

# Recent developments in MAS-based polar research and the Southern Ocean Glider Base

J. Alexander Brearley<sup>1</sup>

Hugh J. Venables<sup>1</sup>

Michael P. Meredith<sup>1</sup>

Mark E. Inall<sup>2</sup>

Vicki Singleton<sup>1</sup>

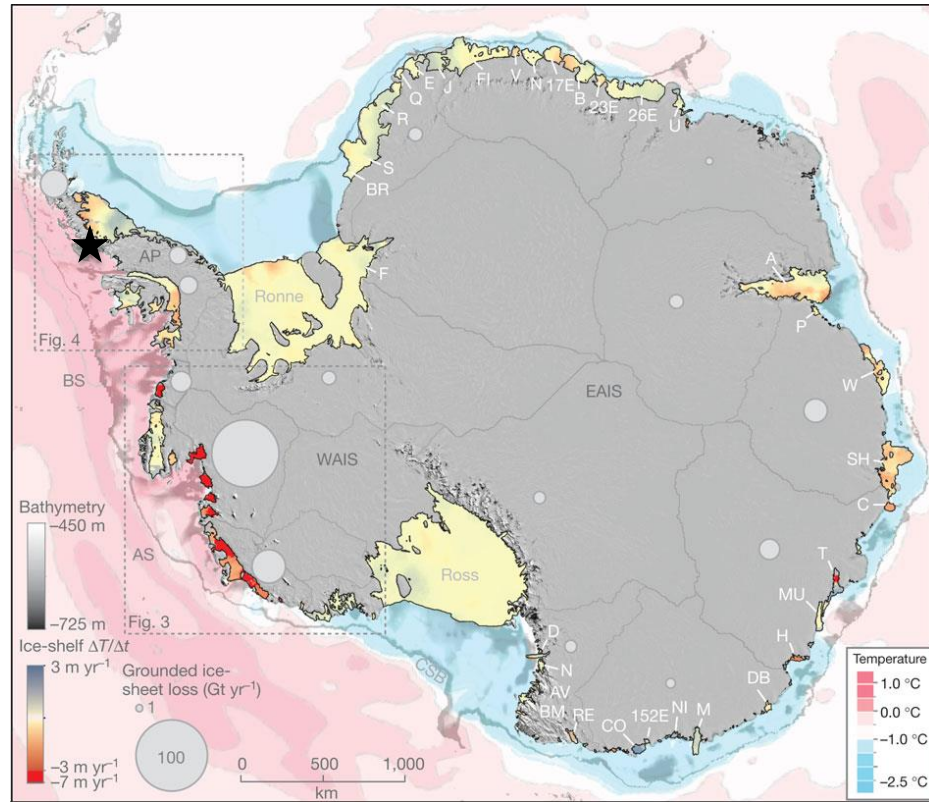
Matthew Palmer<sup>3</sup>

<sup>1</sup> British Antarctic Survey, <sup>2</sup> Scottish Association for Marine Sciences, <sup>3</sup> National Oceanography Centre, Liverpool



**British  
Antarctic Survey**  
NATURAL ENVIRONMENT RESEARCH COUNCIL

**POLAR SCIENCE  
FOR PLANET EARTH**



+3m/yr

-3m/yr

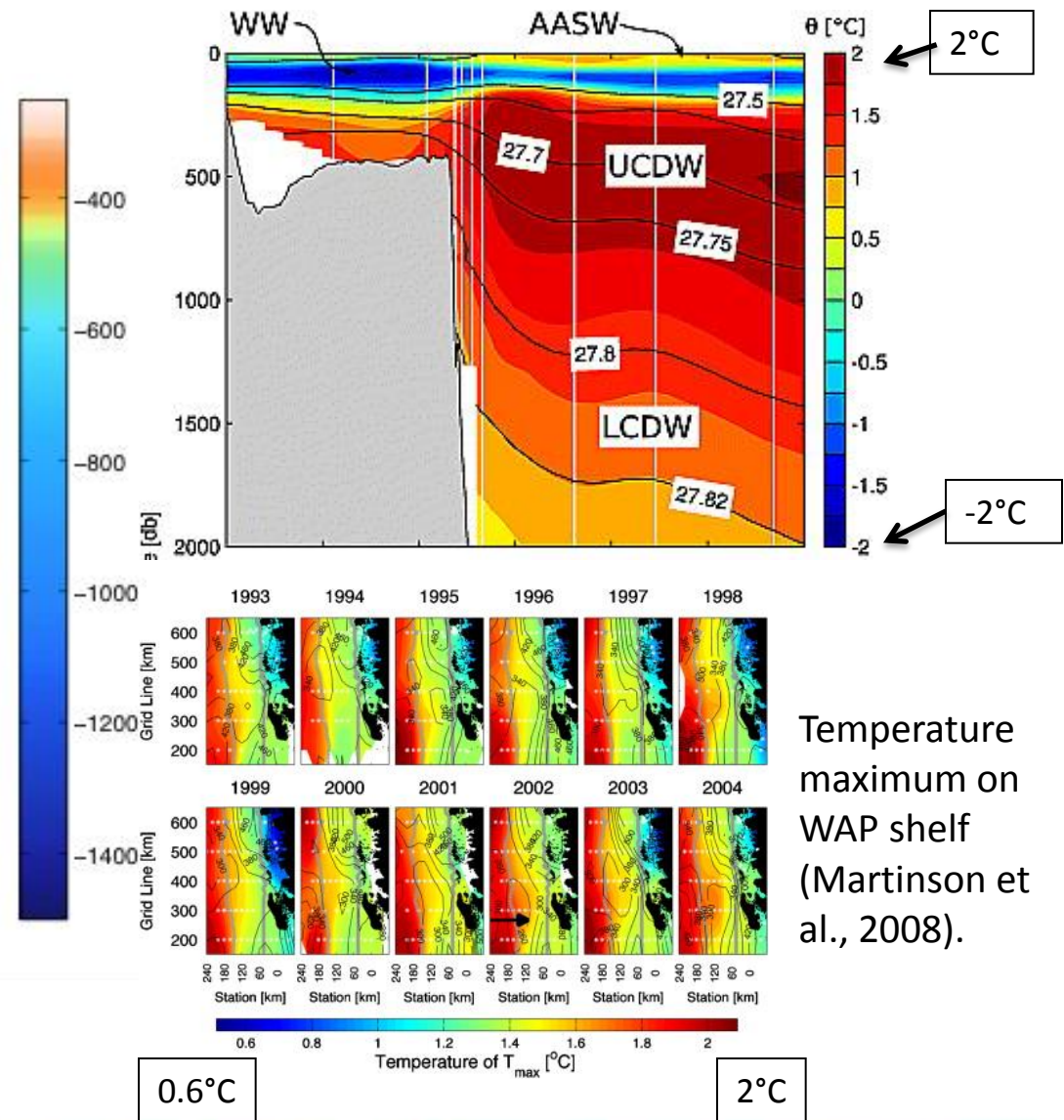
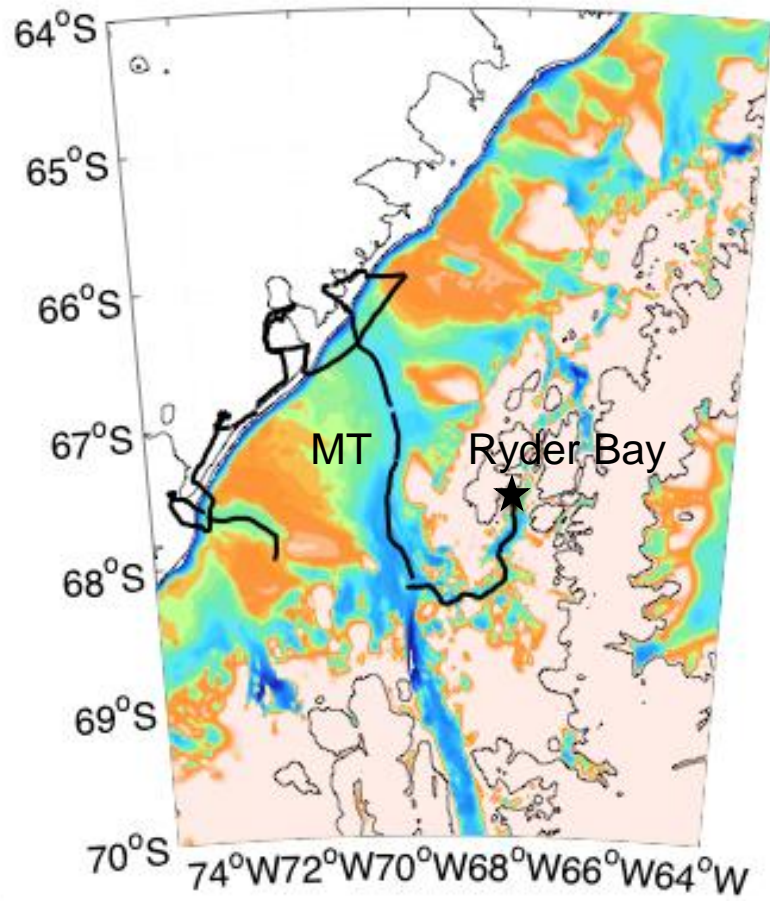
1°C

-2.5°C

The West Antarctic is undergoing the most rapid retreat of land-based ice

It is the region where deep offshore warm waters can access the continental shelves most easily

Ice thickness loss of land-based ice shelves (m/yr) and sea floor potential temperature from Pritchard et al. (2012)

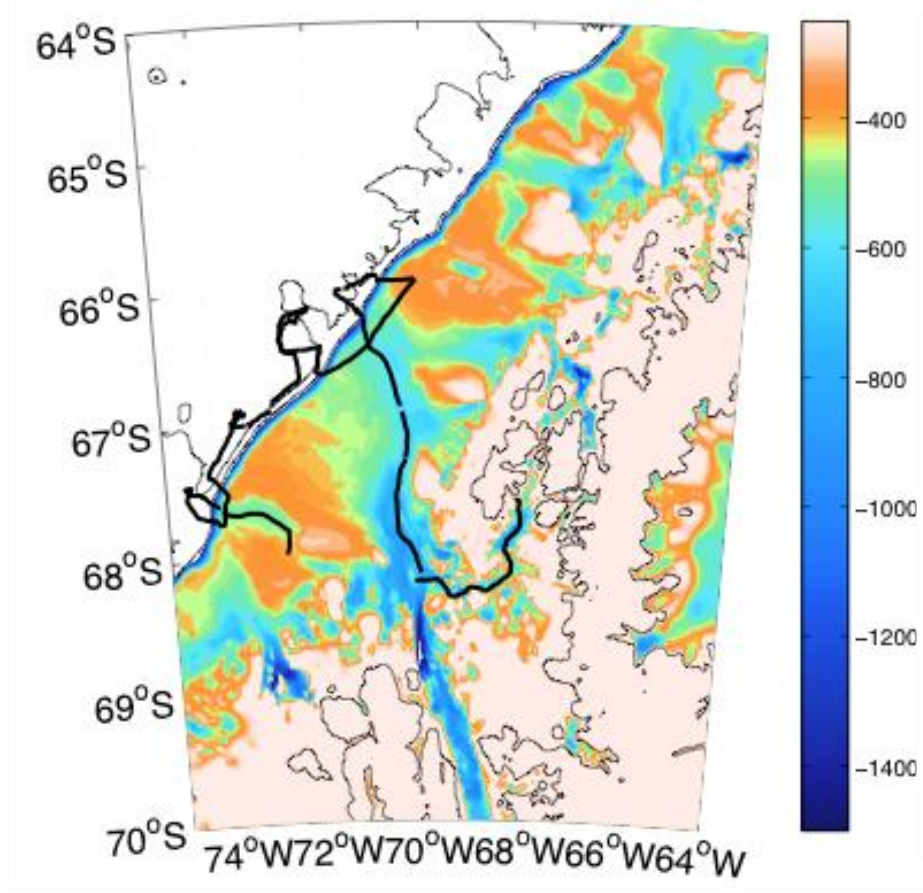


Temperature maximum on WAP shelf (Martinson et al., 2008).

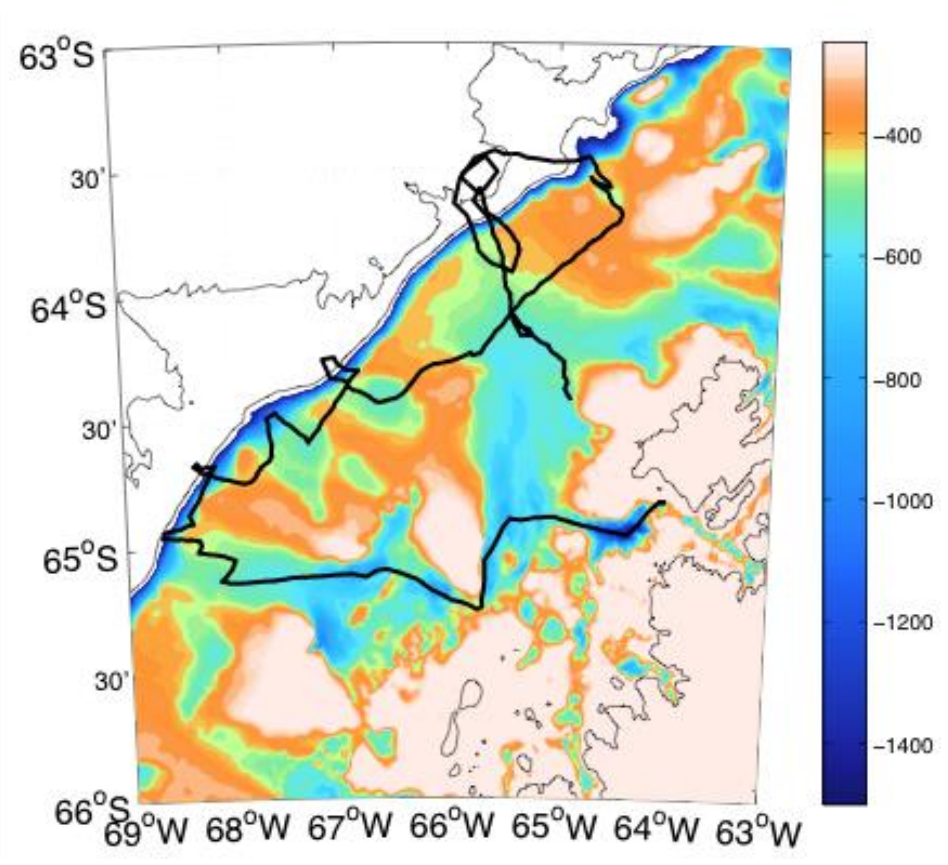


- Fleet of three Slocum G2 1000m gliders (one with microstructure), one Seaglider (with ES853 echosounder)
- Deployed from Rothera and the RRS James Clark Ross
- Ice-coping software development (with TWR)

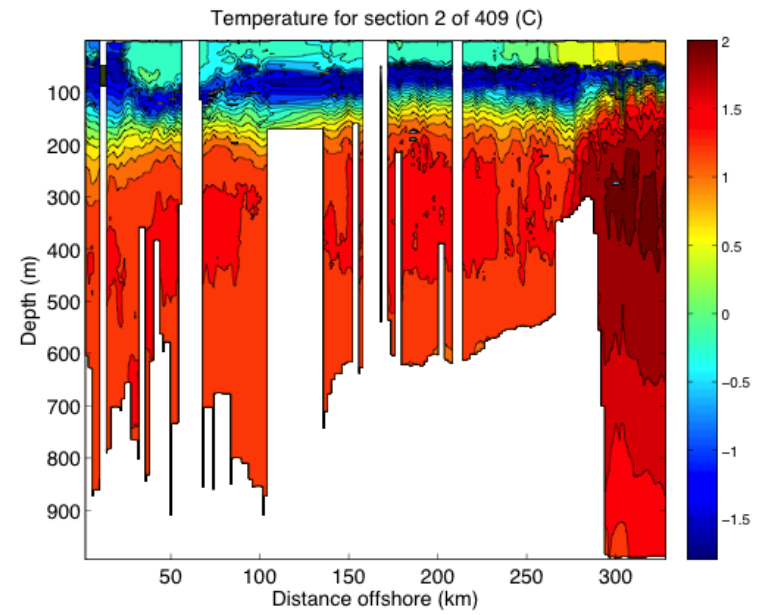
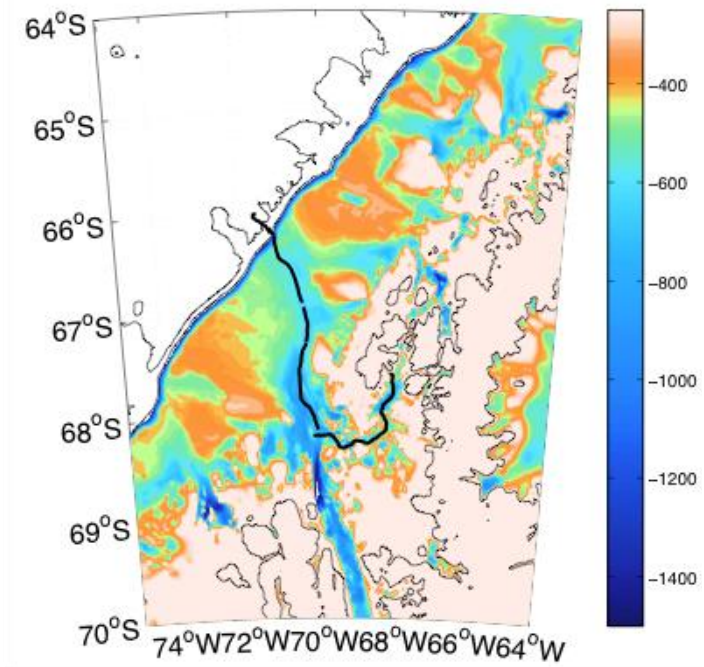




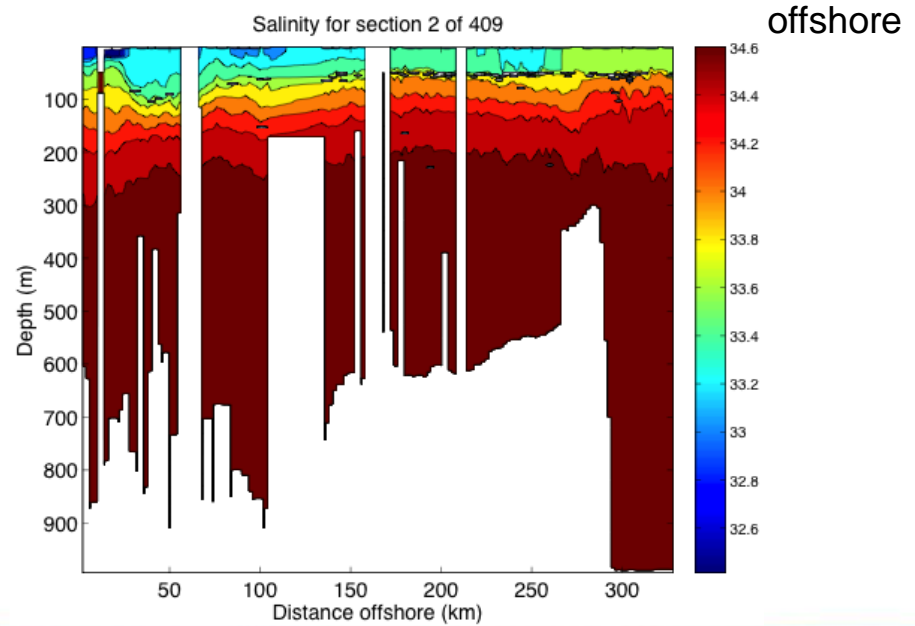
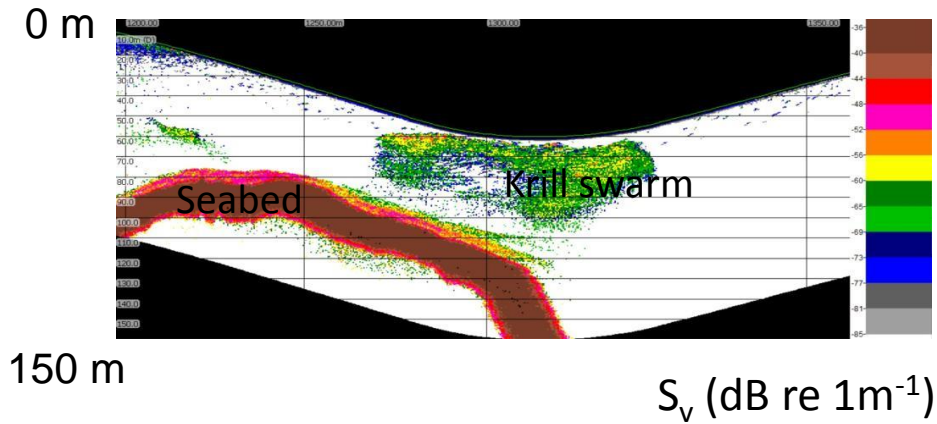
2014-15  
(1278 km)

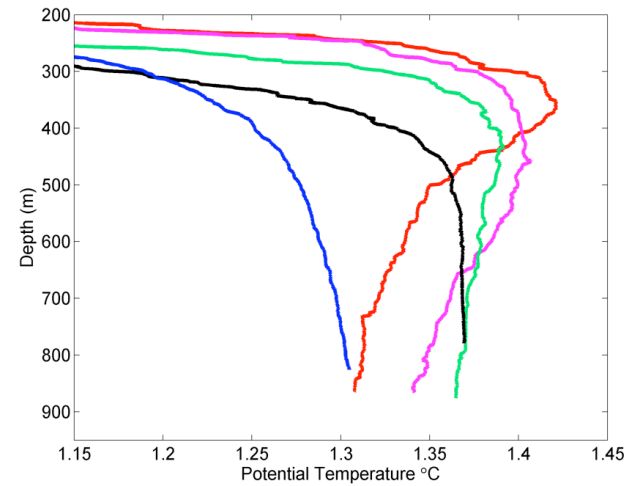
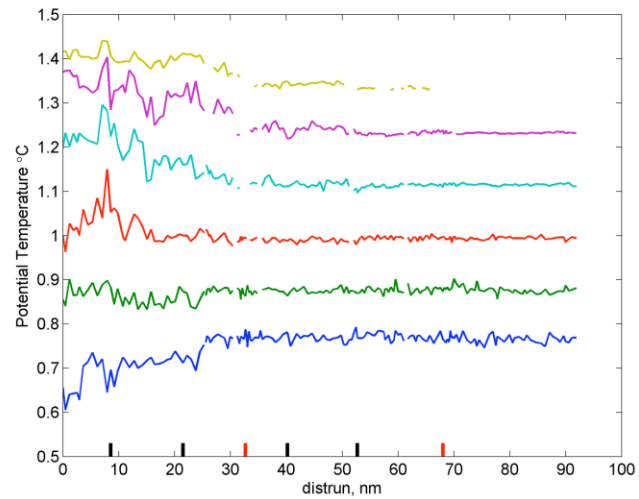
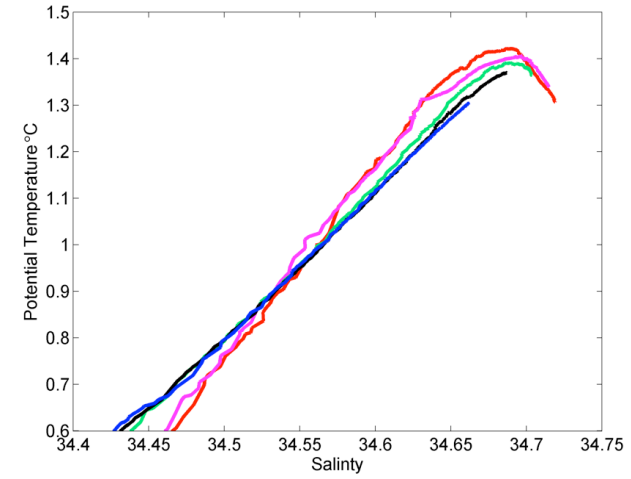
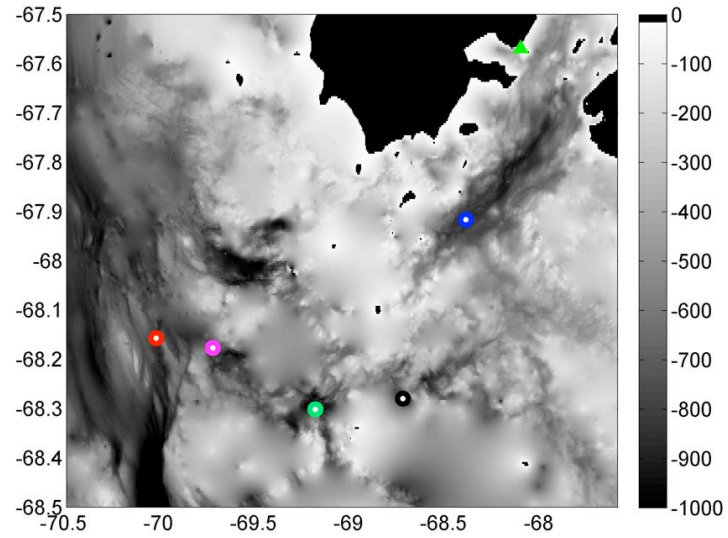


2015-16  
(1225 km)

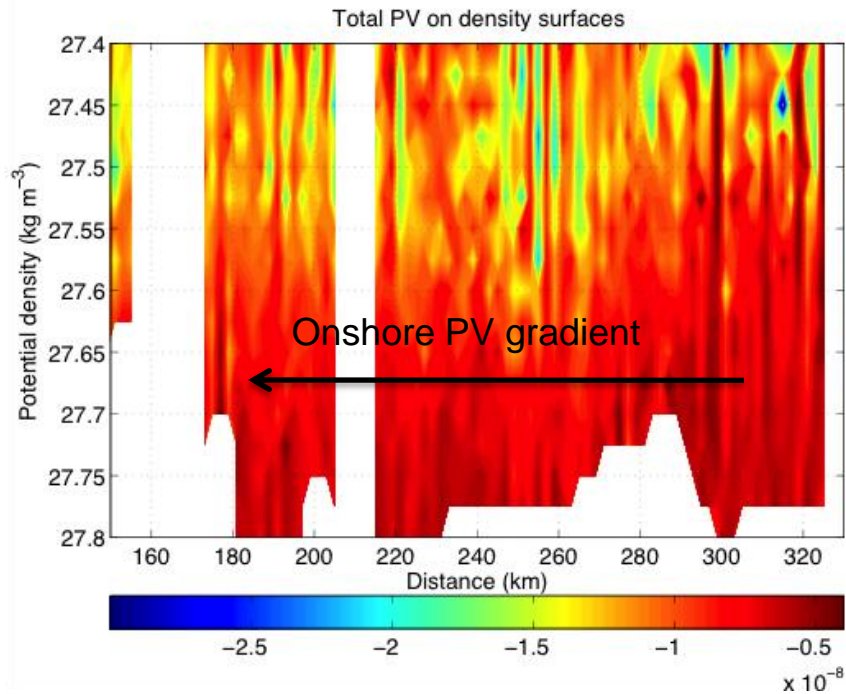


### Marguerite Trough



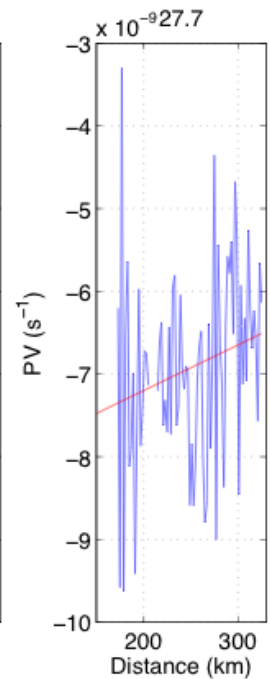
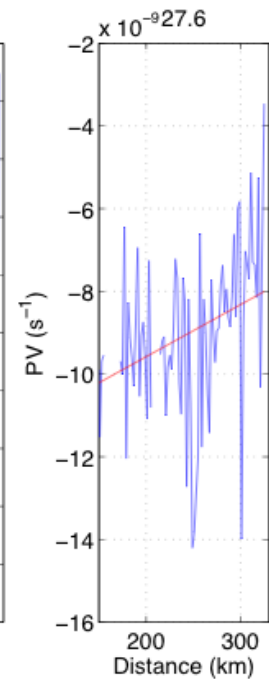
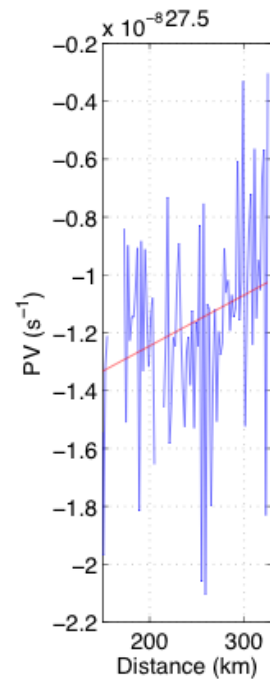


From Venables et al. (2016)

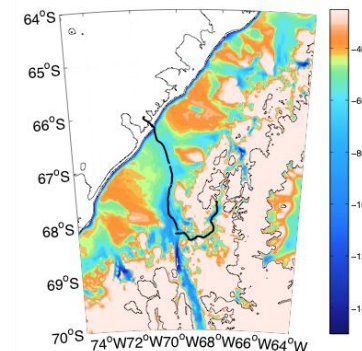


onshore

offshore

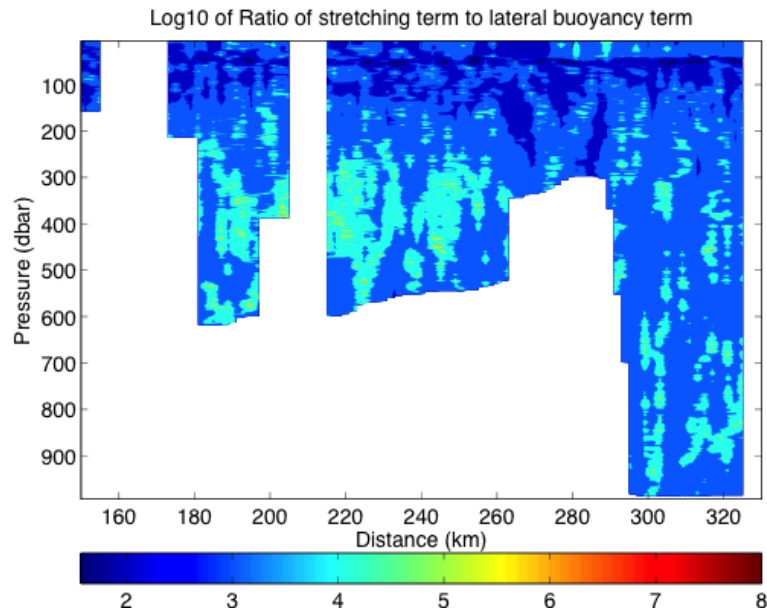


$$Q = fb_z + u_z b_y - u_y b_z$$



Eddy thickness transport is **onshore** at the Marguerite Trough section.

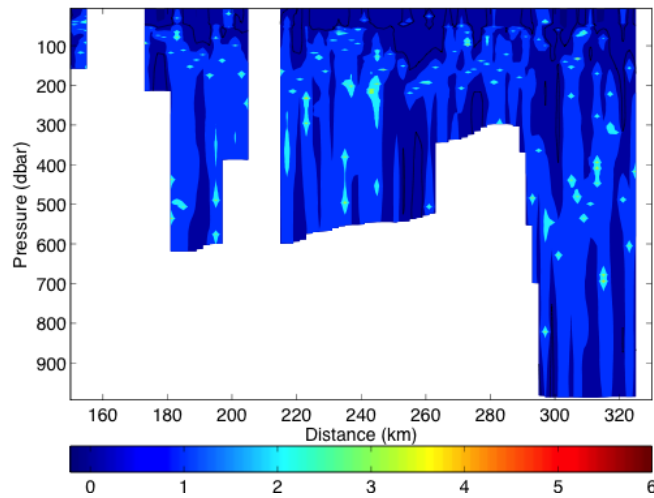




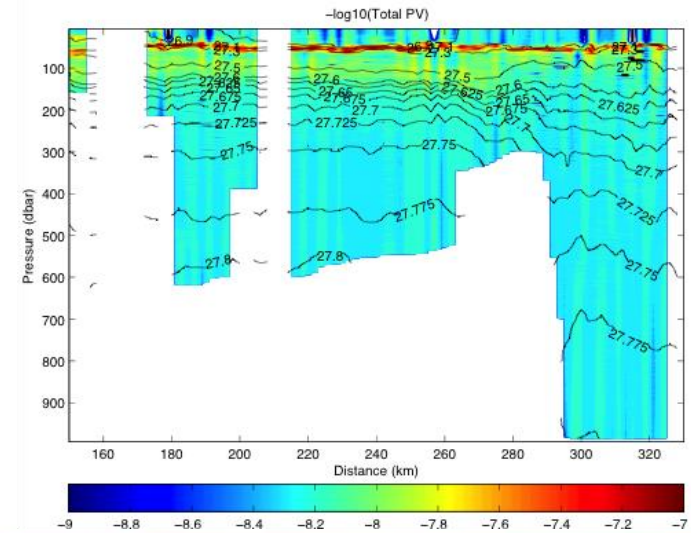
$$fb_z / u_z b_y$$

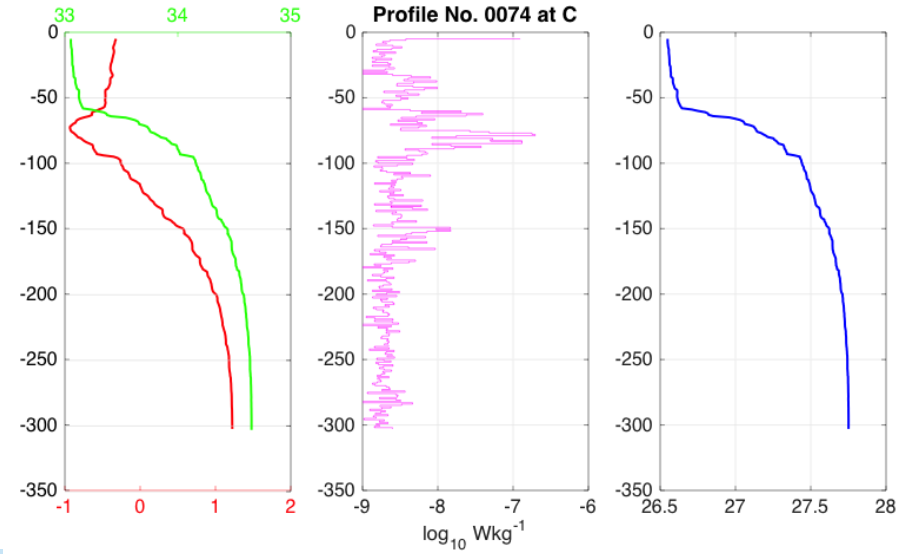
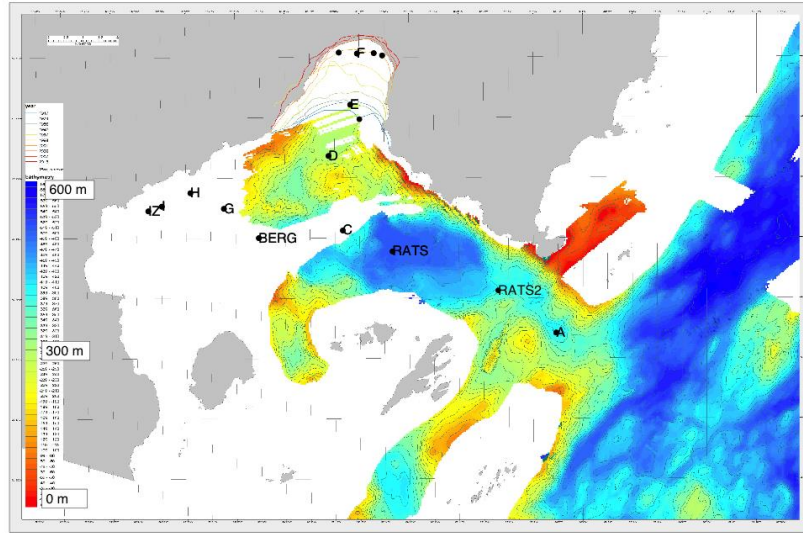
Stretching term  
dominates the PV budget  
(density layers deepen  
and thicken as you move  
offshore)

0 of Ratio of stretching term to lateral shear term. Regions where Lateral shear exceeds 0.25



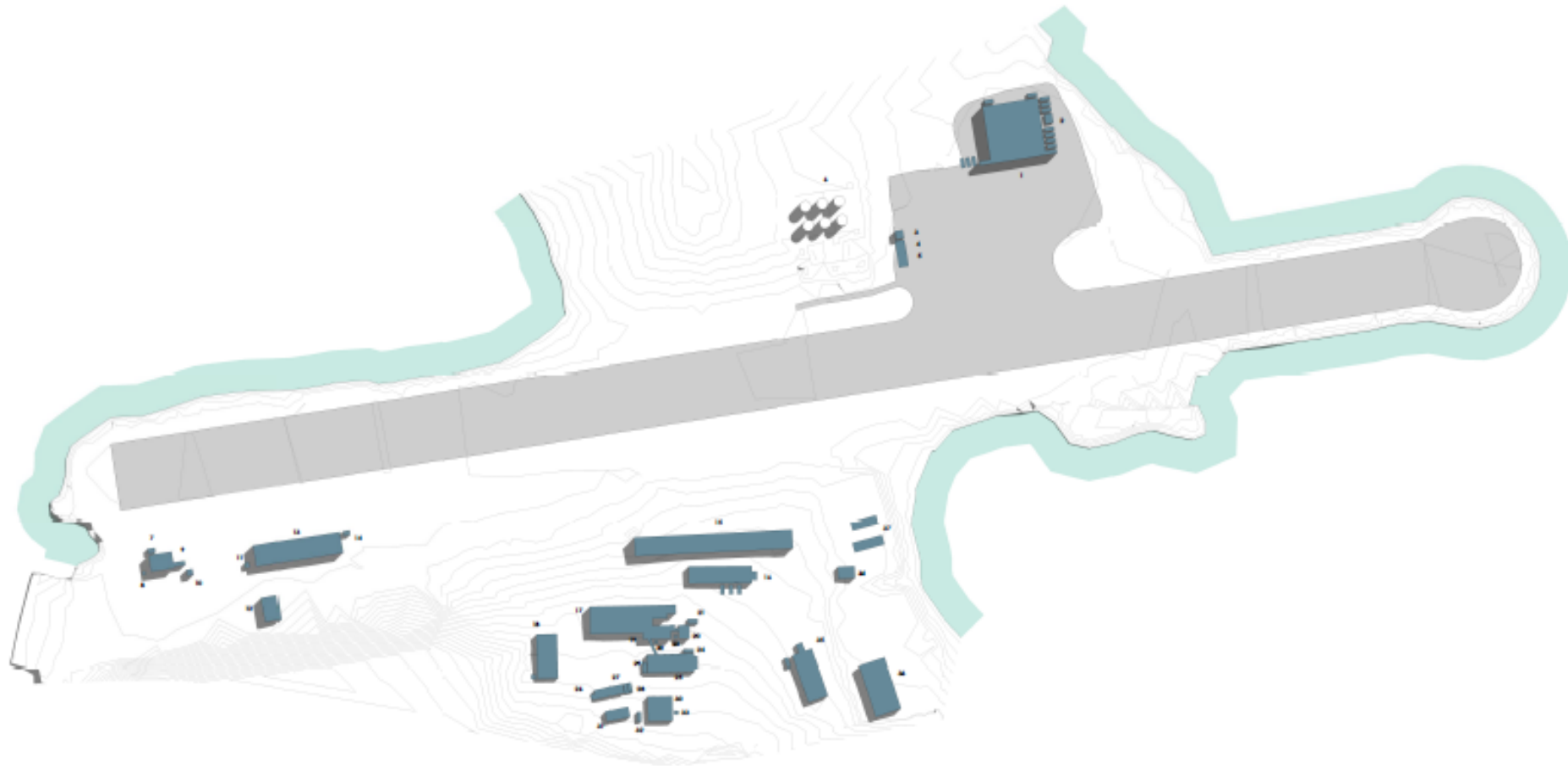
$$fb_z / u_y b_z$$





Background dissipation in the bay is  $\sim 1\text{-}2 \times 10^{-9} \text{ W kg}^{-1}$ , though there appears to be some localised enhancement within the thermocline associated with T/S jumps.





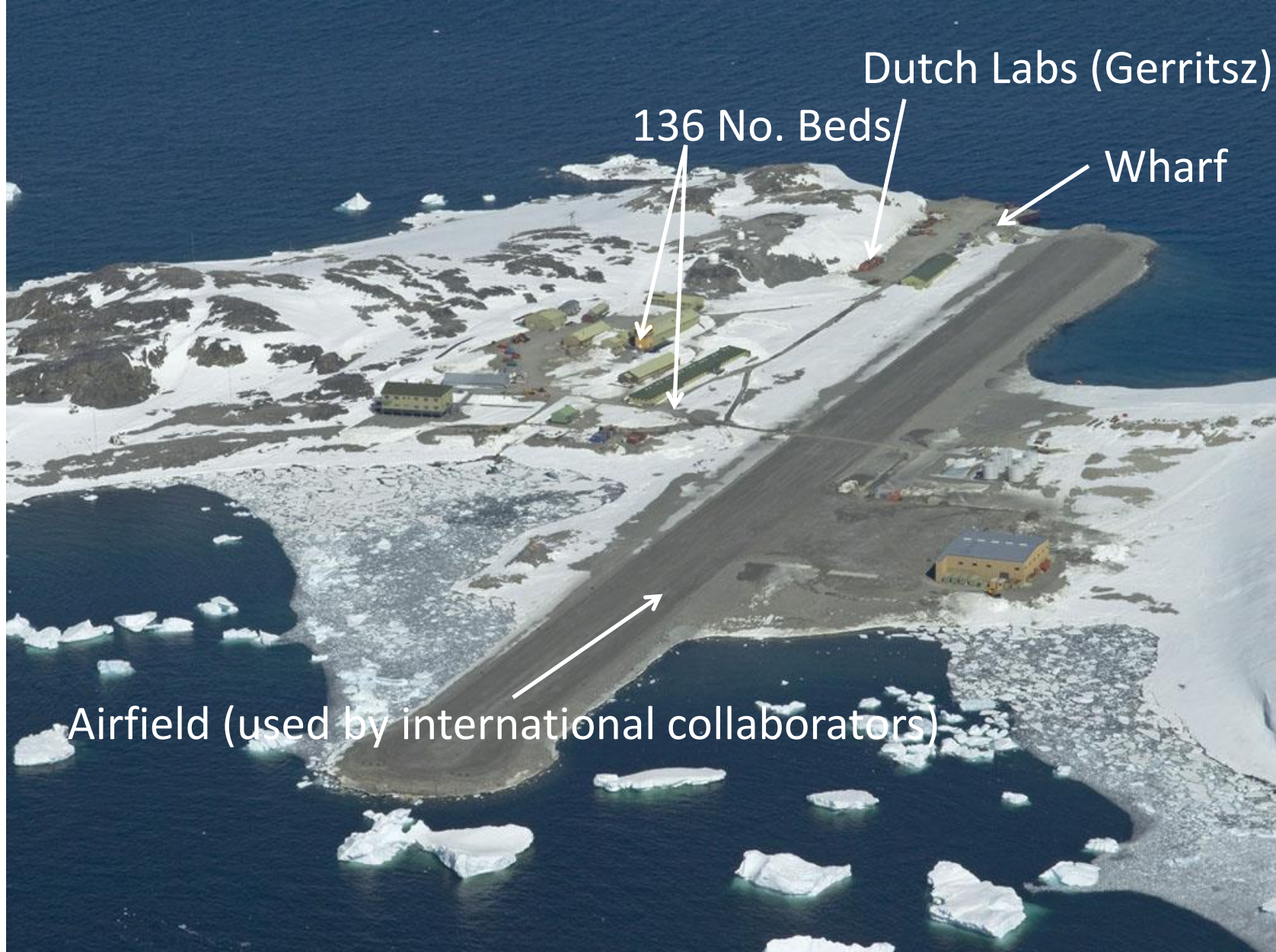
# Rothera Redevelopment Project (RRP)



**British  
Antarctic Survey**  
NATURAL ENVIRONMENT RESEARCH COUNCIL

Redevelopment project

**POLAR SCIENCE  
FOR PLANET EARTH**



Dutch Labs (Gerritsz)

136 No. Beds

Wharf

Airfield (used by international collaborators)



**British Antarctic Survey**  
NATURAL ENVIRONMENT RESEARCH COUNCIL

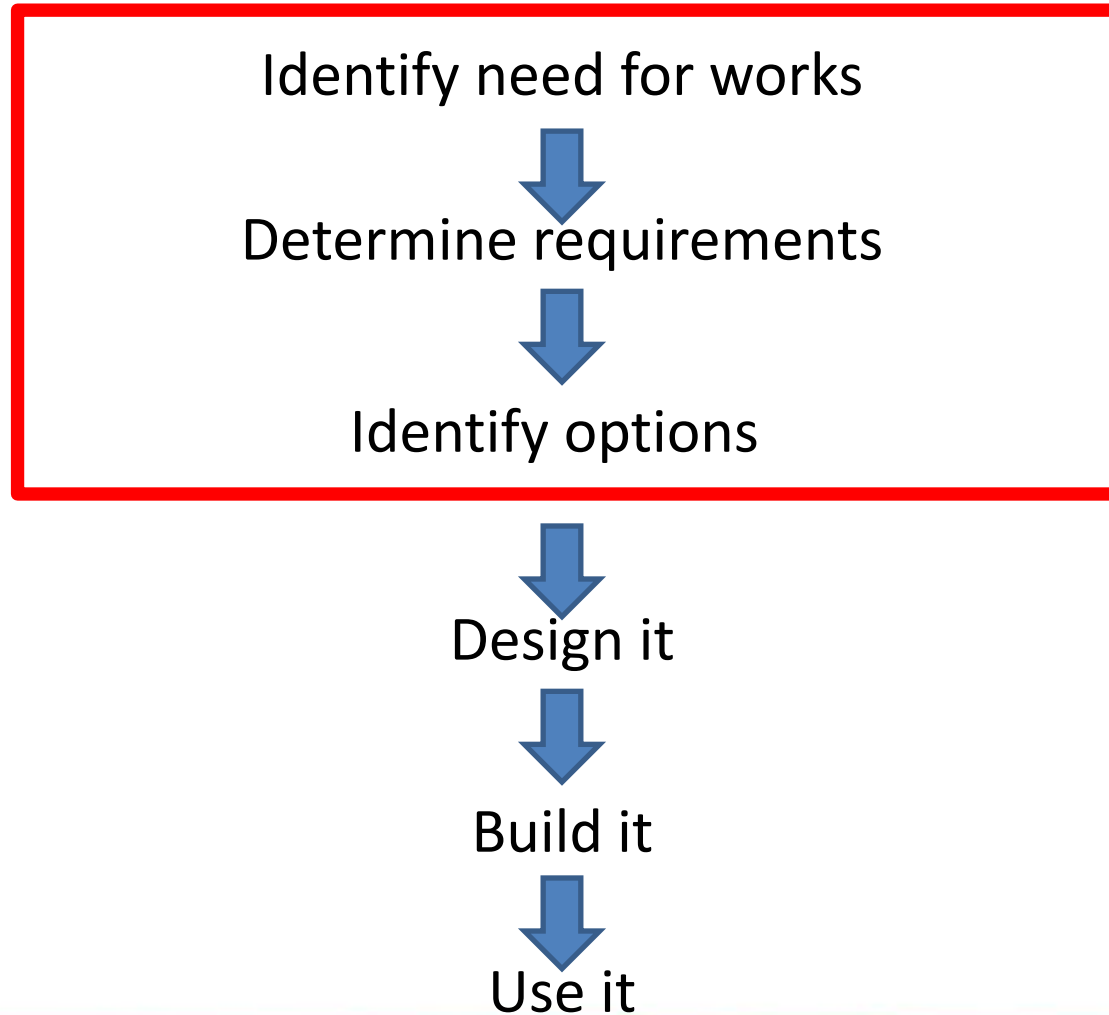
**POLAR SCIENCE**  
**FOR PLANET EARTH**

# Getting old & a little bit tired...

- Oldest building 1976; newest 2008
- Most of key buildings at end of “Design Life”
- RRP is looking at how best to replace



# Construction Project Process...



# Determine Requirements

Ref	End User Group
A	Station Management
B	Met & Field Science
C	Marine Operations
D	Air Operations
E	Vehicle Operations
F	Field Operations
G	Estates
H	Medical & Dental
I	Communications
J	Lab Science

- Glider Capability captured under “Marine Operations”
- Existing requirement too small
- Takes up space in bespoke laboratory facilities
- Can’t expand it to meet future increased demand



# Determine High Level Options

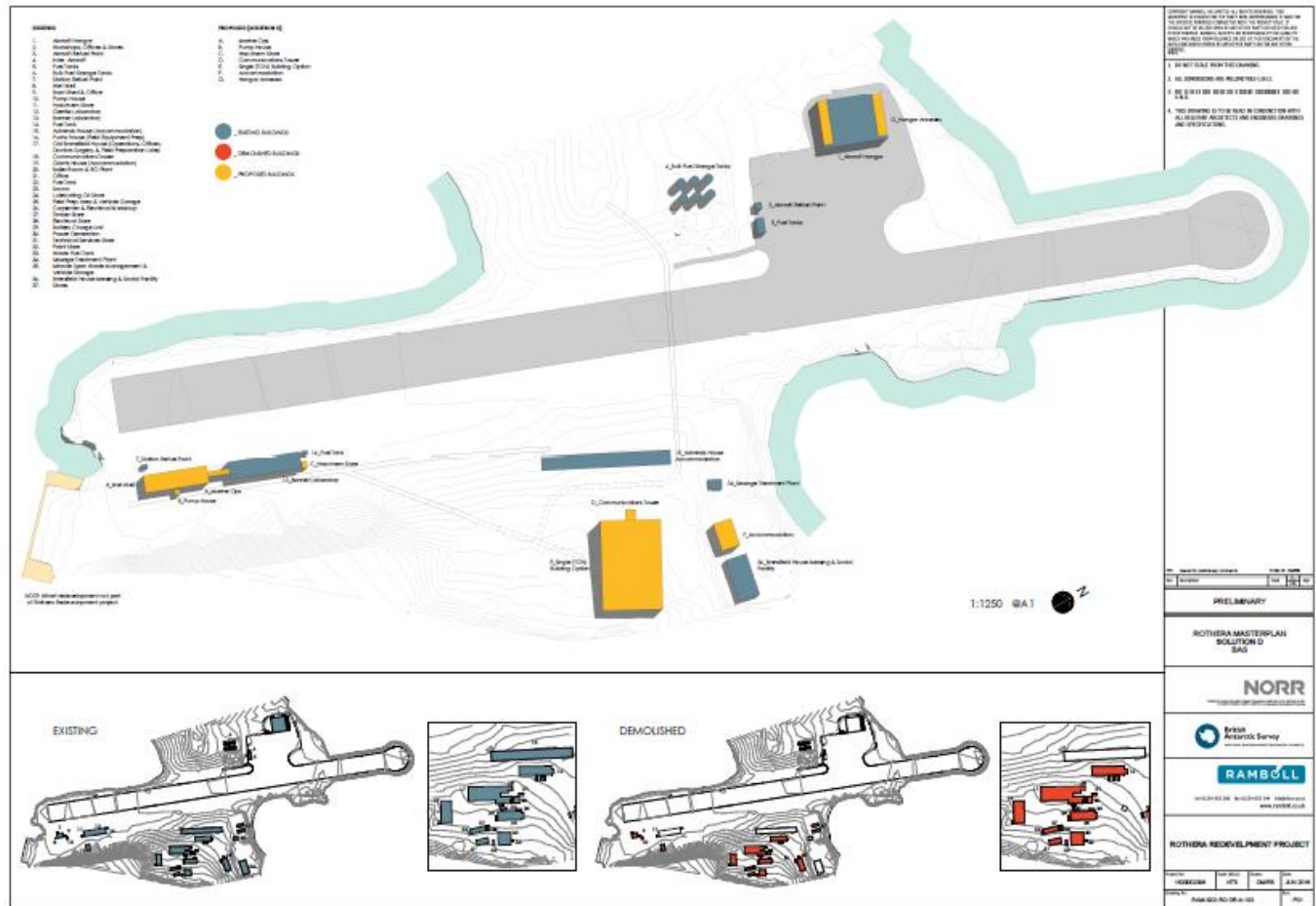
- Made initial assessment of the spatial requirements for each “End User Group”
- Looked at how we can combine requirements to make sure operational need is met
- Come up with a series of 5 Station Wide Redevelopment Options
- Options don’t look at detail (later stage)
- Purely for funding purposes







# Solution D (preferred option)



# Next Stage...Start Detailed Design

- What exactly do we need to provide?
- Where exactly does it need to go?
- How big does it need to be?
- What finishes and fixings do we need to provide?

**THIS IS YOUR OPPORTUNITY TO INFLUENCE WHAT  
FACILITIES ARE INCLUDED...**



# Determine Glider Requirements

So far we have allowed for...

- Glider workshop
- Stores for gliders and associated equipment
- Ballast Tanks
- Washdown area
  
- Is there anything else?
- Are there additional requirements we could provide that would make the facility better / more flexible for future changes and for other groups?



# Any Questions?



**British  
Antarctic Survey**  
NATURAL ENVIRONMENT RESEARCH COUNCIL

**POLAR SCIENCE  
FOR PLANET EARTH**