

Science and Science Platforms in Antarctica & the Southern Ocean

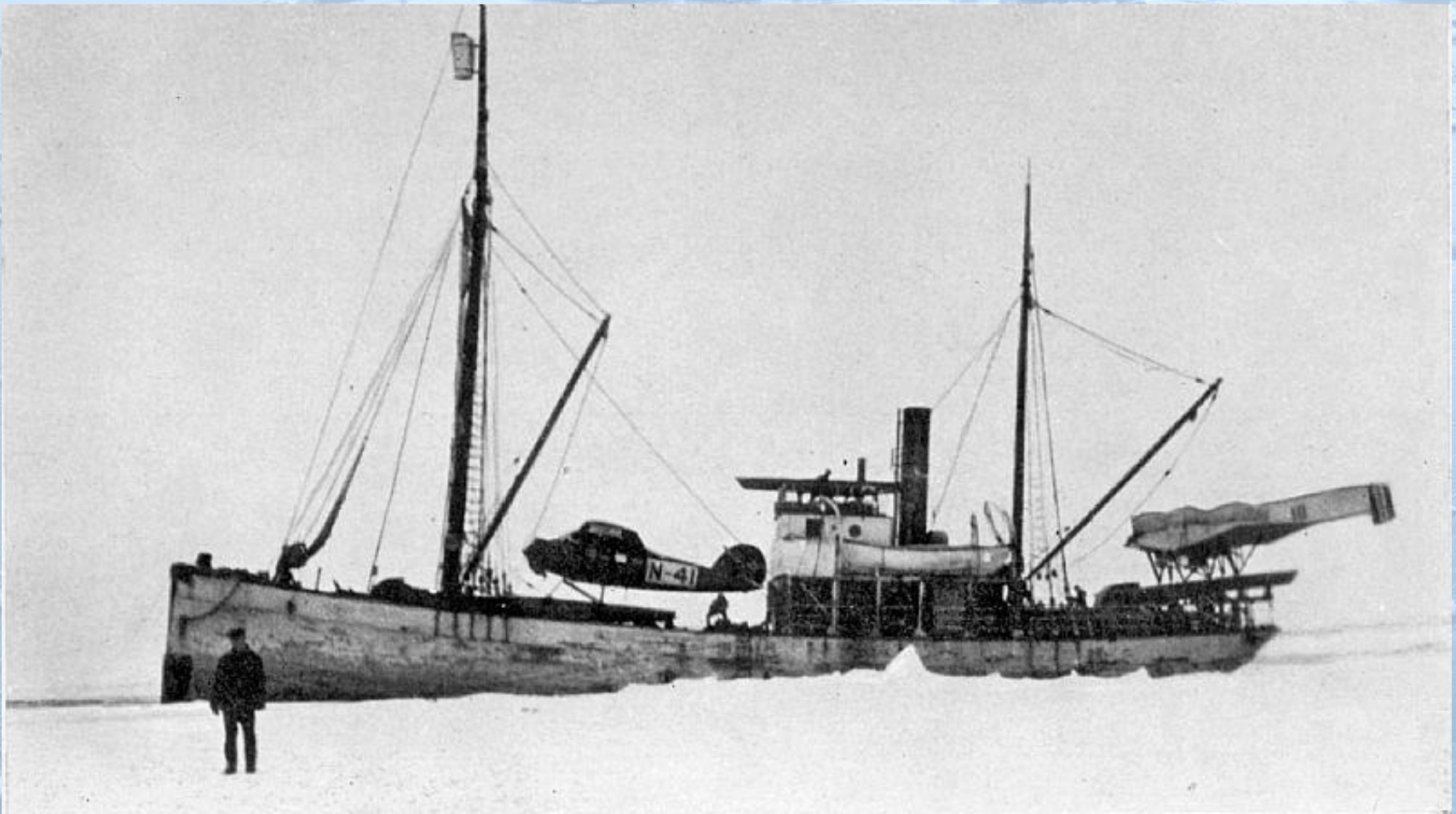


Stein Tronstad
Norwegian Polar Institute

Why Antarctica?



Whaling and Exploring



Norge & al.

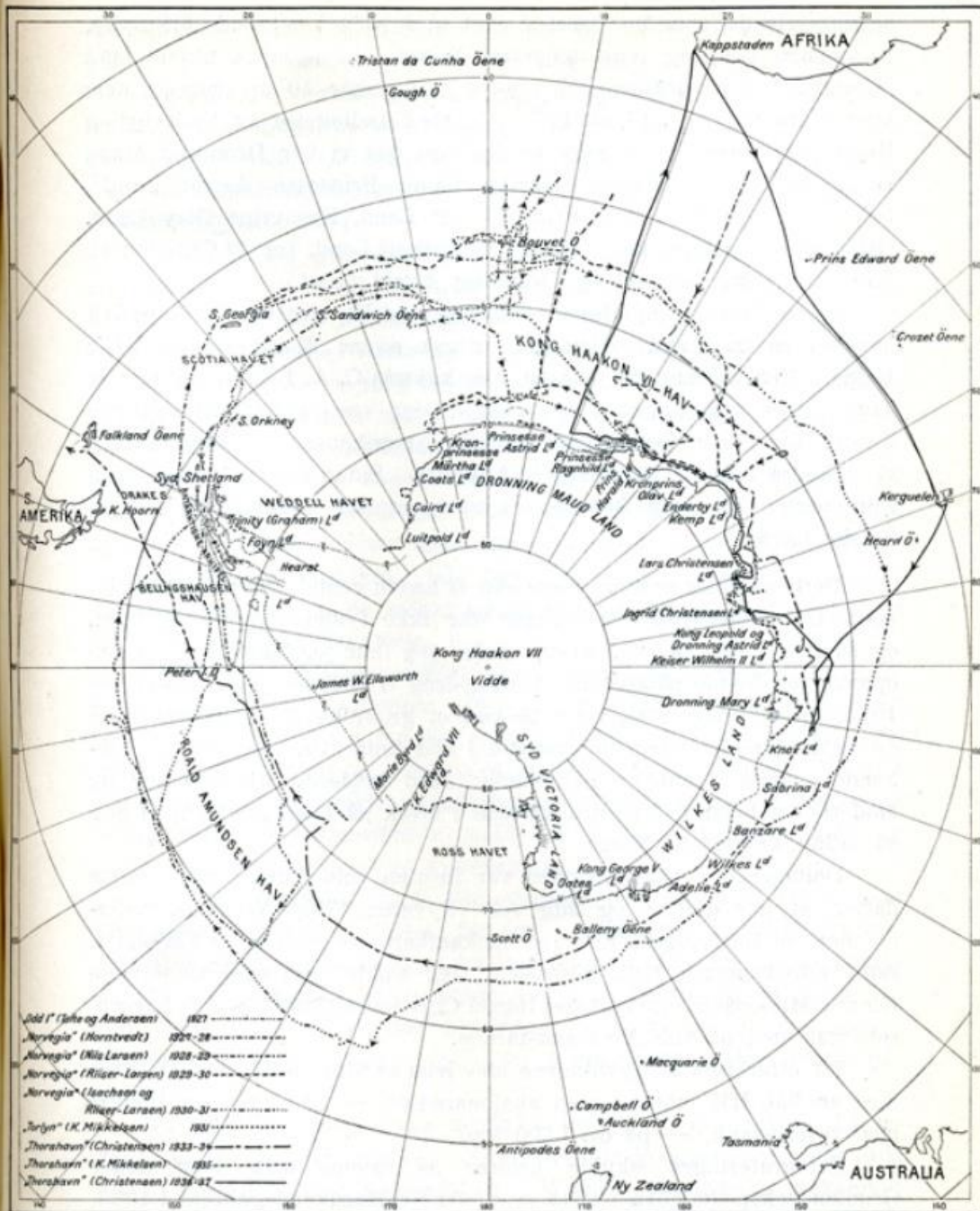


Fig. 1. Lars Christensens ekspedisjoners ruter.

Science Priorities



- » Underpinning polar aspects of earth system modelling
- » Interactions between the polar and global climate systems
- » Processes influencing the polar ecosystems
- » Ocean circulation and climate
- » Improved models for forecasting

Scientific Priorities



- » Marine and polar resources: technology, safety, environmental impacts
- » Geopolitical aspects of polar change
- » Cultural heritage
- » Collaborative management of resources, environment, safety, emergency response
- » Maintain existing observation series and facilities
- » Open access to new and legacy data
- » Improved data coverage

Stations

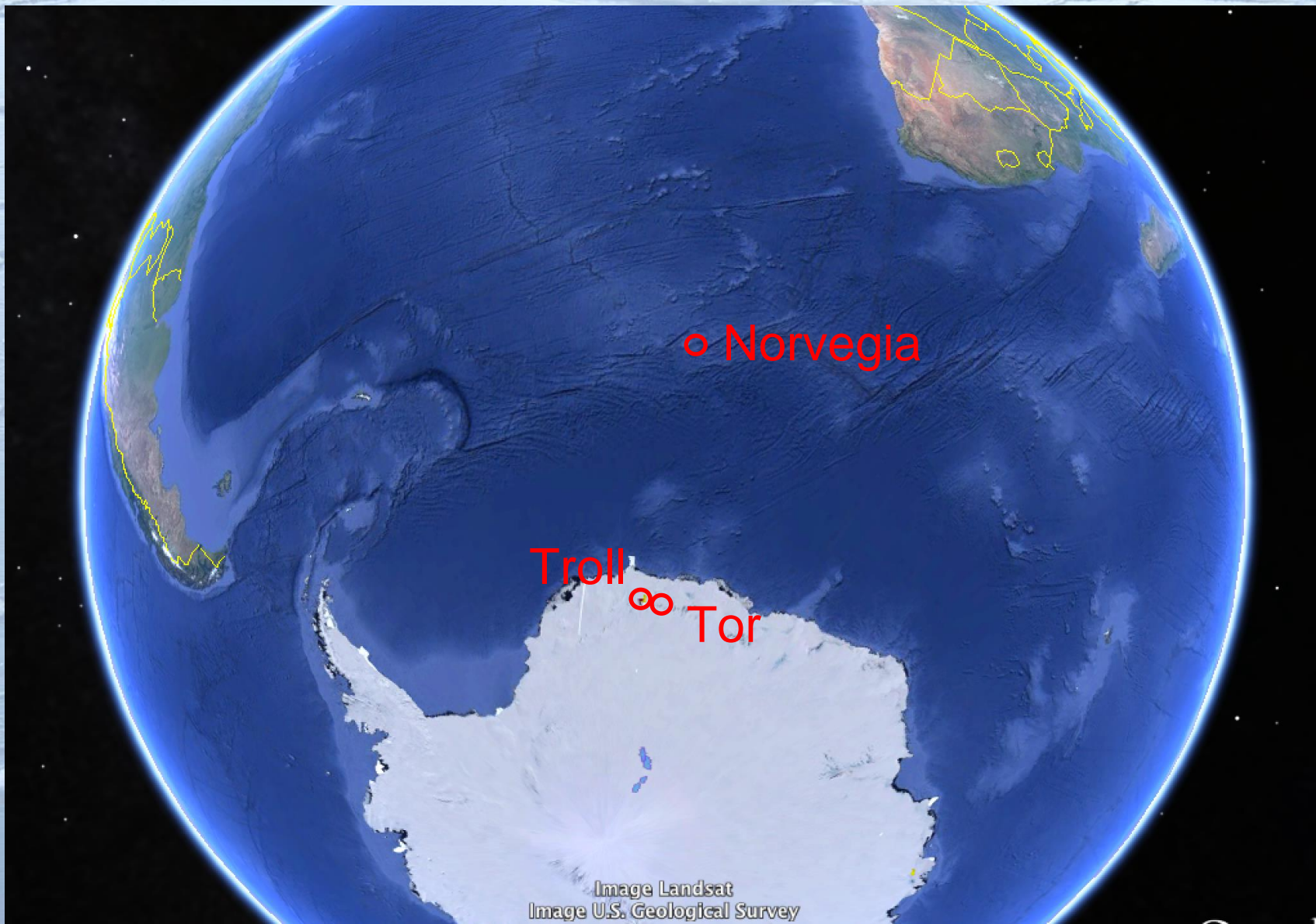
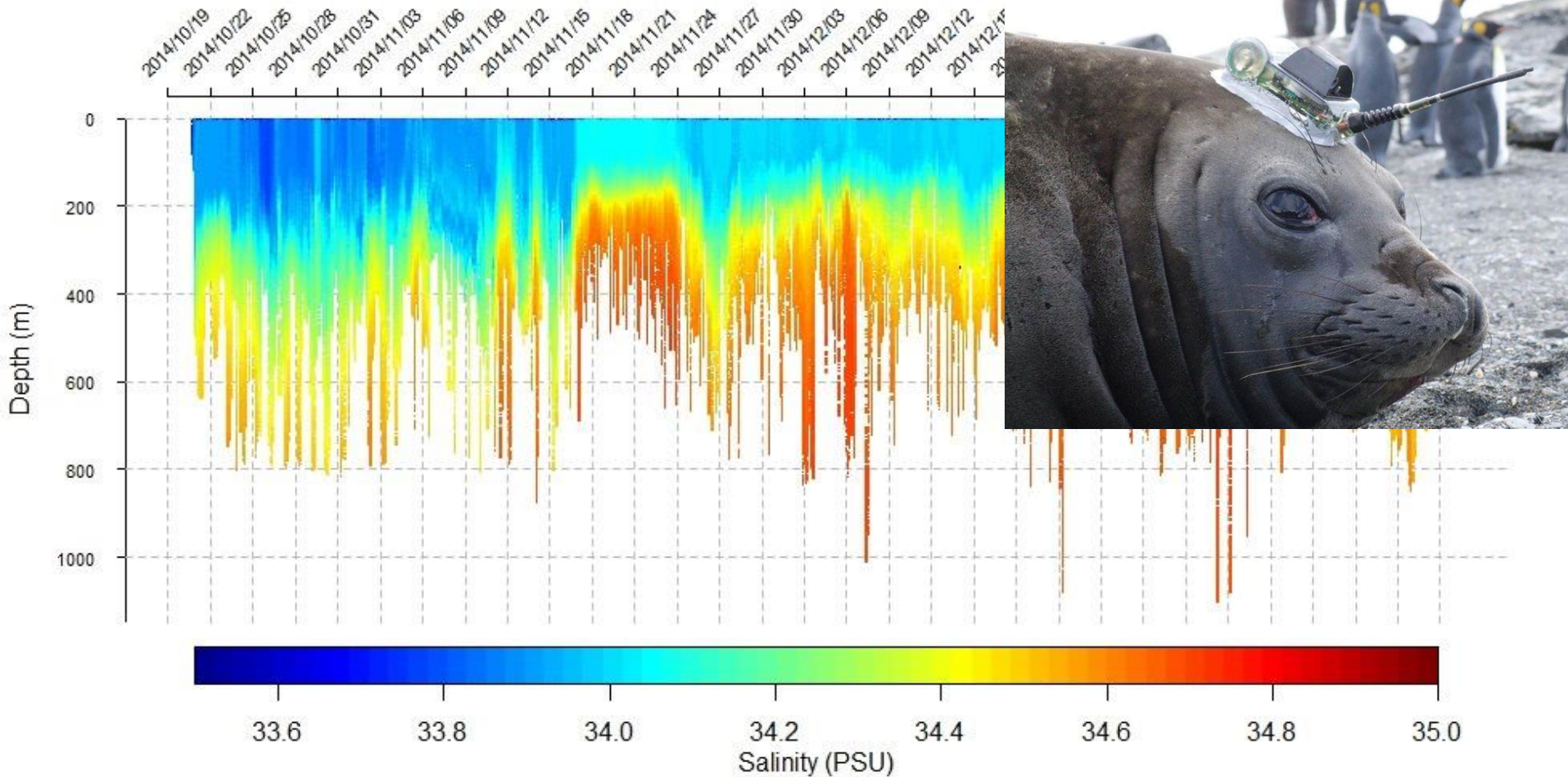


Image Landsat
Image U.S. Geological Survey

Bouvetøya



CCAMLR, MEOP

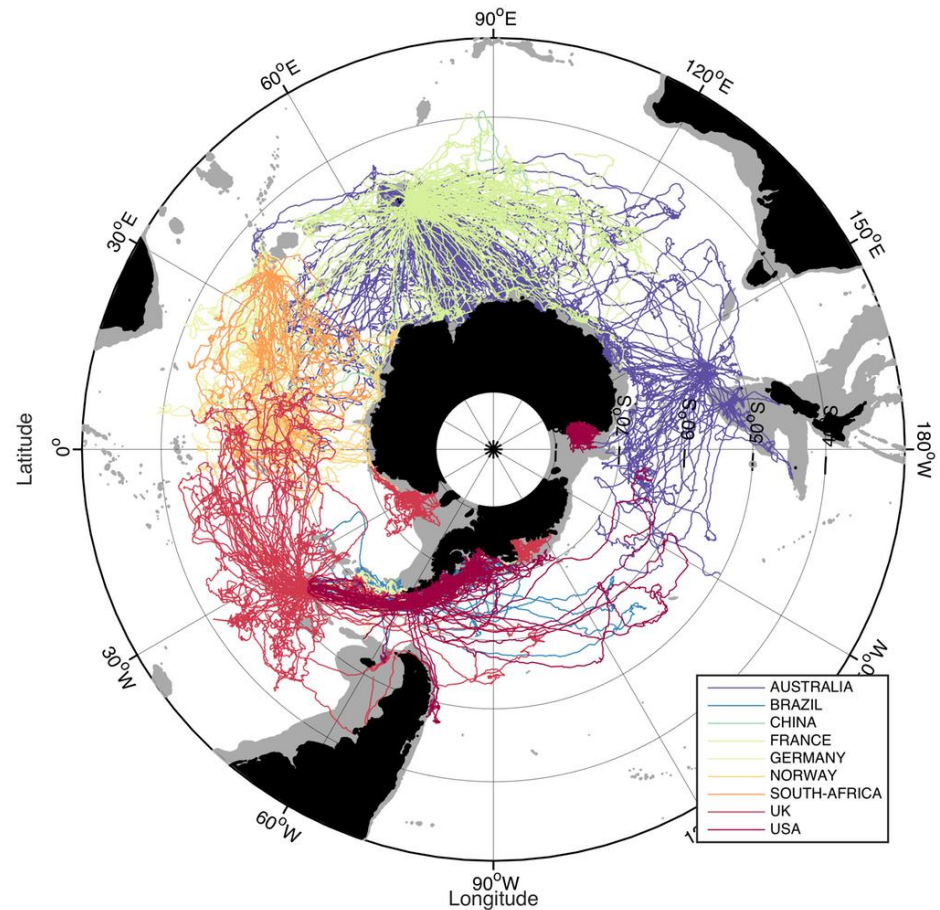
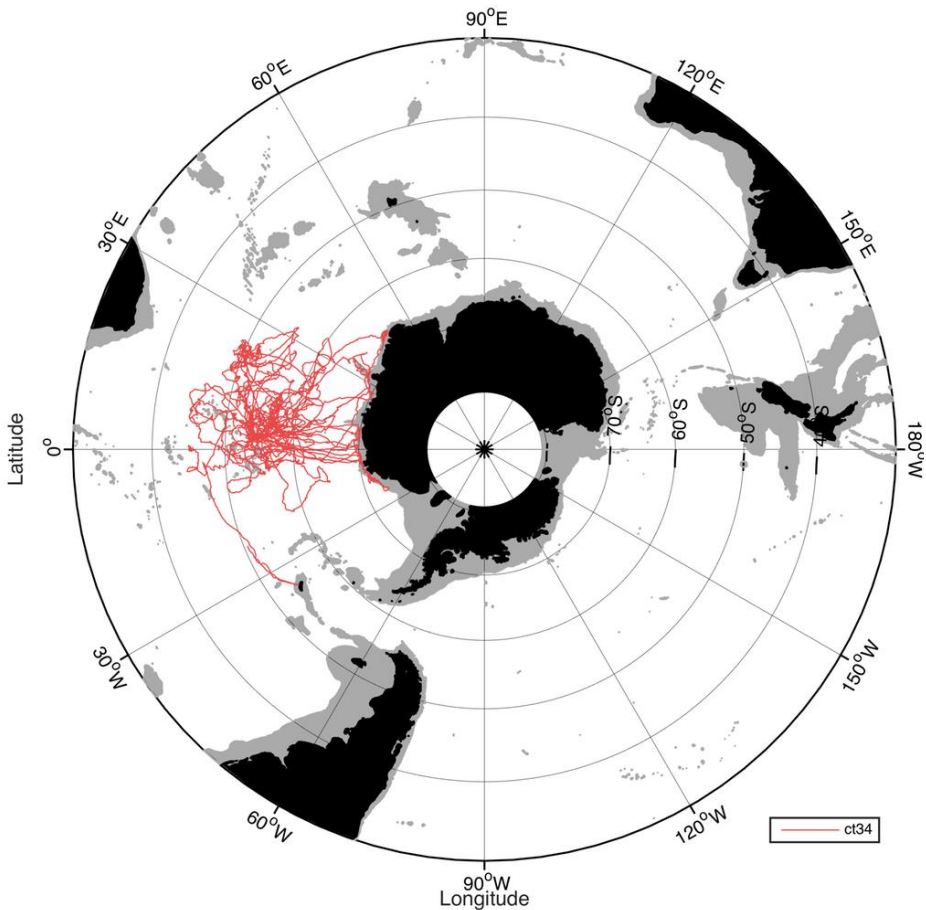


"Biohydrography"



Group NORWAY : 12063 profiles, 1 deployments, 19 tags

MEOP-CTD SH dataset : 302175 profiles, 85 deployments, 689 tags



Tor



Troll



Troll



Mobile Platforms



Basal Melting and Calving

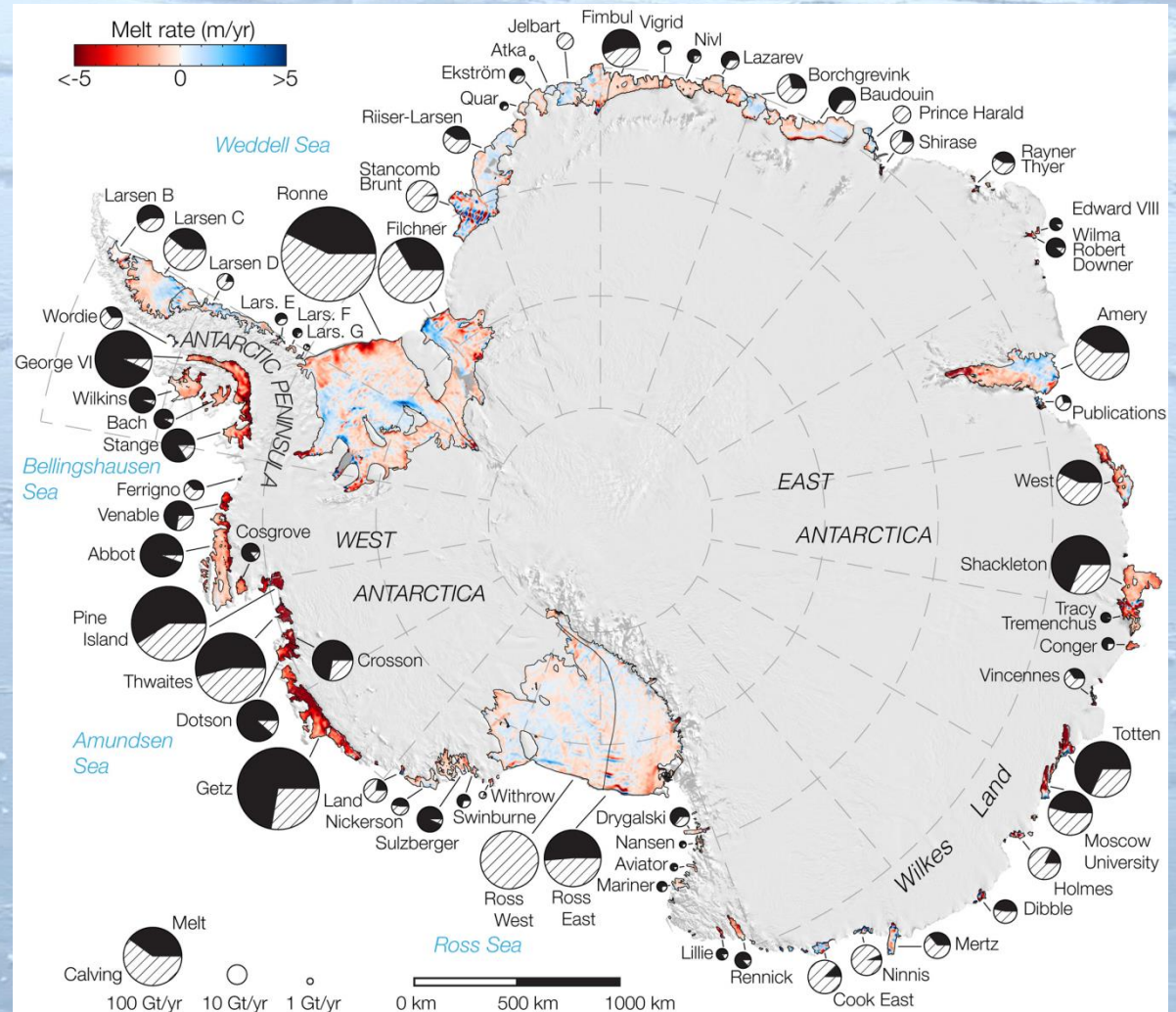


Basal melt:

3.39 ± 0.64
mm/a GSL

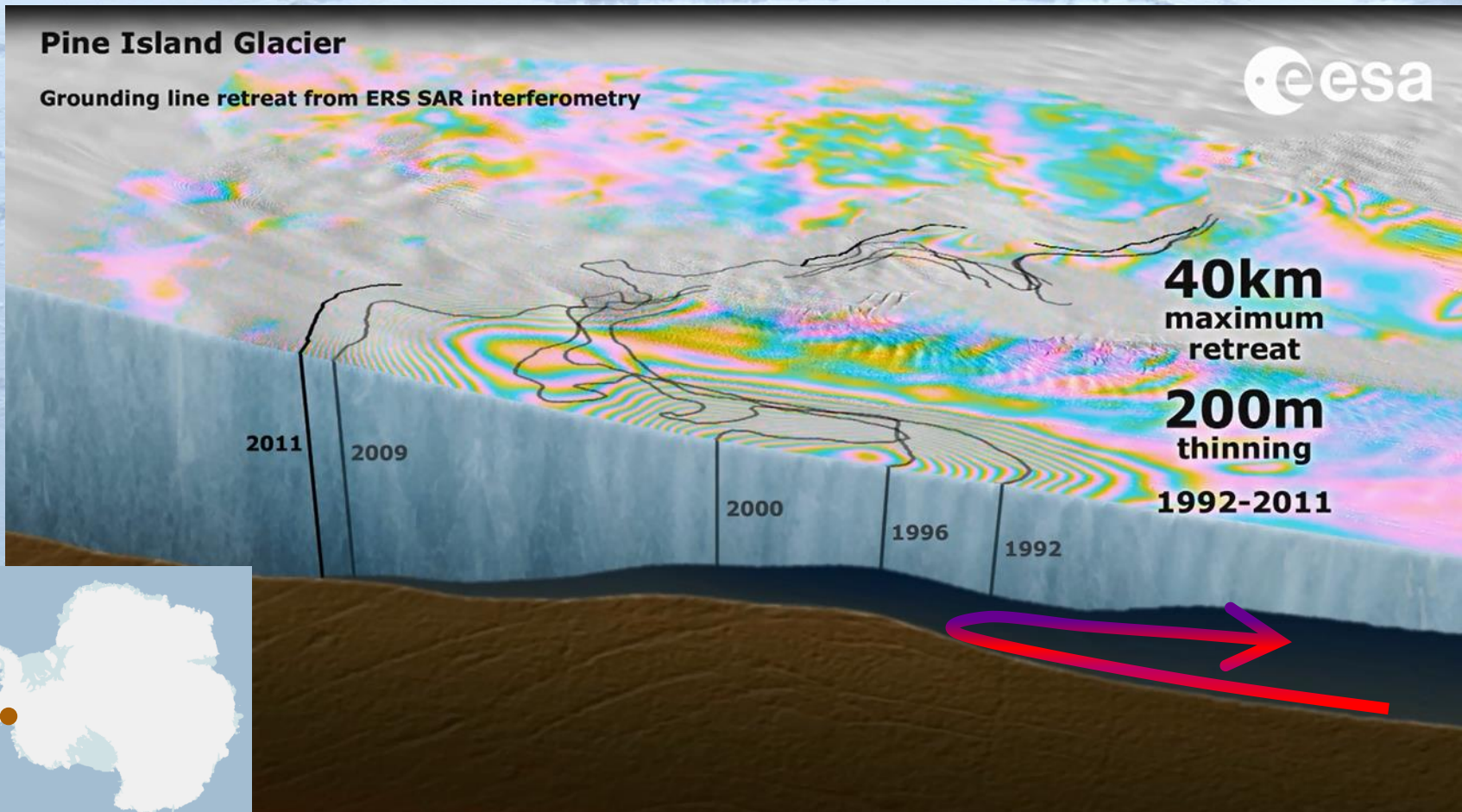
Calving:

2.99 ± 0.38
mm/a GSL



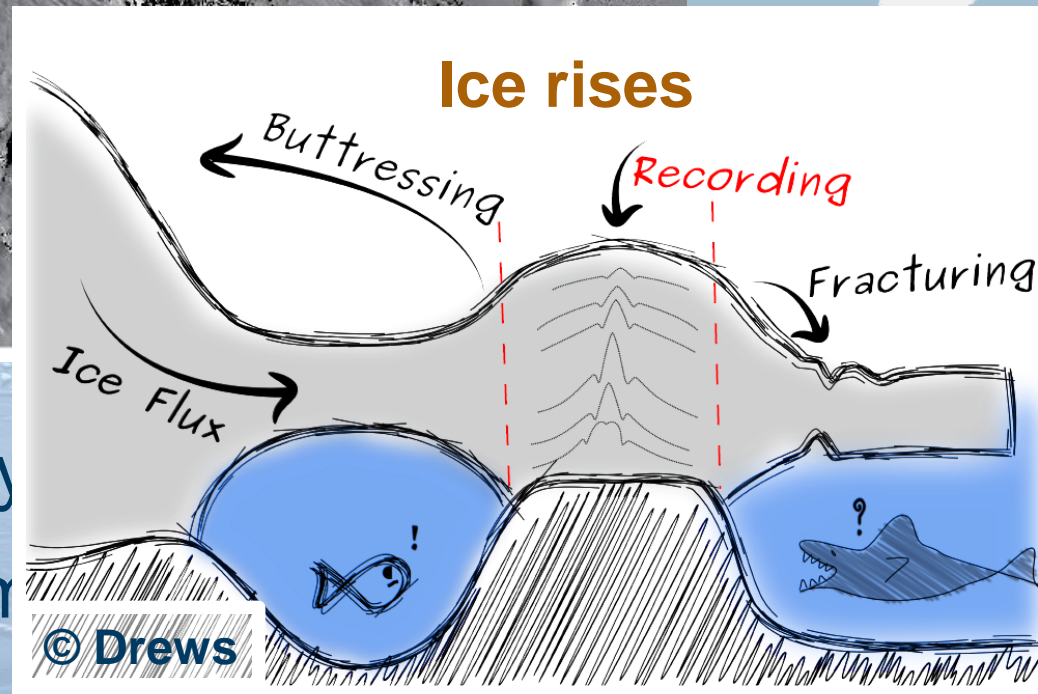
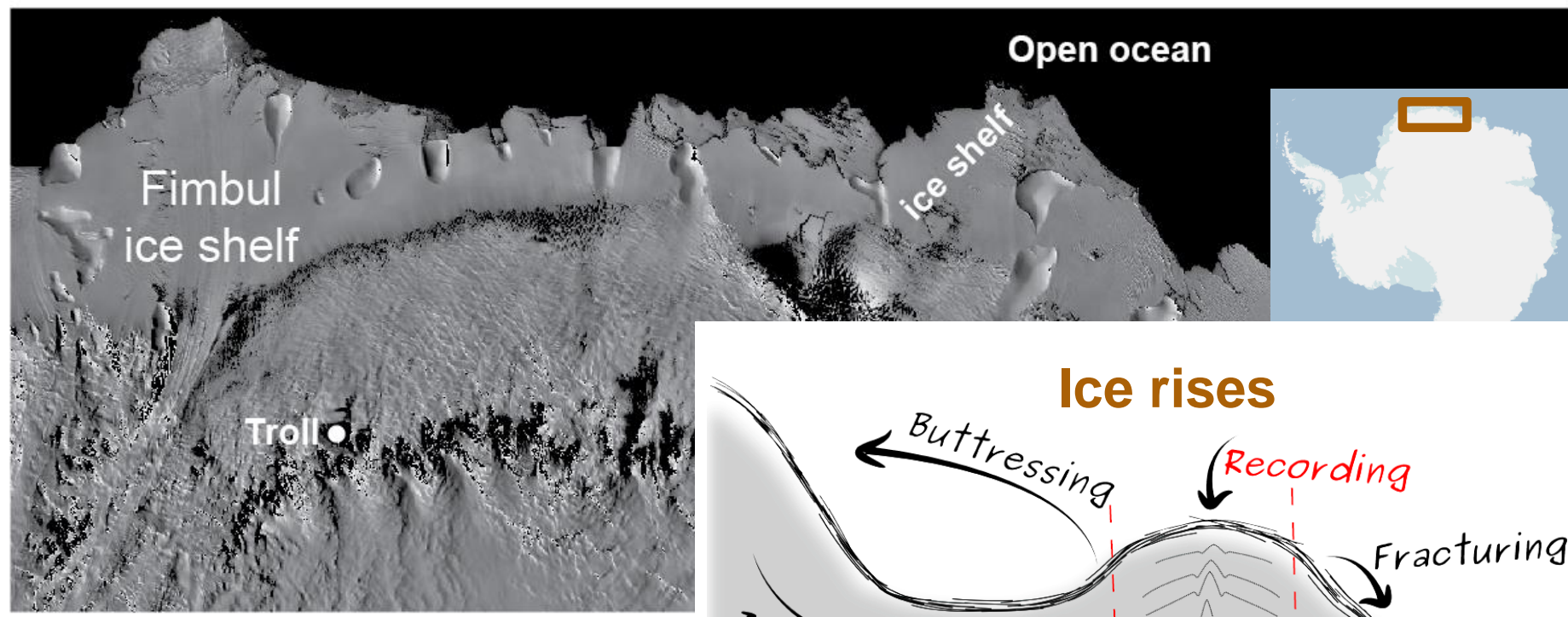
Rignot et al. (June, 2013, Science)

Ocean eats ice: ongoing rapid change of Pine Island Glacier



Park et al. (2013, GRL)

Dronning Maud Land (DML)



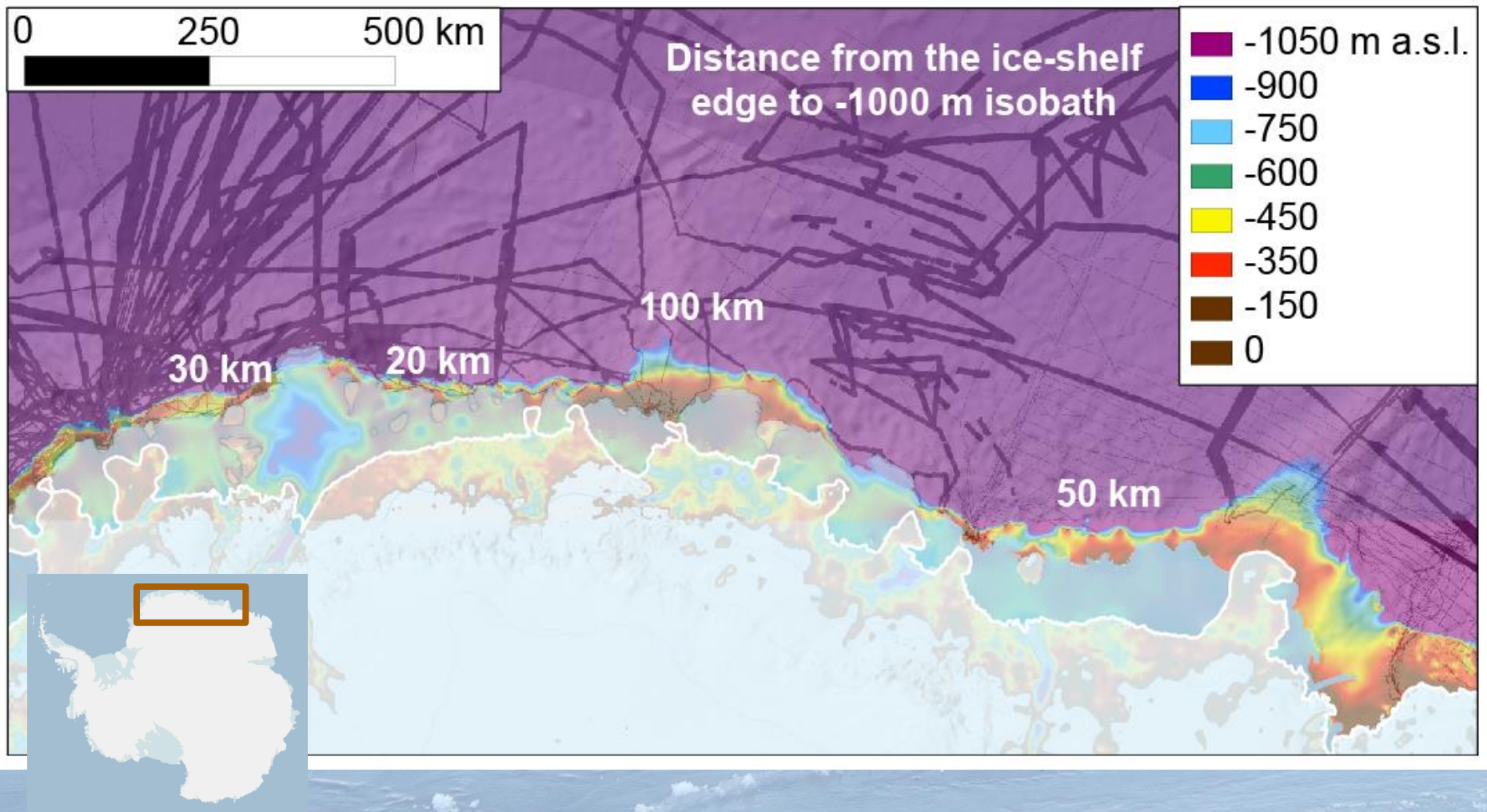
- Complicated geometry
- Ice-rise isles and promontories

MODIS imagery (Scambos et al., 2008, Rem. Sens. Env.)

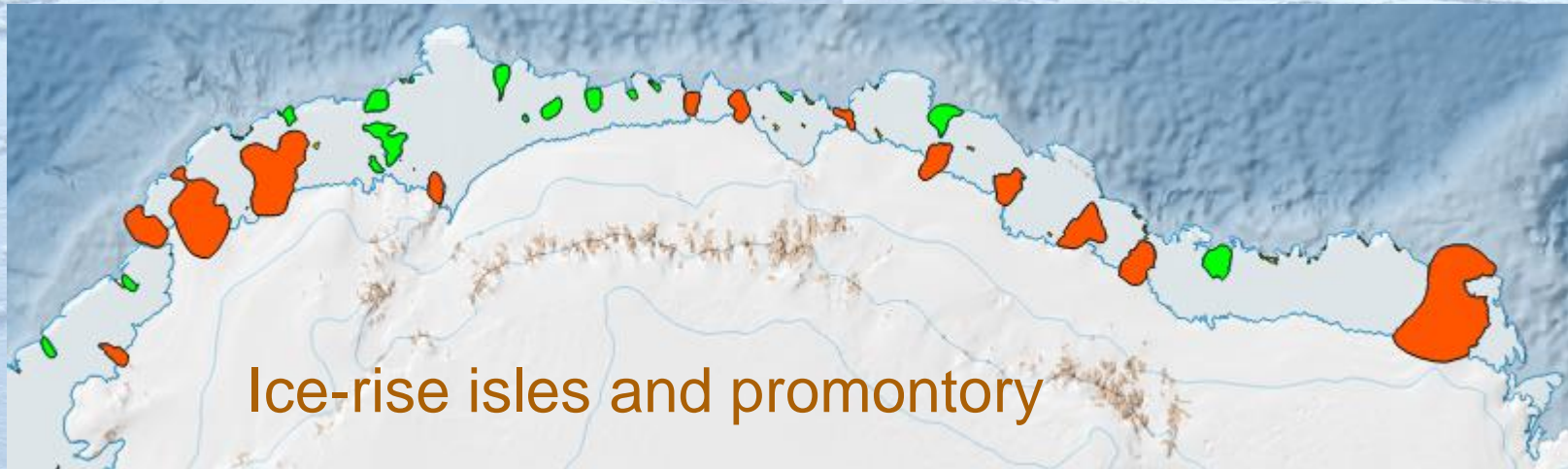
Narrow Continental Shelf



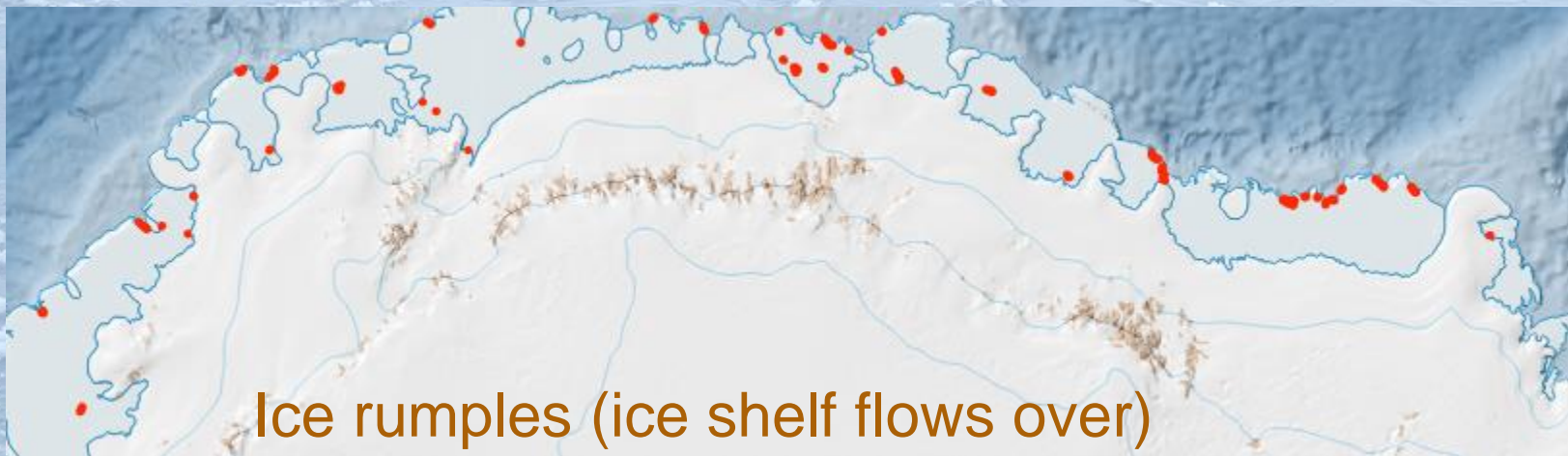
Short path length from abyssal plains



DML: Ice Rise Archipelago



Ice-rise isles and promontory



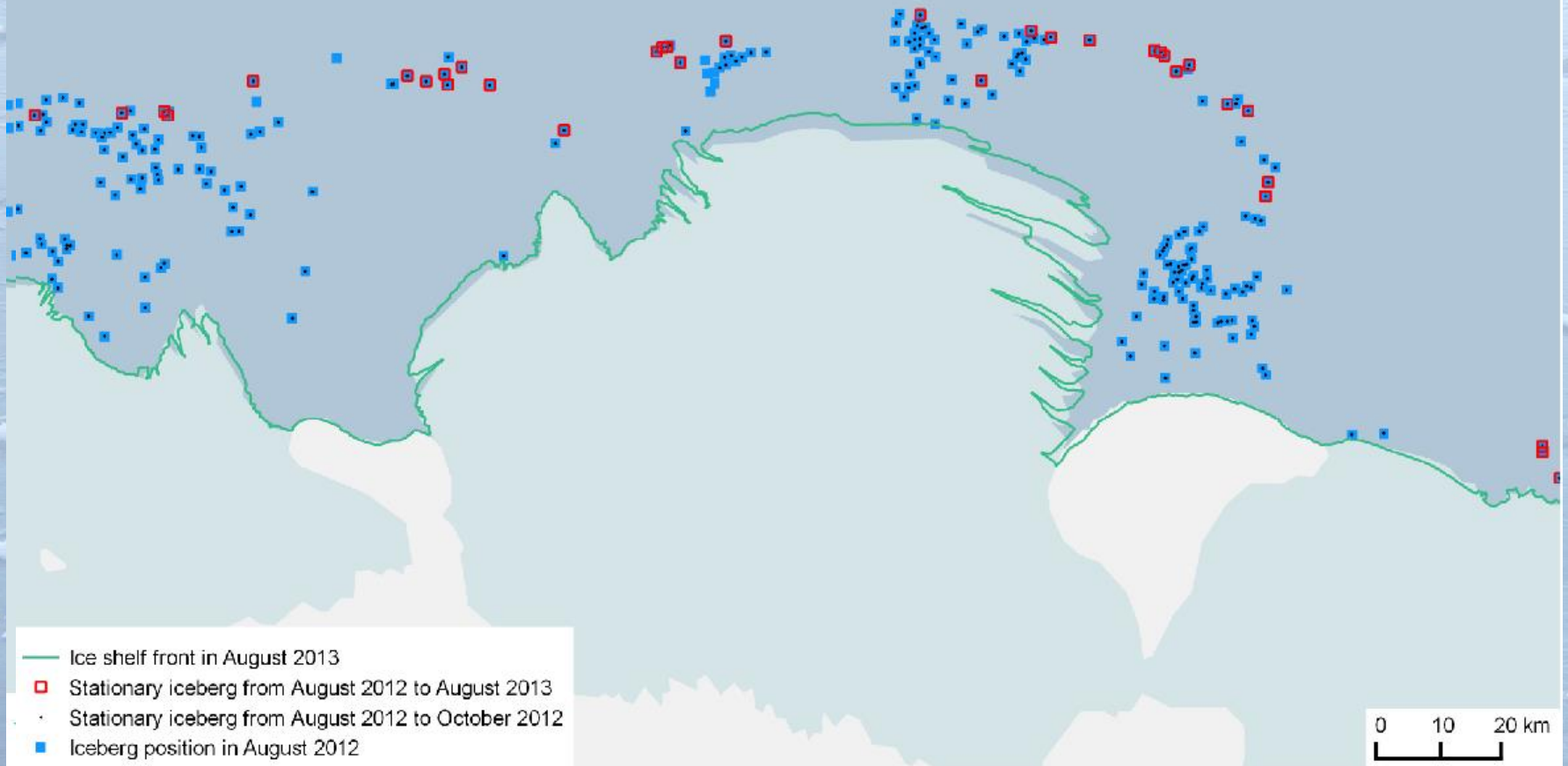
Ice rumpling (ice shelf flows over)

First inventory of ice rises/rumpling (Moholdt, Matsuoka et al.)

Stationary Icebergs



Blue dot: Aug-Oct, 2012
Red squares: Aug 2012 – Aug 2013



Marine Science



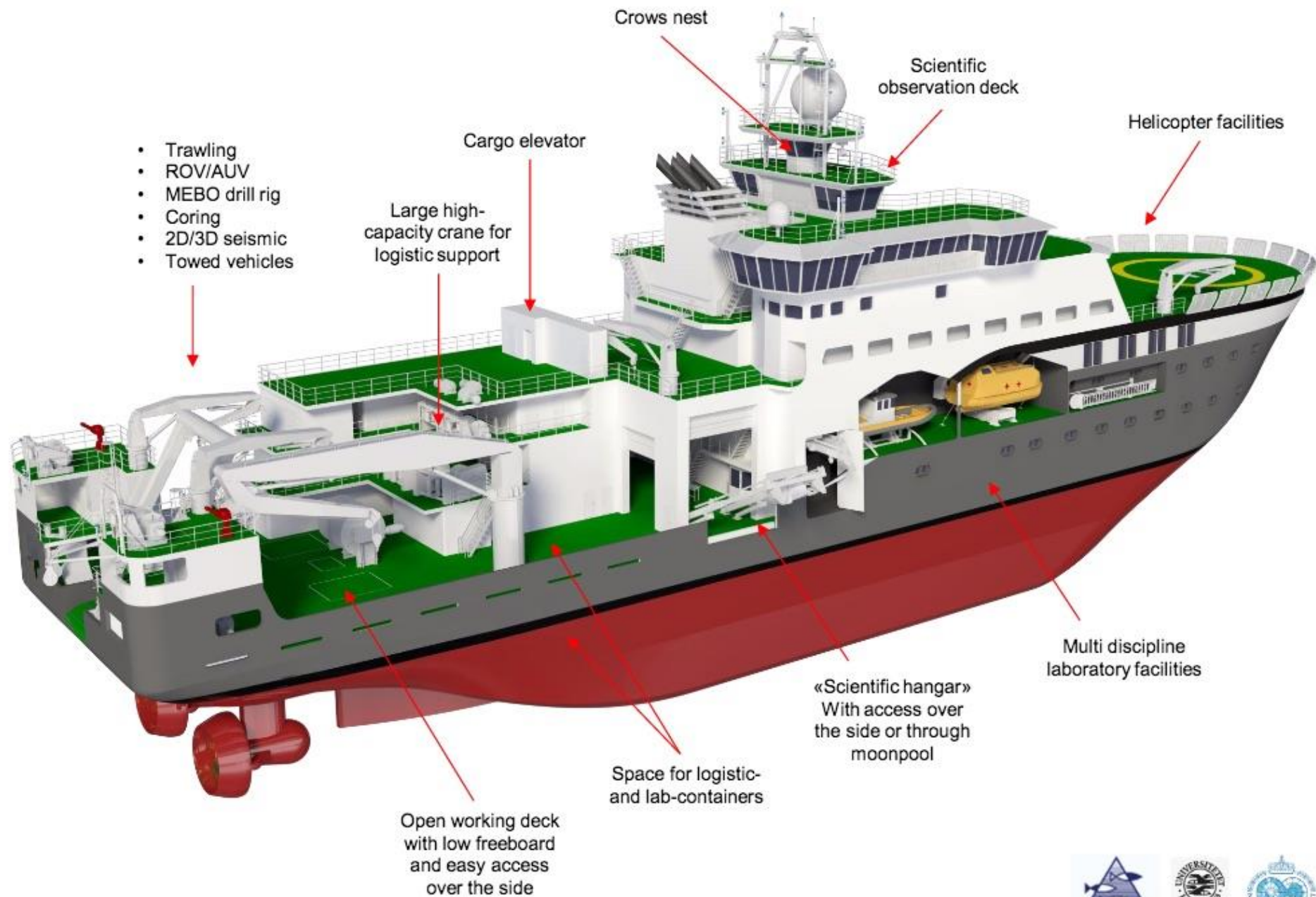
2017: RV Kronprins Haakon



Technical details



- » Length over all (LOA): 100,0m
- » Width: 21,0m
- » Draft: 8,0m
- » Gross tonnage 9000T
- » 4 diesel gensets (A/C) 17MW
 - 2x5MW and 2x3,5MW
- » Two (Z-drives) aft 11MW
- » Two tunnel thrusters fwd 2,2MW
- » DP 2
- » DNV-Class: POLAR 10
ICEBREAKER
- » PC-3 *Year-round operation in second-year ice which may include multi-year ice inclusions.*

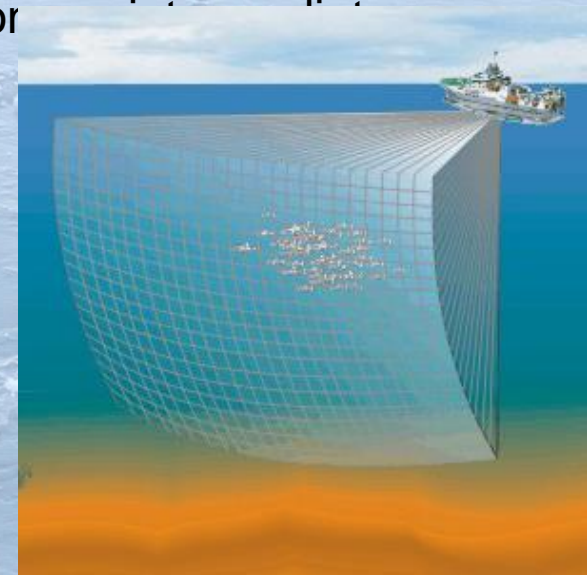
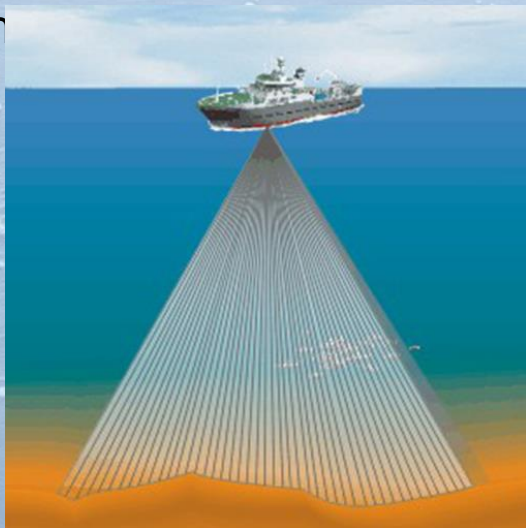


Marine Biology



Echo Sounders & Sonars

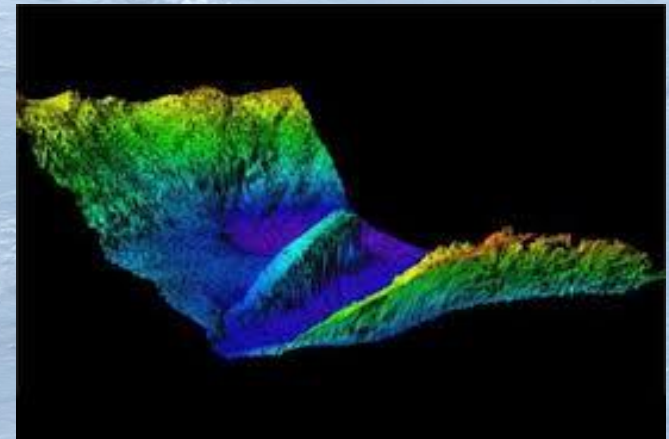
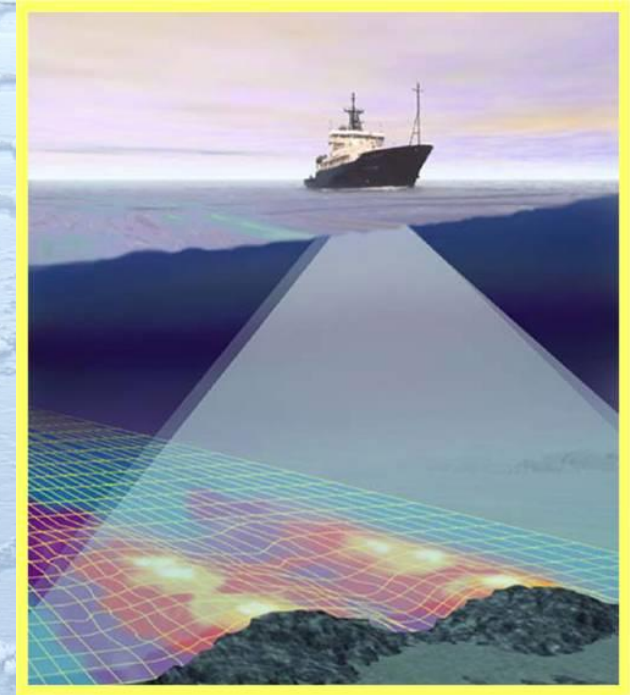
- » Simrad EK 80 Scientific Split Beam Echo Sounders: 18, 38, 70, 120, 200 and 333 kHz with transducers both in drop keels and in arctic tanks in the hull.
- » Simrad ME 70 Scientific Multi Beam Echo Sounder with transducer mounted in drop keel.
- » Simrad MS70 Scientific Multi Beam Sonar with transducer mounted in drop keel.
- » Two Simrad SH90 omni-directional fisheries sonars mounted in drop keels and long



Multi-beam Bathymetric Echo Sounders



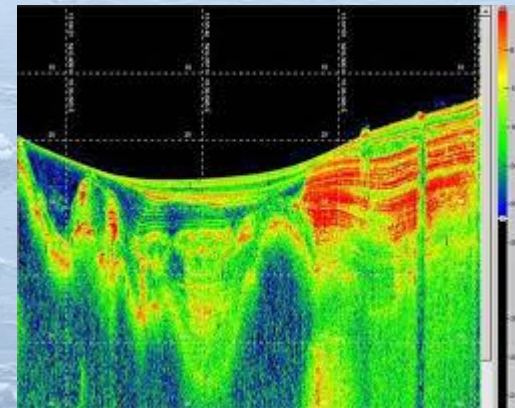
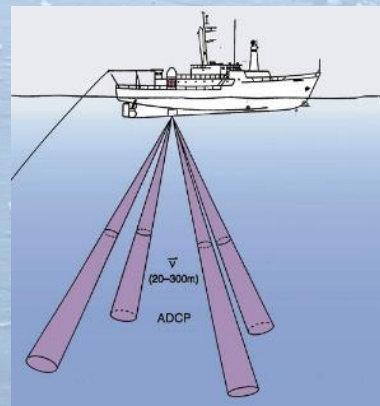
- » Simrad EM710 Medium Depth Bathymetric Multi Beam Echo Sounder (2000m)
- » Simrad EM302 Deep Water Bathymetric Multi Beam Echo Sounder (8000m)



The most comprehensive acoustic sensor suite on any research vessel. Ever.



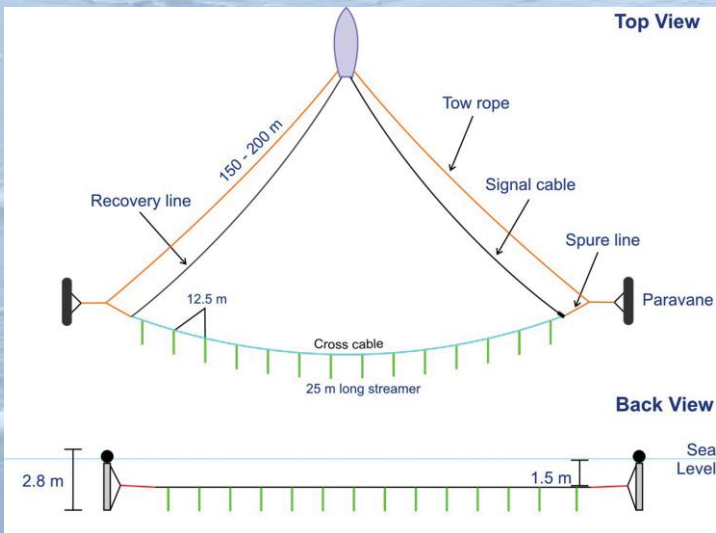
- » Kongsberg Topas PS40 Sub Bottom Profiler in hull
- » Two Teledyne Acoustic Doppler Current Profilers (ADCP) 38 and 150 kHz with transducers both in drop keels and in arctic tanks in the hull.
- » Kongsberg EA600 Single Beam Echo Sounder with 12 kHz transducer mounted in "arctic tank" in the hull.



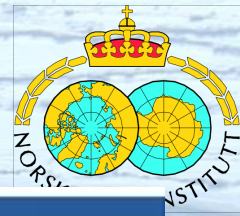
Other Facilities



- » 2D seismic surveying (multi-channel)
- » 3D seismic mini system
- » ROV heavy duty
- » AUV (Autonomus Underwater Vehicle)
- » Magnetometer
- » Gravimeter



Geology Equipment - Coring



Coring systems:

- Gravity corer (< 5-6 m)
- Calypso coring (ca. 30 m long)
- Surface-subsurface sampling:
 - multicore-box core
 - Vibrocoring (mobile unit) for stiff bottom
- MeBO mobile coring system:
(80 m coring)

The MeBO sea floor drill platform
launched from R/V Maria S. Merian



Spring 2016



Data Distribution



Quantarctica

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Quantarctica 1.8.0-Lisboa - Quantarctica

File Edit View Layer Settings Plugins Vector Raster Database Analysis Web Help

Layers

- Miscellaneous ->
- Elevation contours ->
- Geophysics ->
- Glaciology ->
- Sea ice ->
- Terrain rasters ->
- Satellite imagery ->
- Detailed basemap ->
- Simple basemap ->
- Control rendering order

Control rendering order

Originally developed by the Norwegian Polar Institute. Visit www.quantarctica.org

Coordinate: -2089381,753582 1108220,772657 Scale: 1:669812 1:30107218 Render EPSG:3031