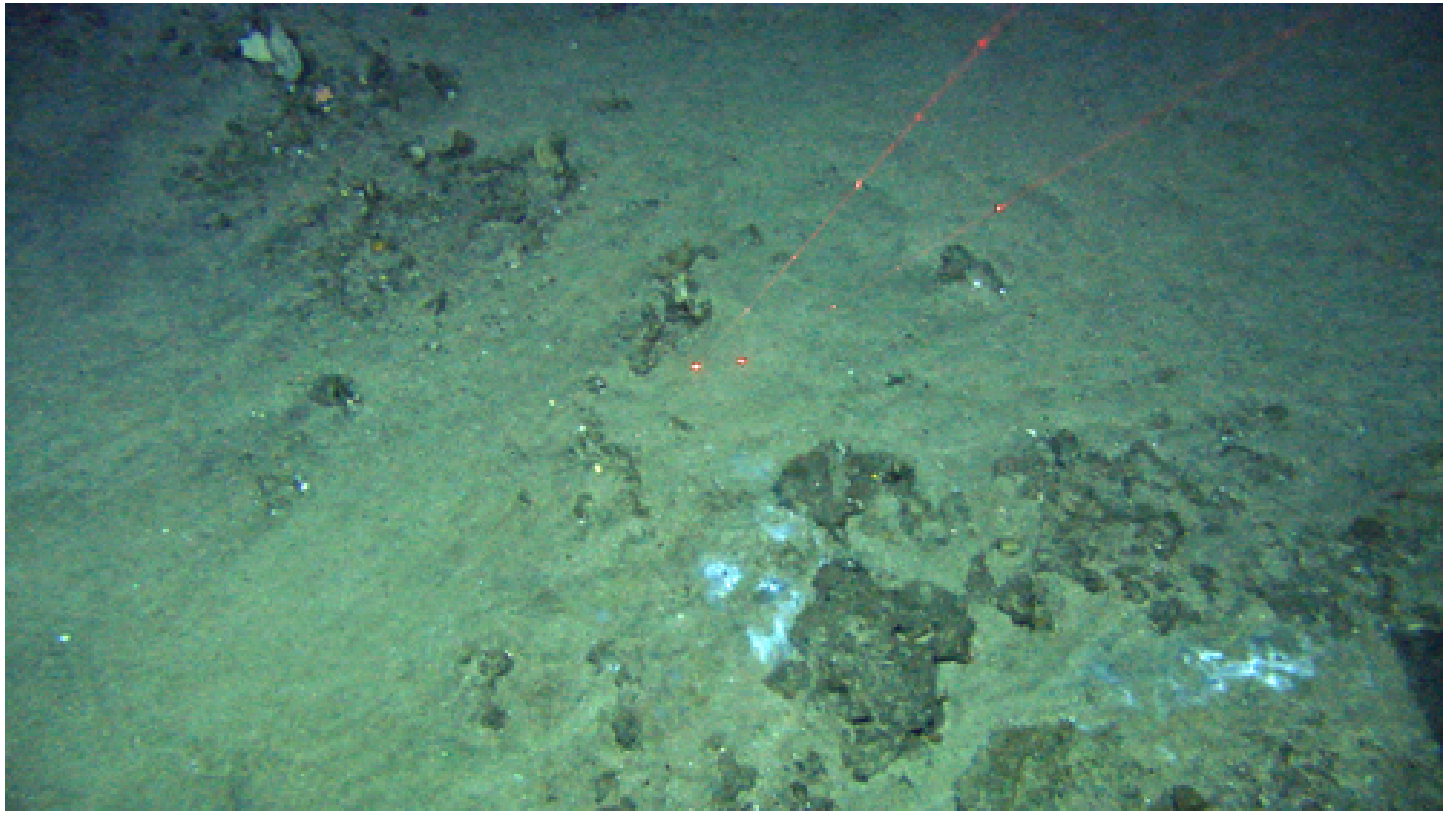

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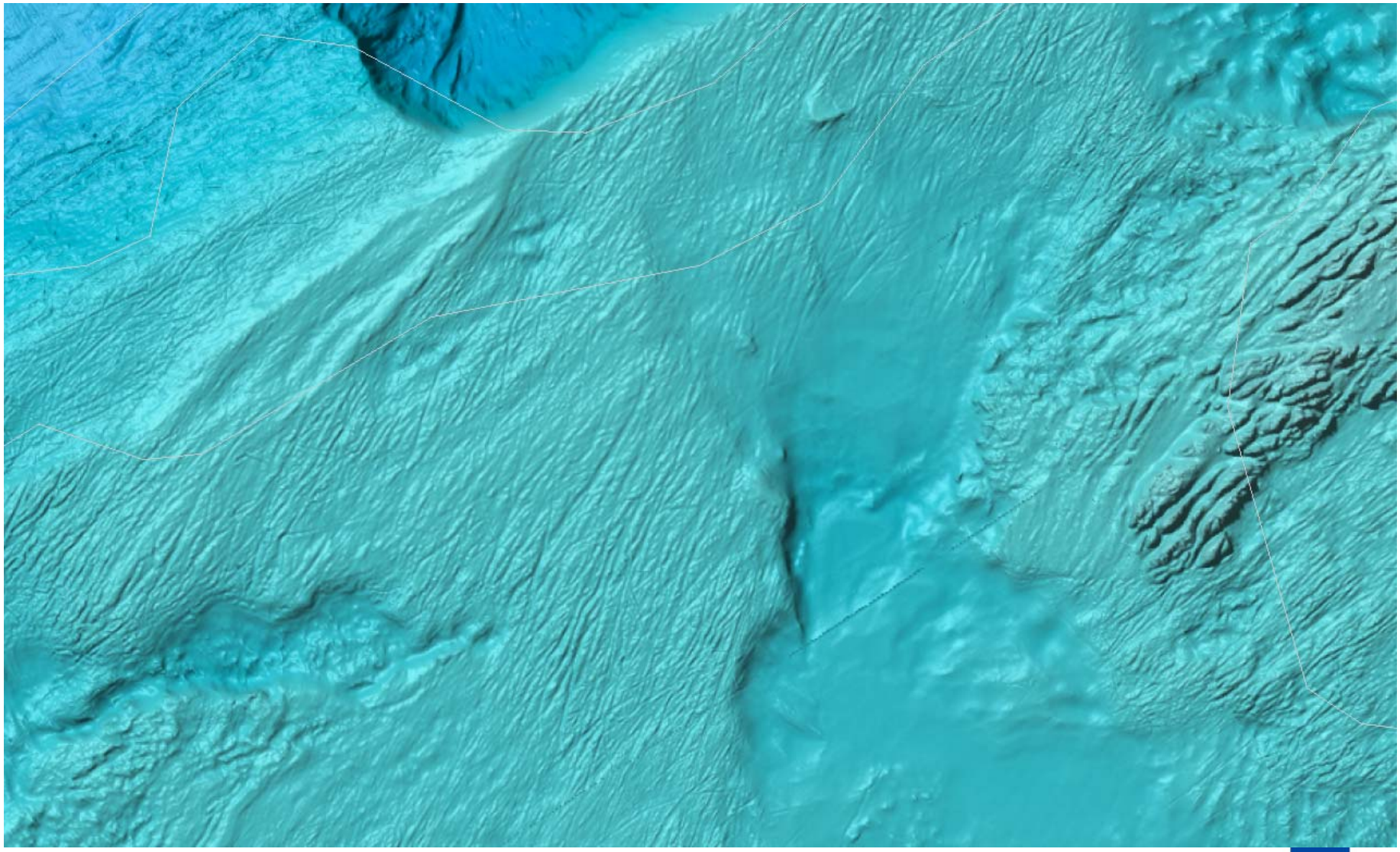

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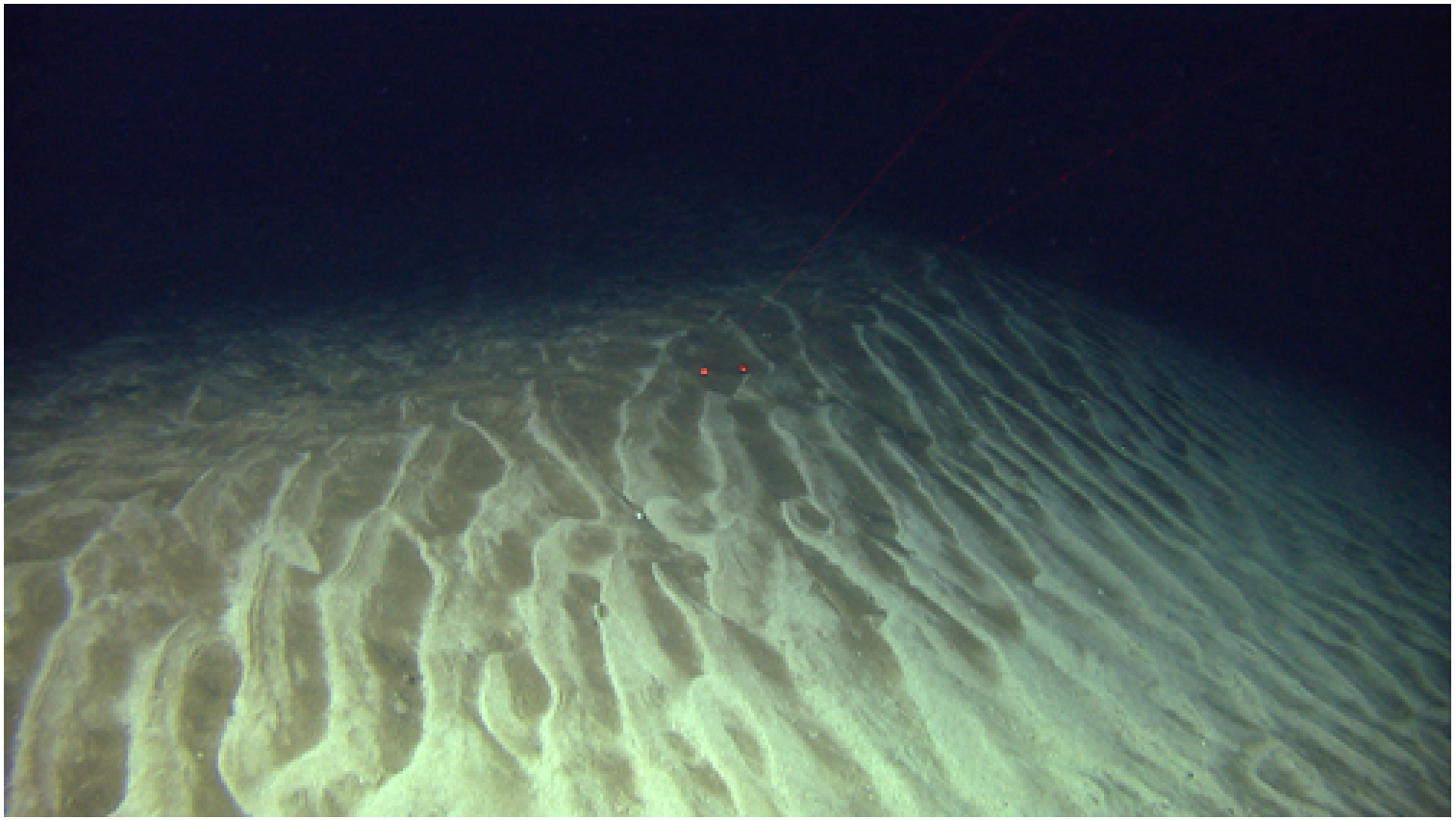

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