

Research using the North Pole Fibre infrastructure

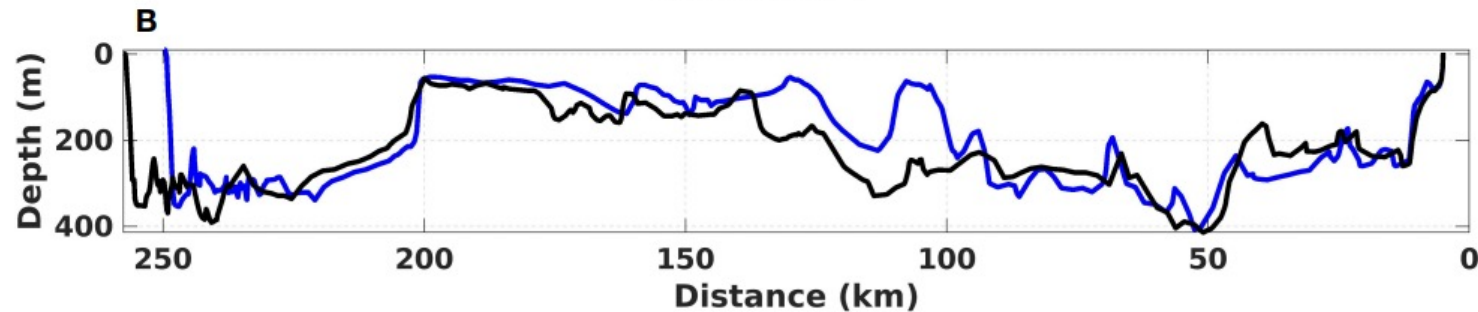
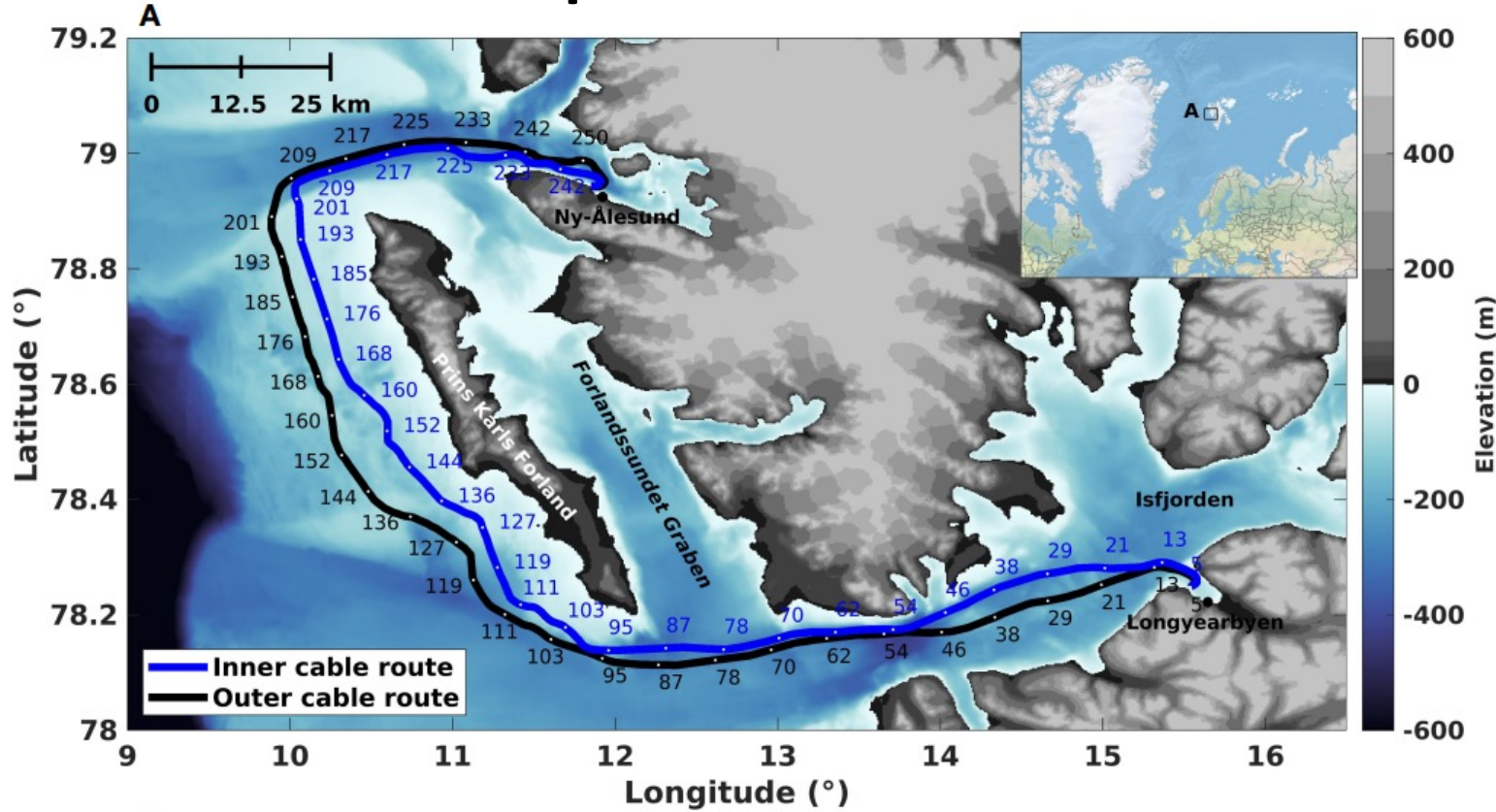
by Martin Landrø



SFI Centre for
Geophysical
Forecasting



The two fibre optic cables offshore Svalbard

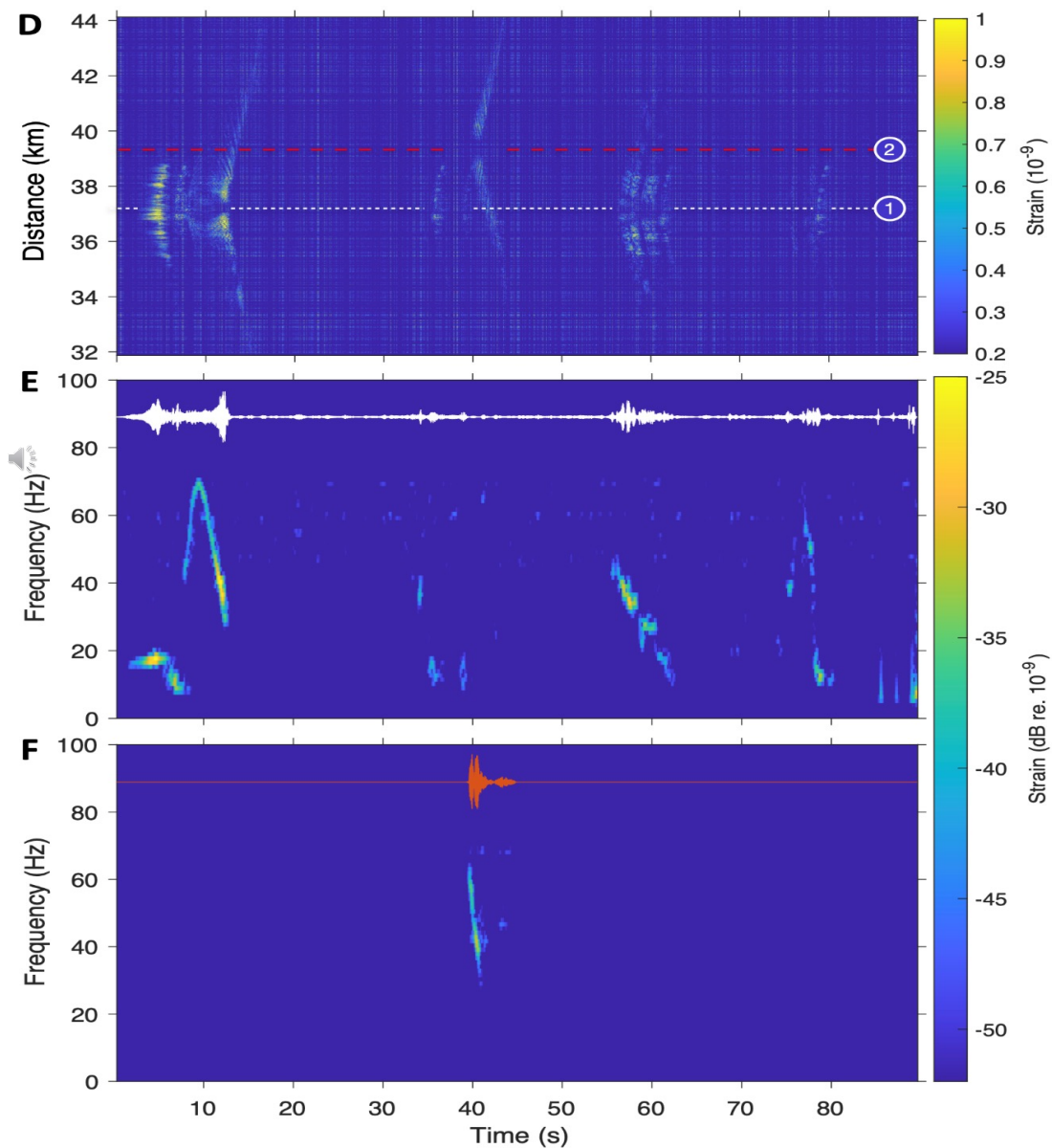
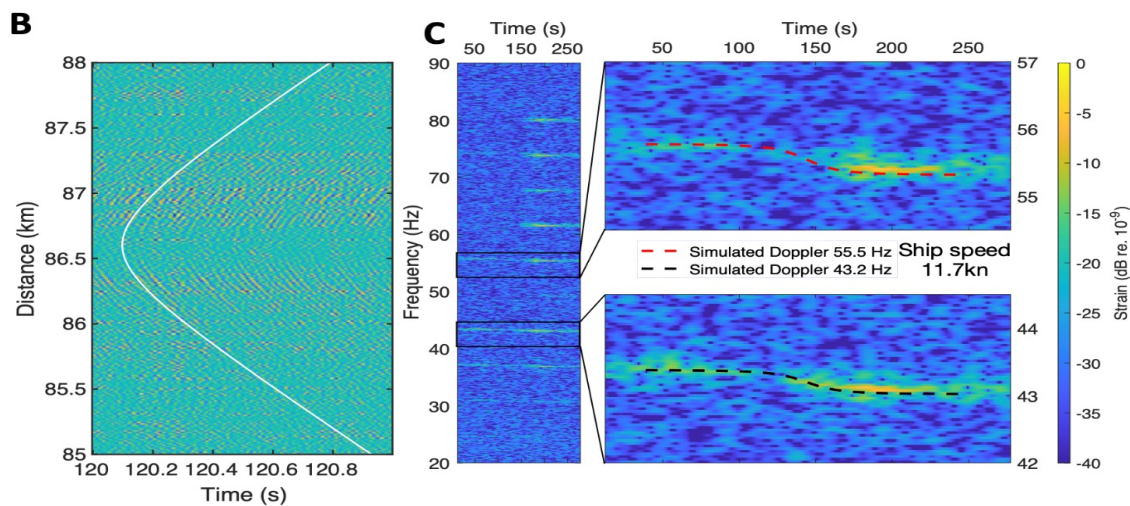
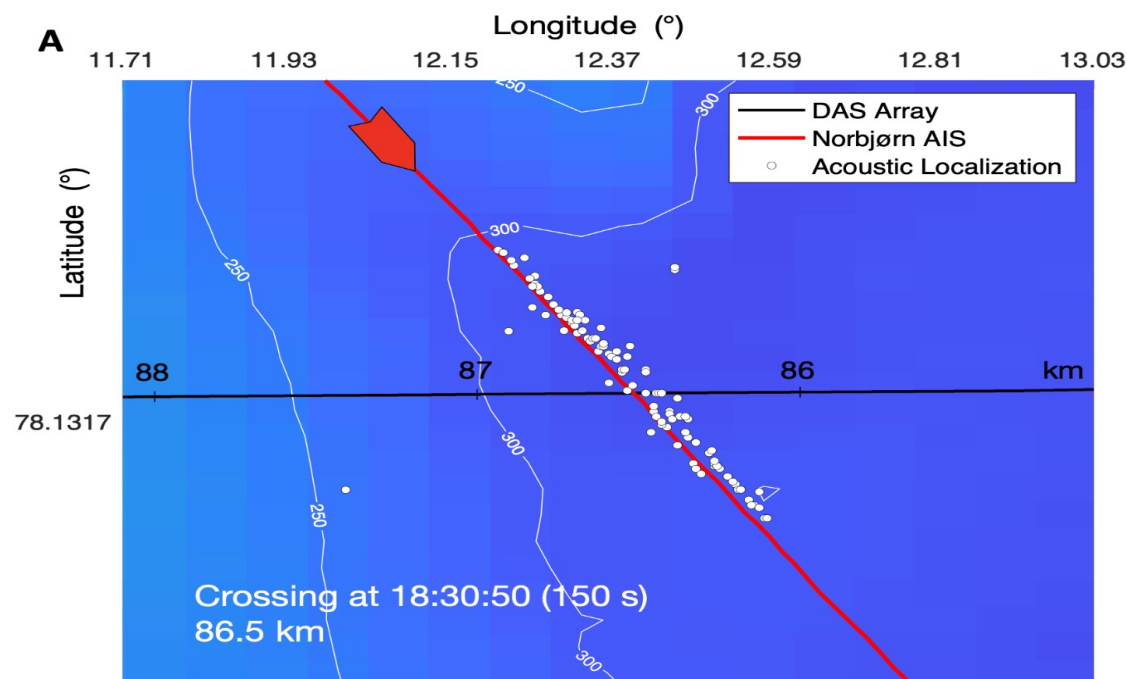


These fibres are being used by:

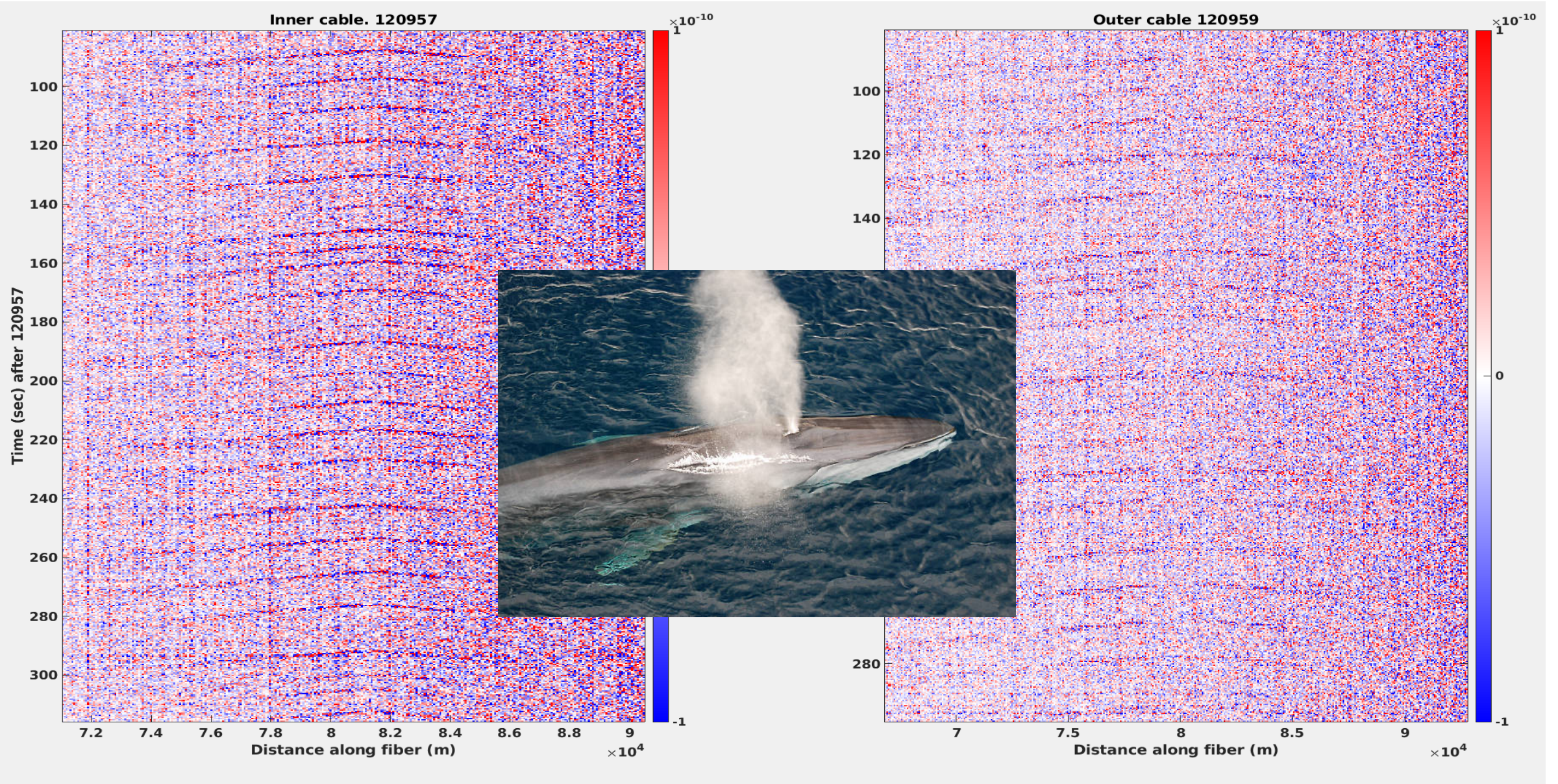
- CGF(Centre for Geophysical Forecasting, NTNU)
- SUBMERSE (EU Tech01 project)
- SeaSounds (EU ITN project)

JAMSTEC in Japan is a partner in CGF

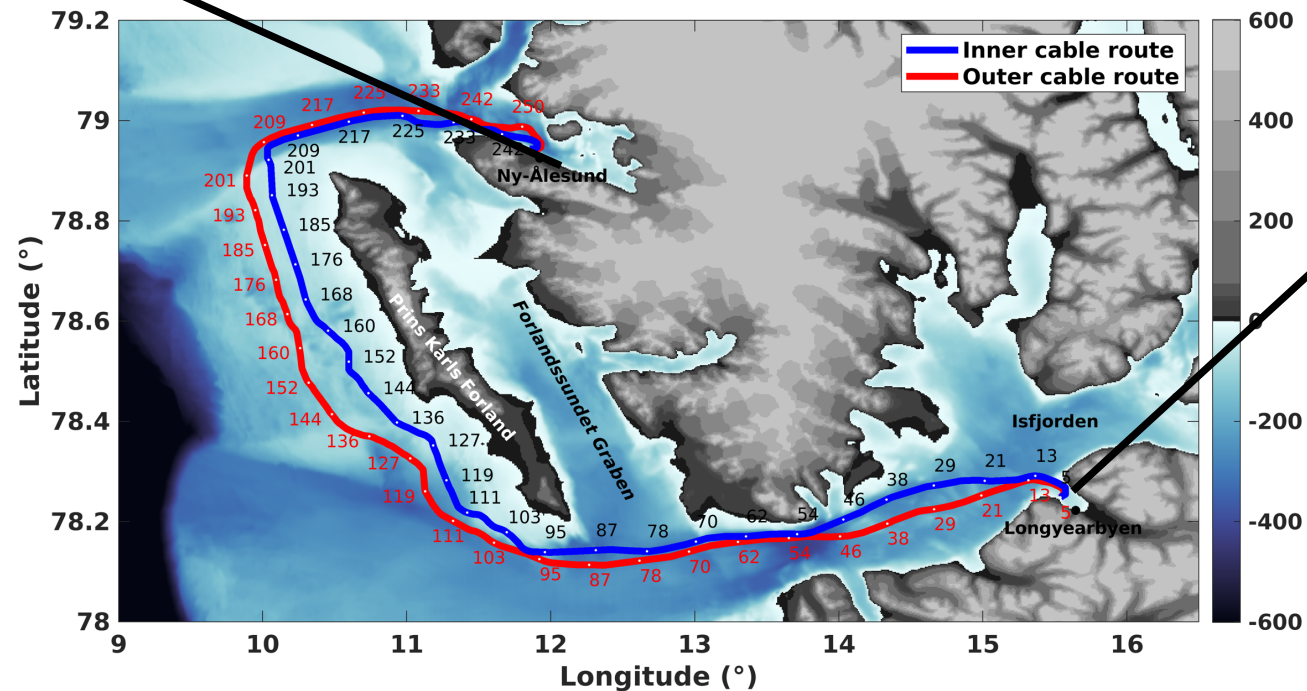
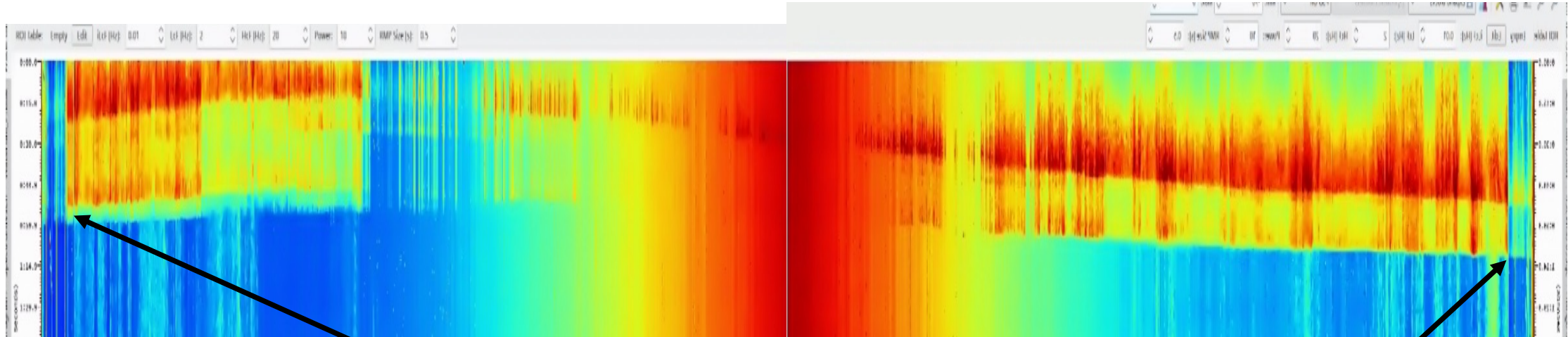
Sensing whales, storms, ships and earthquakes - Arctic fibre-optic cable



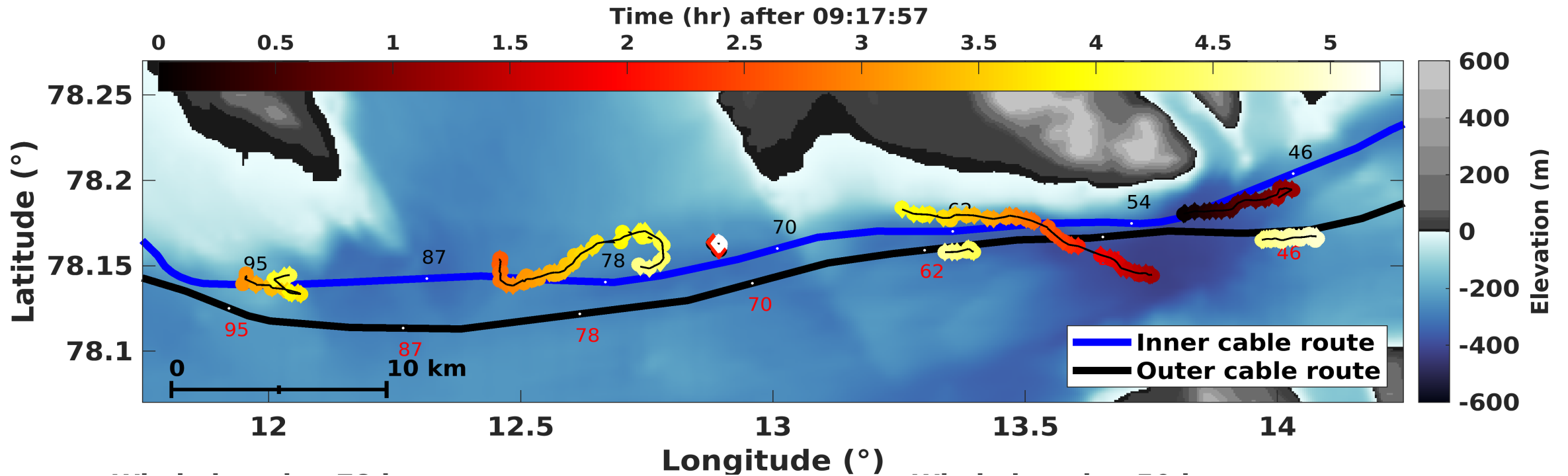
24 fin whale calls recorded simultaneously on both cables



The 2022 CGF Svalbard field campaign: Using 4 interrogators

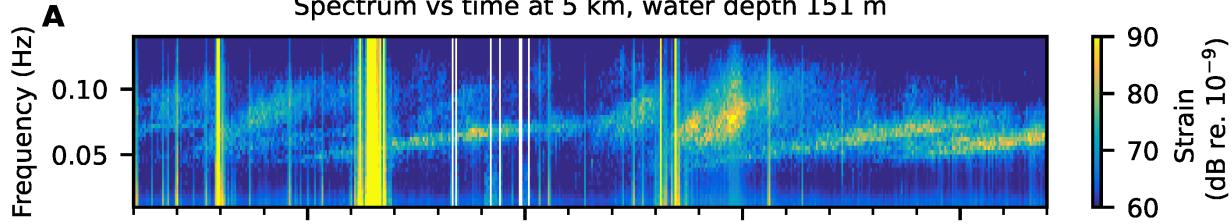


Tracking fin whales

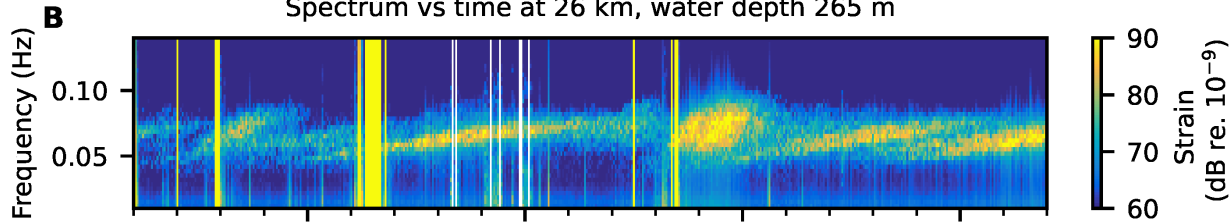


Low frequency DAS – Distant storms

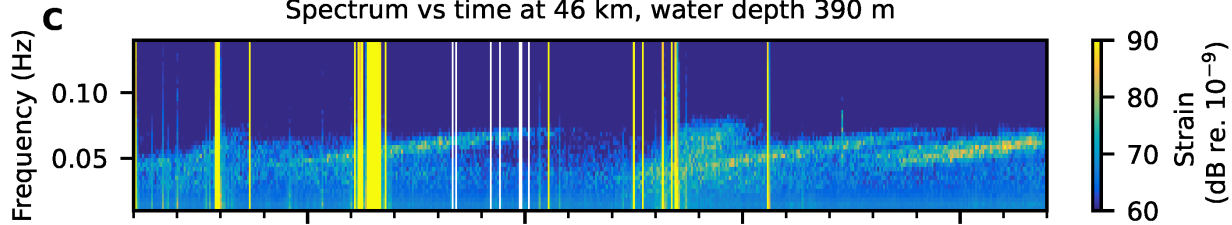
Spectrum vs time at 5 km, water depth 151 m



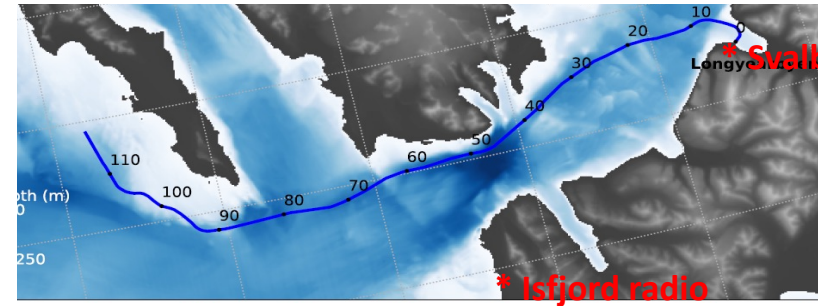
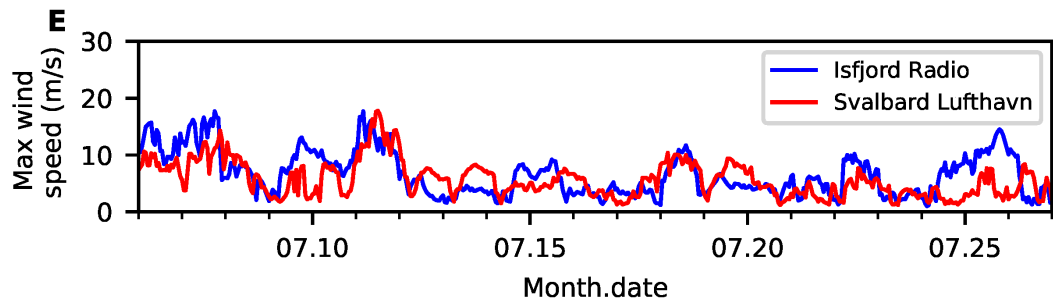
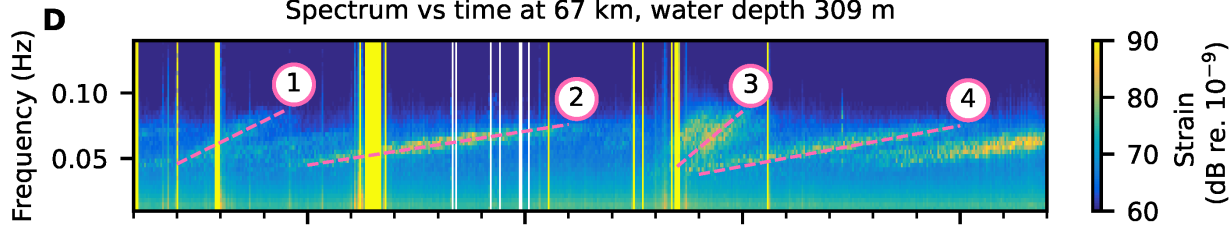
Spectrum vs time at 26 km, water depth 265 m



Spectrum vs time at 46 km, water depth 390 m



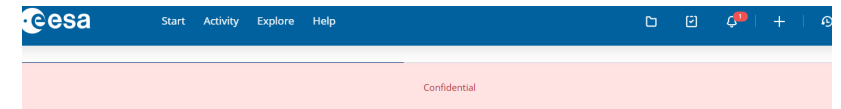
Spectrum vs time at 67 km, water depth 309 m



Munk, 1963:

$$x = \frac{g}{4\pi \left(\frac{df}{dt} \right)}$$

- 1: Edouard 4100 km
- 2: Offshore Brazil, 13000 km
- 3: Storm between Iceland and Greenland 2400 km
- 4: Offshore Brazil, 11 000 km



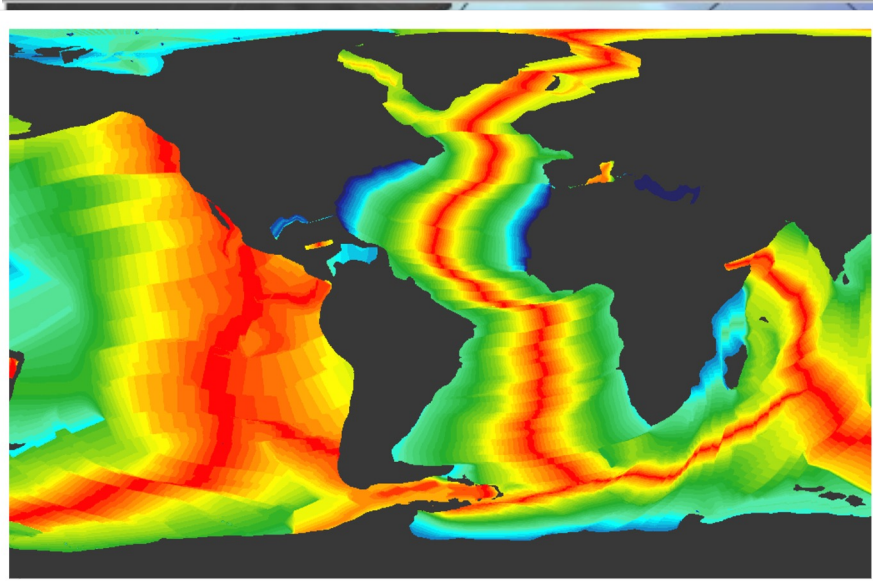
Lunar Gravitational-wave Detection

Channel: SciSpacE CORA - Topical Team (TT) Category: Physical Sciences

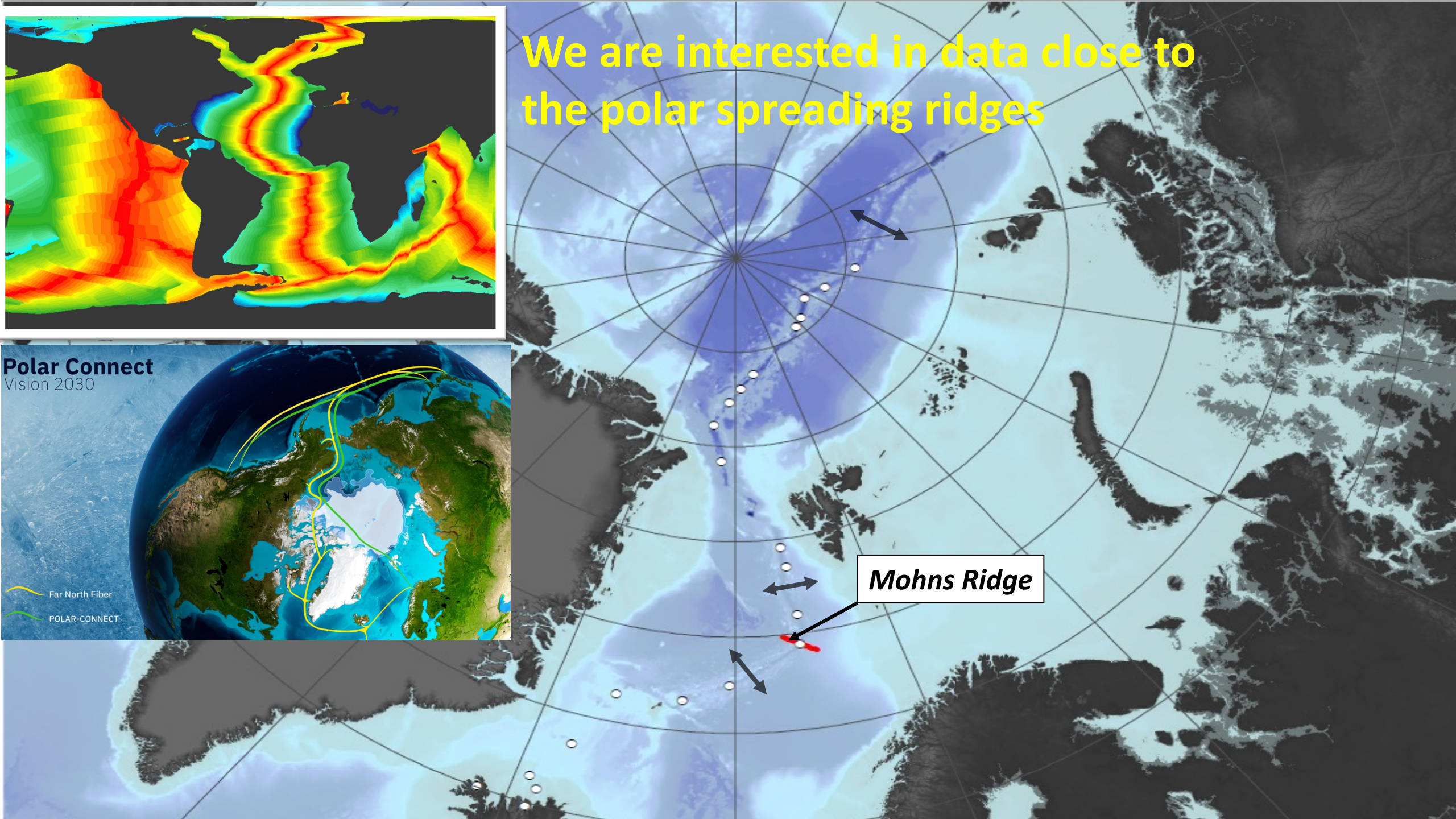
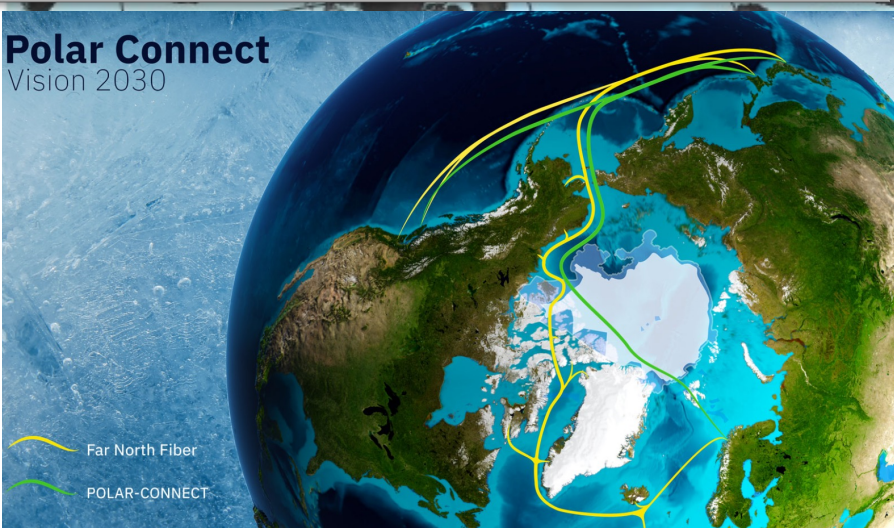


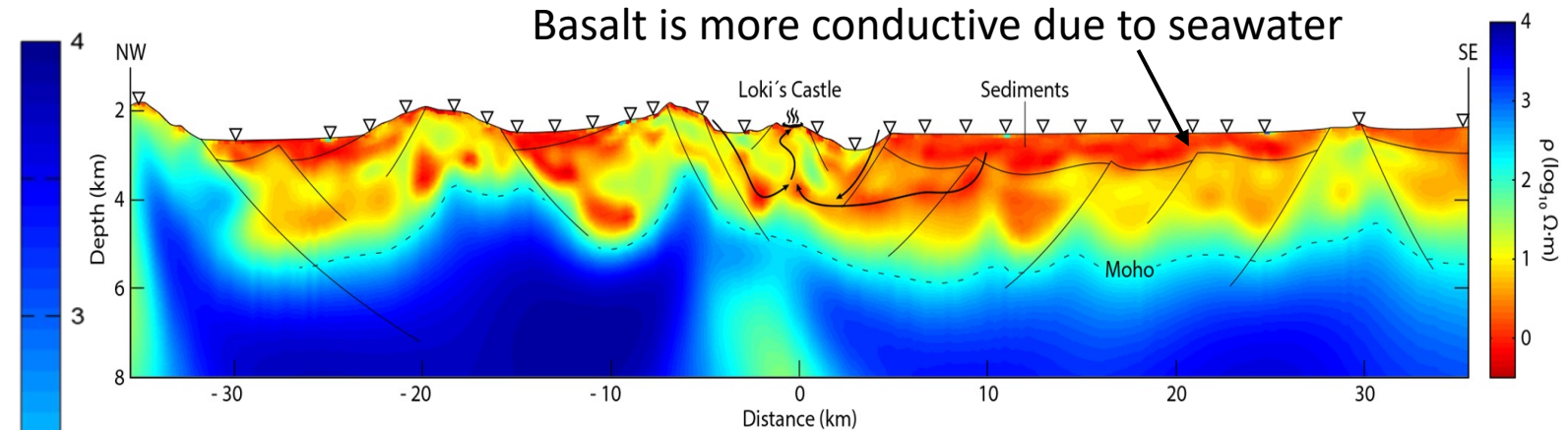
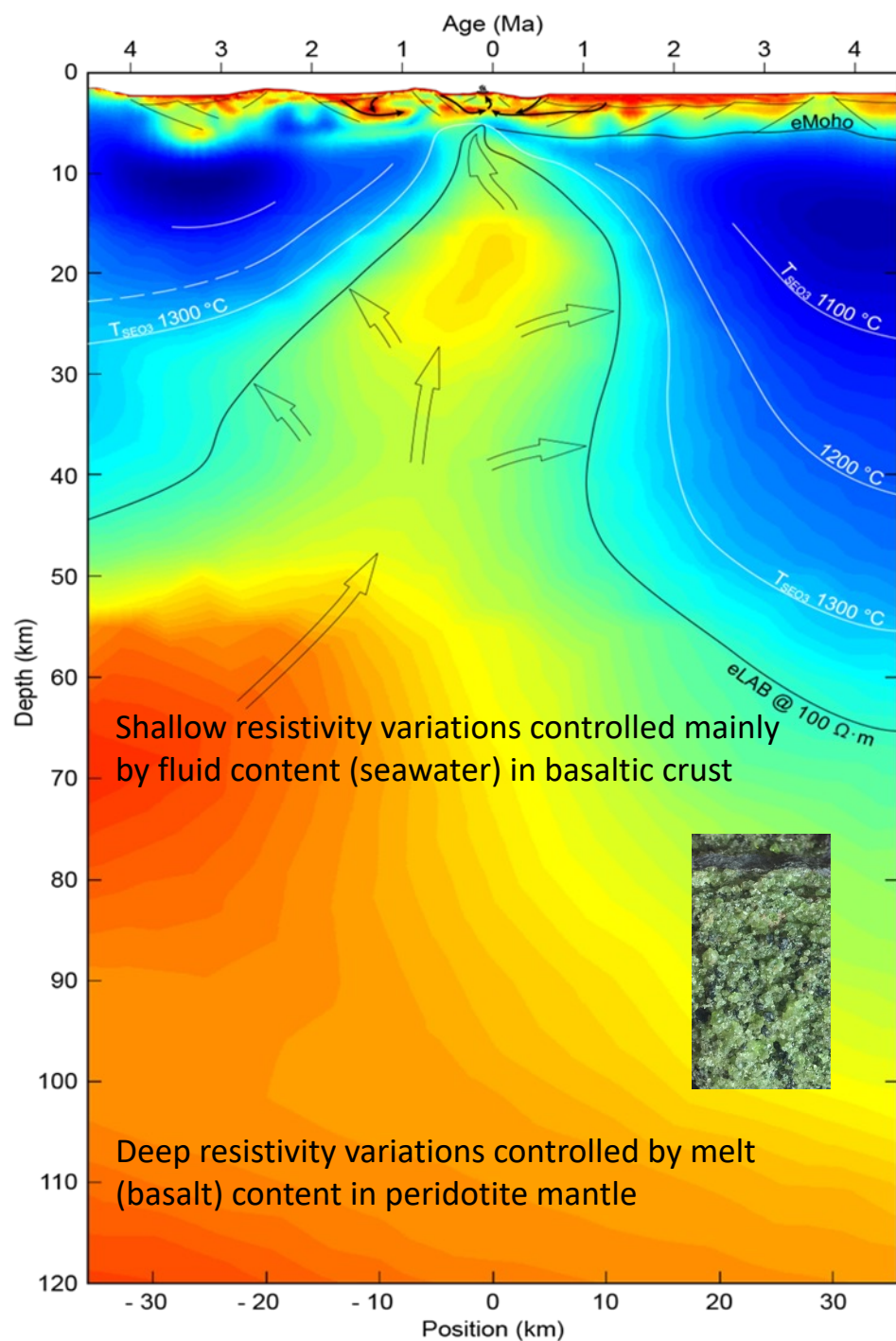
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We are interested in data close to the polar spreading ridges






nature
International journal of science

Letter | Published: 20 March 2019

Deep electrical imaging of the ultraslow-spreading Mohns Ridge

Ståle Emil Johansen , Martin Panzner, Rune Mittet, Hans E. F. Amundsen, Anna Lim, Eirik Vik, Martin Landrø & Børge Arntsen

Nature **567**, 379–383 (2019) | [Download Citation](#) 

Summary

- **Ocean floor DAS:**

- Efficient tool for tracking of whales:
- Oceanography (distant storms, ocean currents, tidal, temperature...)
- Seismological studies (earthquakes, gas flares, explosions,..)
- Present range of DAS is 100-150 km – need amplifiers every 100 km => under development
- Possible to combine DAS and telecommunication in near future

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References

- Bouffaut, L. et al., 2022, **Eavesdropping at the speed of light: Distributed acoustic sensing of baleen whales in the Arctic**. *Front. Mar. Sci.* 9, 901348.
- Landrø, M. et al., 2022, **Sensing whales, storms, ships and earthquakes using an Arctic fibre optic cable**, *Sci Rep* **12**, 19226.
- Landrø, M., S.E. Johansen, N. Schmitz, H. E. F. Amundsen, 2022, **Using DAS-fibres for Lunar seismic imaging**, paper presented at the European Lunar Symposium 2022 May 24th-26th.
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