



Royal Netherlands Institute for Sea Research



Ultra Clean Titanium Zodiac Winch and Sampling Bottles for Antarctica

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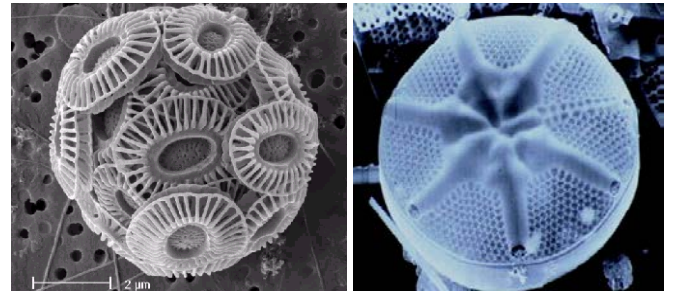
NIOZ Royal Netherlands
Institute for Sea Research



Why Ultraclean?

Iron is an important trace element in the Oceans

- Iron limits primary production in over 40% of the oceans
- Iron therefore influences the biogeochemical cycles of:
 - a) carbon
 - b) nitrogen
 - c) and many other bio-essential elements



There is a need to understand the biogeochemistry of iron at all levels from its chemistry in seawater up to its large scale distribution in the oceans!



Why Ultraclean?

Fe affects biogeochemical cycles

The concentration of dissolved Fe in the modern ocean

0,00000001 gram iron per liter seawater = 10×10^{-9} gram per liter

that is



dissolved in 40 million liters of water

OR

1 x



15 X





Measuring trace metals in the Antarctic

Wishes:

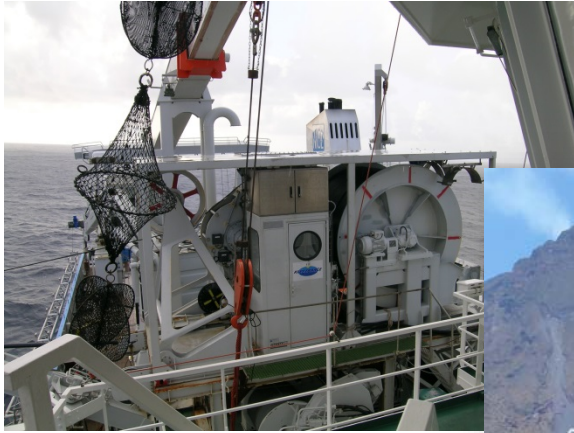
- Winch in zodiac
- Electrically driven
- Maximum sampling depth 650 m
- 8 x 500 m sampling depth/day
- Ultra clean





Large to small scale

How to measure trace elements using a zodiac

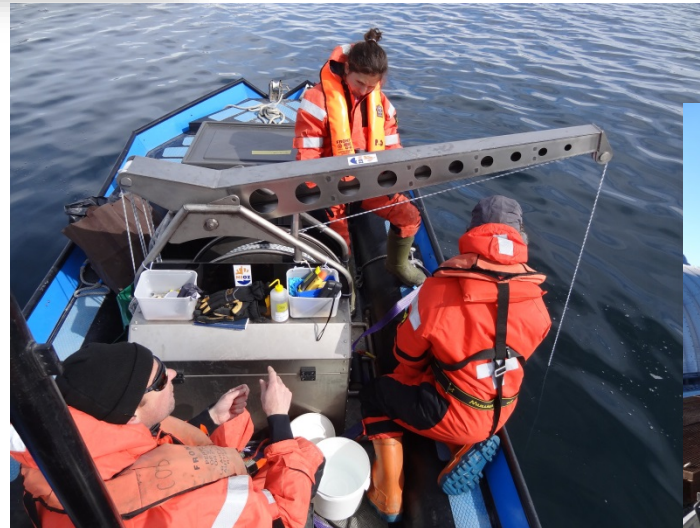


Ultra clean deep sea winch

- Mounted on large vessels
- With or without own A-frame
- 8500 m Super Aram cable with fiber optics
- 23 tons including powerpack

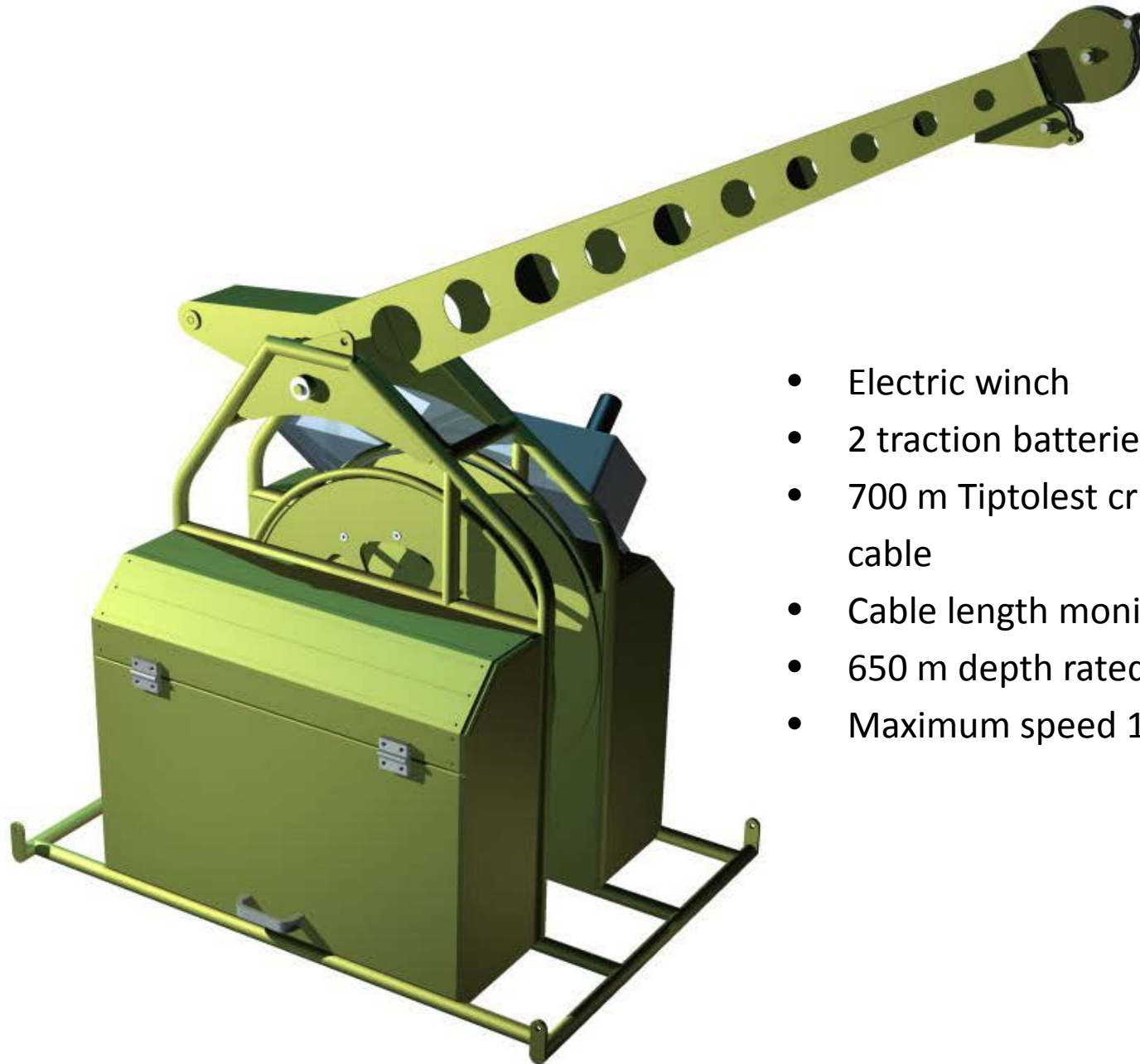
Ultra clean winch Antarctic

- Mounted on zodiac
- No a-frame needed
- 700 m 6 mm cable
- 400 kg





Titanium winch specifications



- Electric winch
- 2 traction batteries (24V)
- 700 m Tiptolest cruising cable
- Cable length monitor
- 650 m depth rated
- Maximum speed 1m/sec



Winch specifications:

- Rated line pull: 20.000lbs (9072kg)
- Motor 24V: 6.2hp / 4.2 kw
- Gearing: 315:1



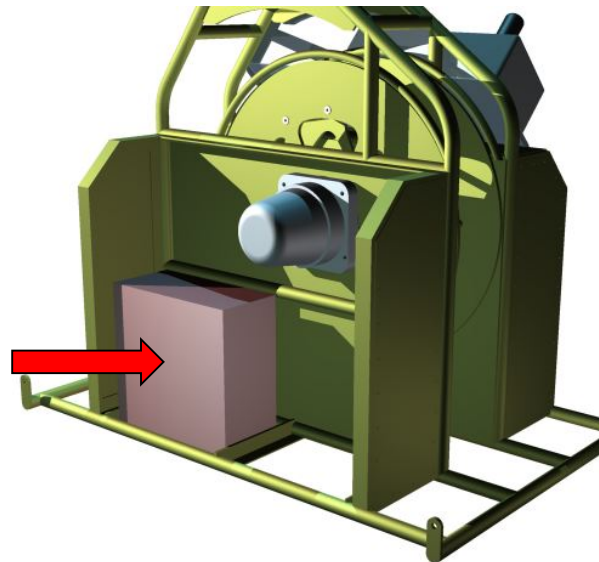
'of the shelf' winch



Titanium drum

Accu's specifications:

- 2 x 12V= 24V
- Normal conditions 185Ah, 0°C → 111Ah
- 80% allowed discharge means 89Ah
- 48 kg each

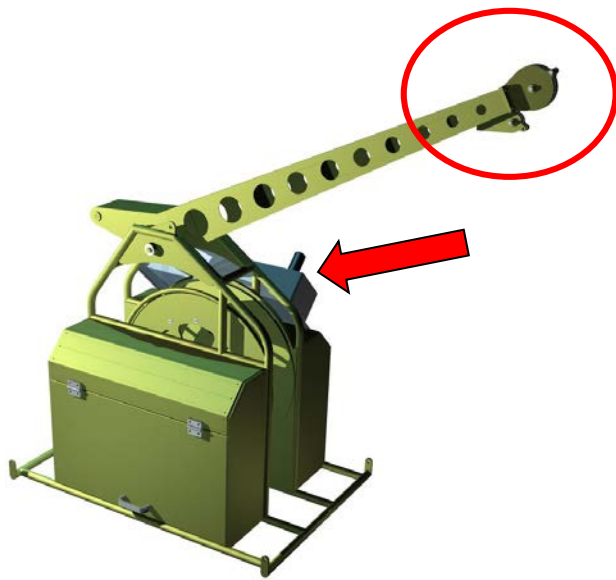




Cable details:

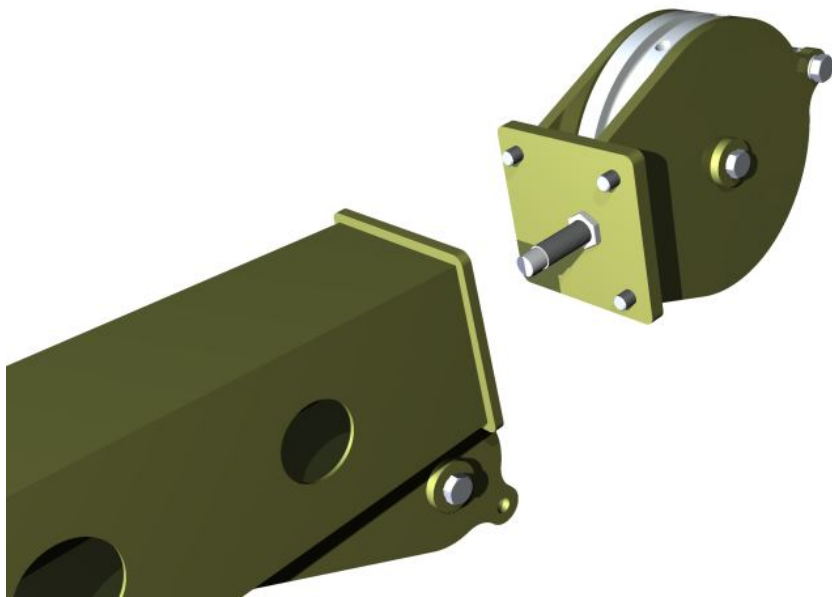
- 'Tiptolest cruising'
- Plaited 100% polyester yarn with plaited core
- Non floating and kinking
- Easy to split
- Sheet or halyard for middle loads
- 1100daN breaking load





Wire reader features:

- Totalizer and position display (6 digits)
- Set value, scaling factor, momentary signal duration and operating mode programmable
- Interface RS232 (RS422, RS485)



*Baumer N214
Totalizer*



*Hall
sensor*

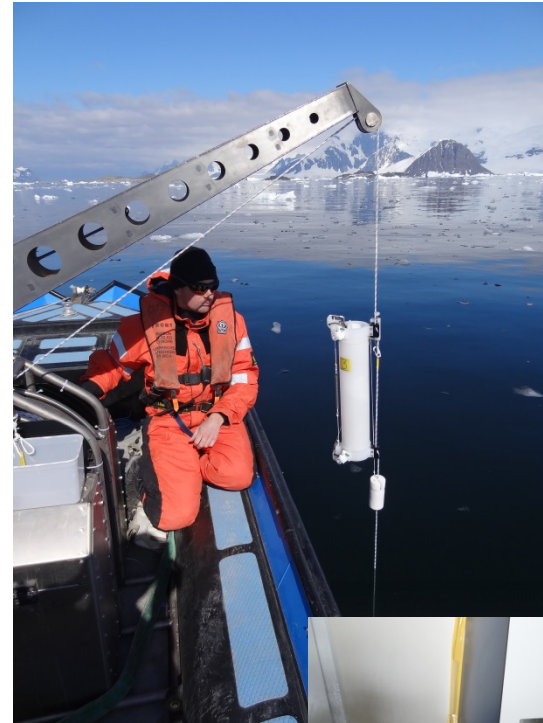


Large to small scale

From 24 to 4 liter

Antarctica special

- 1 single bottle



Ultraclean CTD

- 24 bottles in frame





Bottle specifications:

- Tripped in the traditional way using a messenger weight
- Standard rope clamp to mount and unmount
- NIOZ designed butterfly valves

Two versions

- PP
- PVDF (Polyvinylidene fluoride, illuminating)



Rope clamp



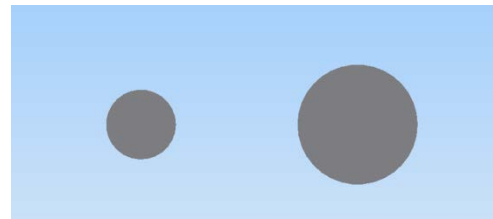


Small bottle specifications:

- Same design as Ultraclean CTD sampler
- PP or PVDF (depends on sample type)
- NIOZ designed butterfly valves
- 4 liters
- High flushing rate (67% compared to 34%)
- Closed by messenger

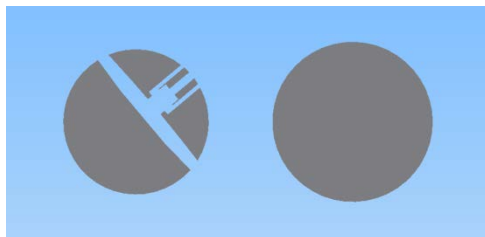


Standard CTD bottle



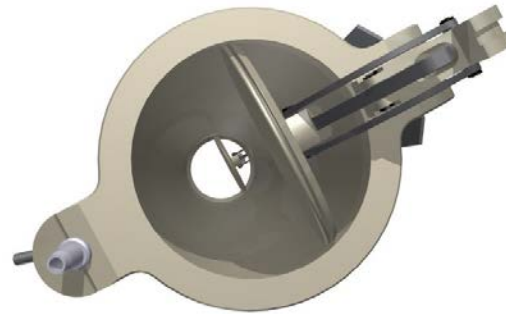
*Inlet
diameter*

*Inner
diameter*



*Inlet
diameter*

*Inner
diameter*



NIOZ butterfly valve

Additional instrumentation

- SBE 19plus Seacat Profiler CTD
- Cyclops-7 Fluorometer
- SBE 43 Oxygen sensor



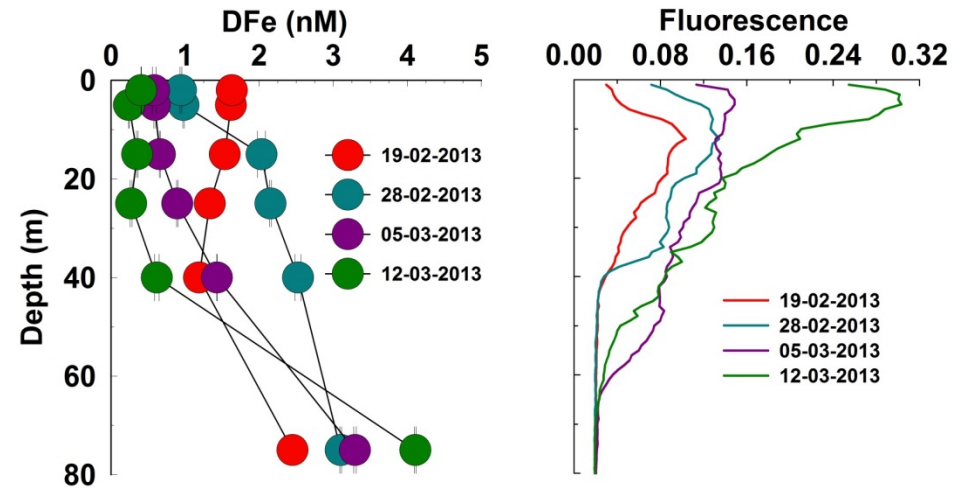
CTD profiler



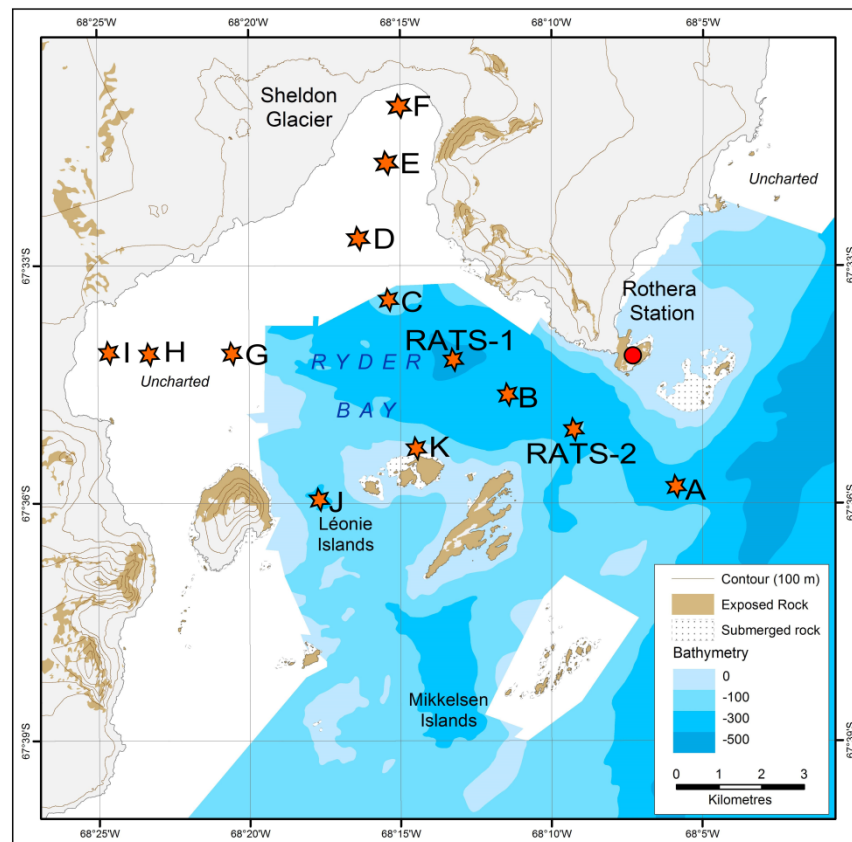
Fluorometer



Oxygen sensor



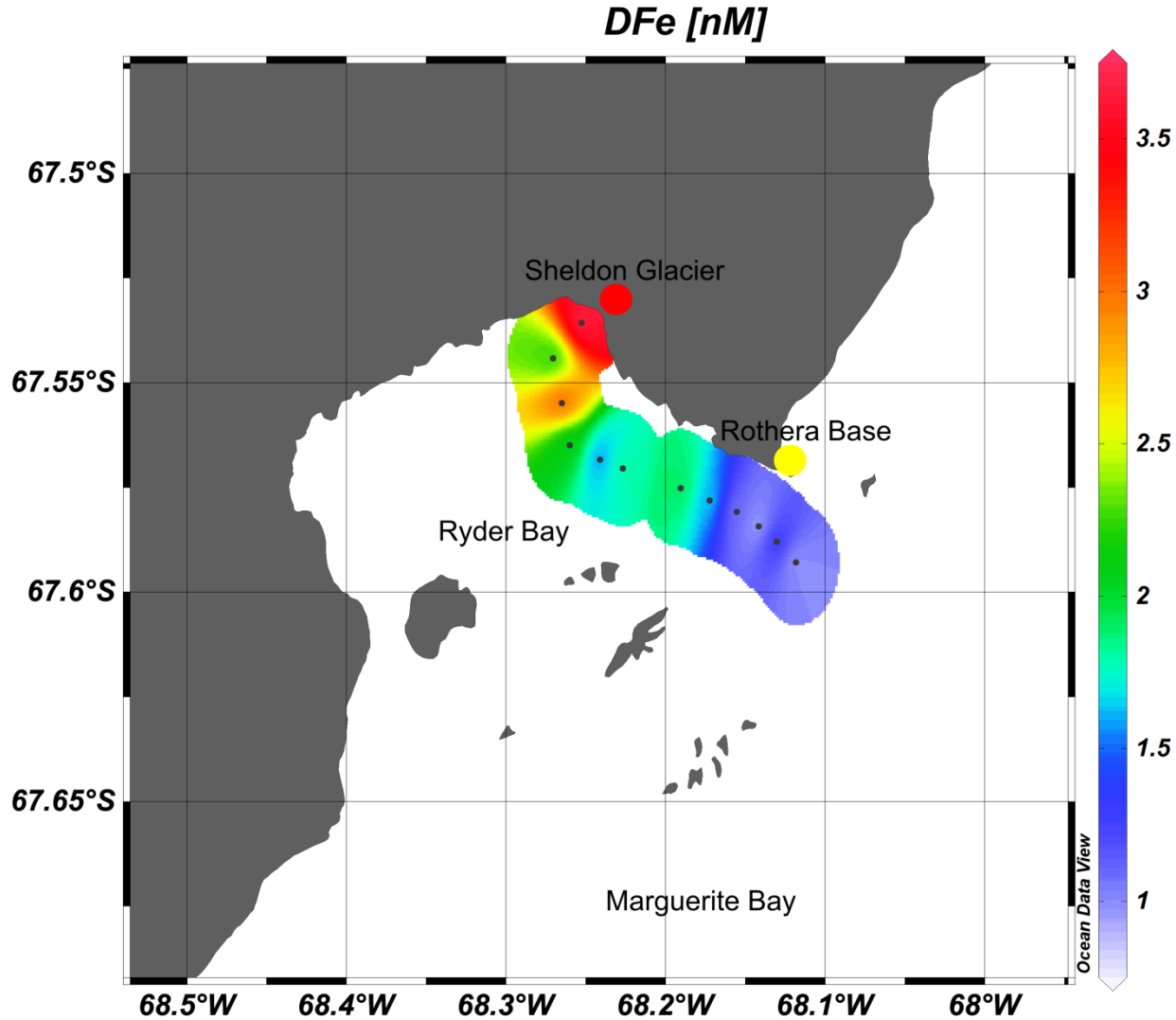
Using DFe to investigate glacier melt inputs



British Antarctic Survey

NATURAL ENVIRONMENT RESEARCH COUNCIL

12 stations surface transect (DFe concentration at 5 m depth)



Decreasing DFe from Sheldon glacier to the offshore station
Sheldon Glacier can be a source of DFe

Modifications and future plans

- Modified motor and gears -> improved breaking system
- Electric motor with belt driven -> noise reduction
- Smoother running system



Belt driven





Questions?

