



OASIS workshop

# Observing the polynya and ocean under sea ice in Prydz Bay, Antarctica

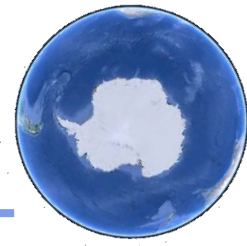
Jiuxin Shi, Yutian Jiao, Yongming Sun, Guijun Guo

Ocean University of China

June 14-17, 2017  
AWI, Bremerhaven, Germany

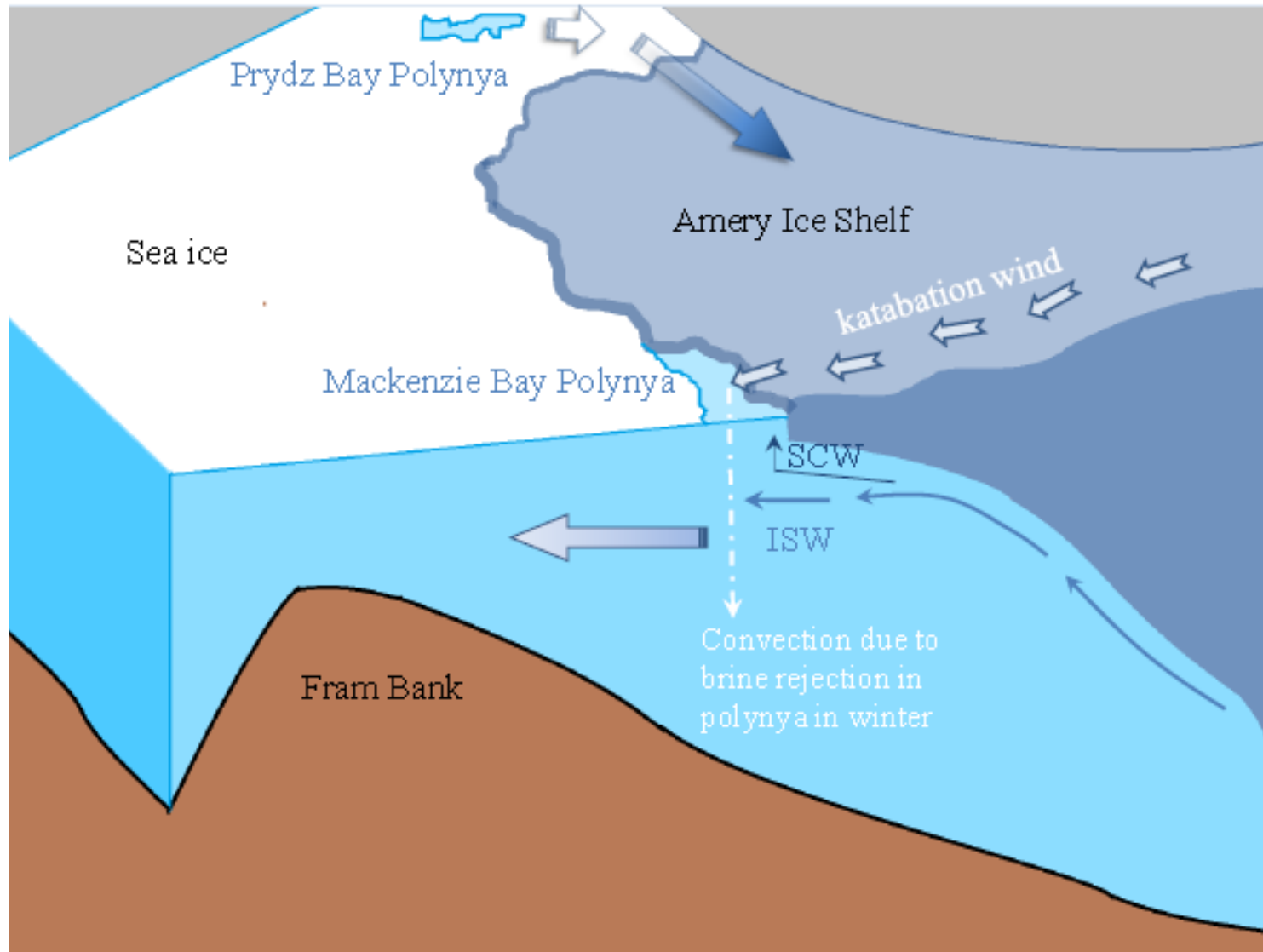
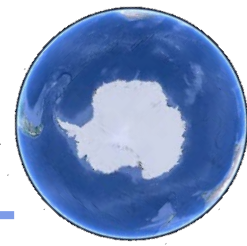
# Outline

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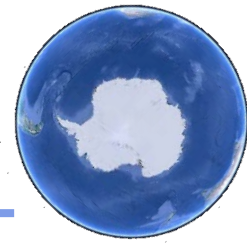


- Sea ice-polynya-ice shelf-ocean system in Prydz Bay
- Field Observations
  - XCTD launched from Helicopter
  - Programmed winch on fast ice
  - Mooring with breakable-connector
- Future Field Plan

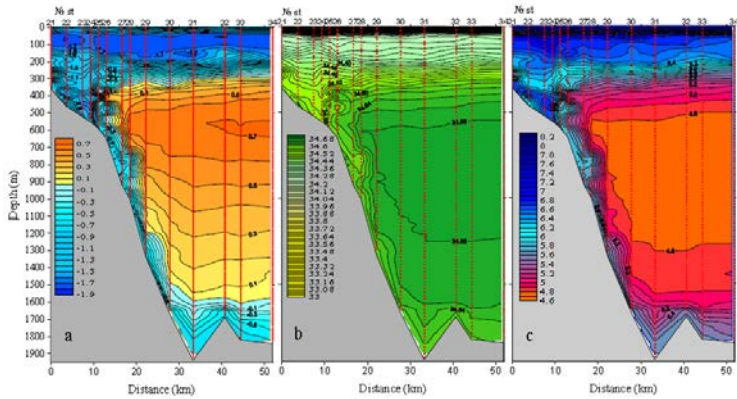
# Sea ice-polynya-ice shelf-ocean system in Prydz Bay



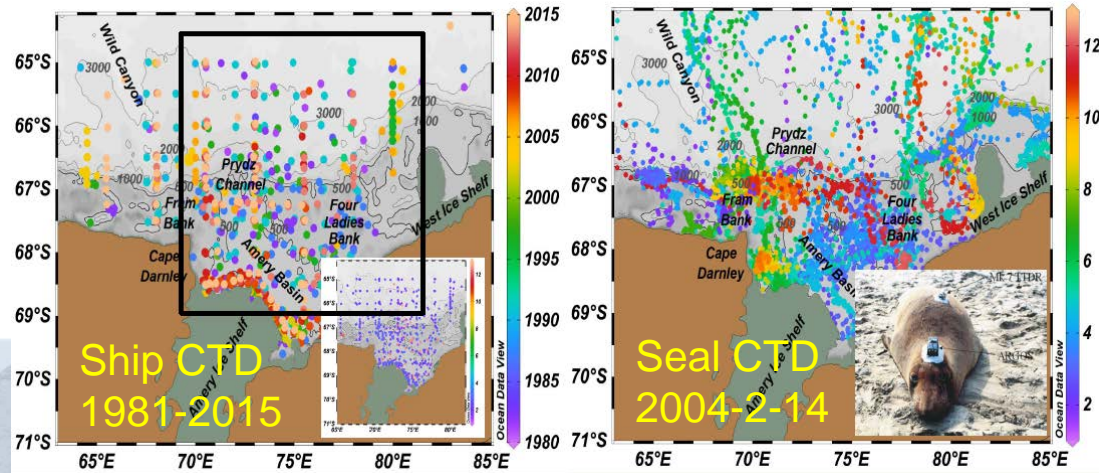
# Observations in Prydz Bay



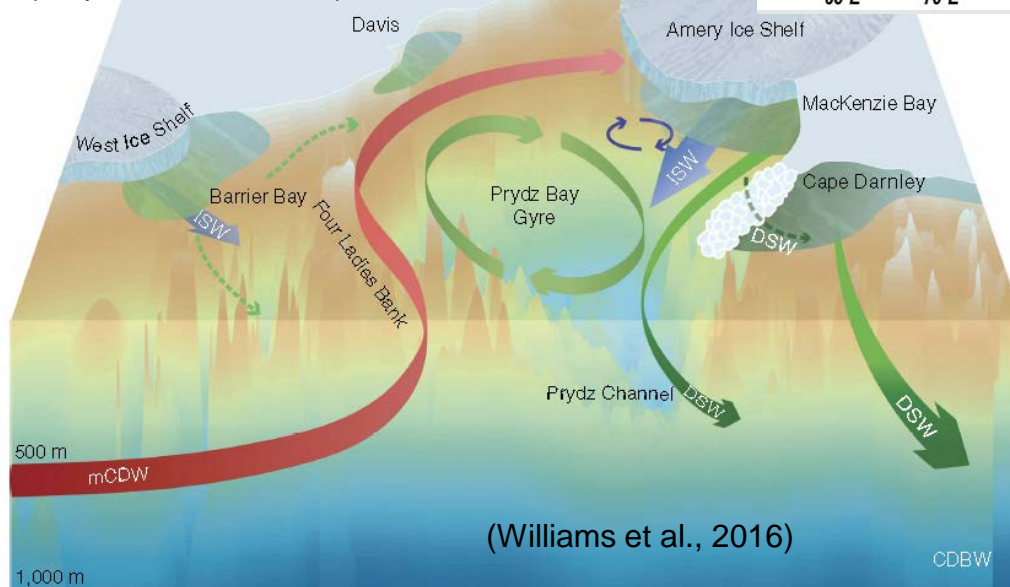
- Process studies need time series data in upper ocean at fixed sites, e.g. polynyas.



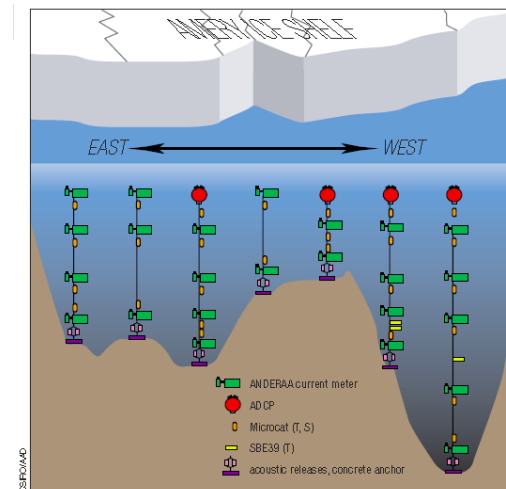
(Klepikov et al., 2012)



(Sun et al., 2016)



(Williams et al., 2016)

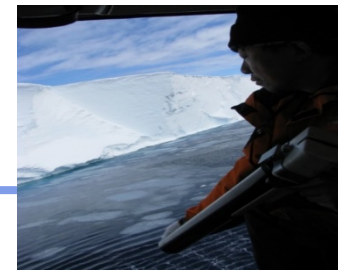


(Church et al., 2002)

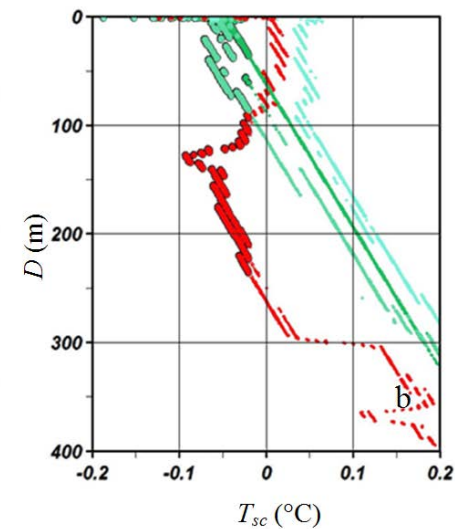
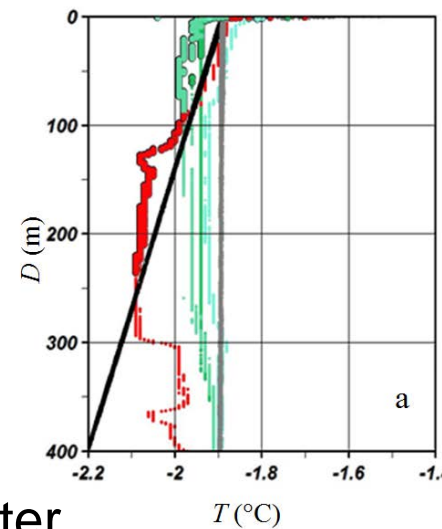
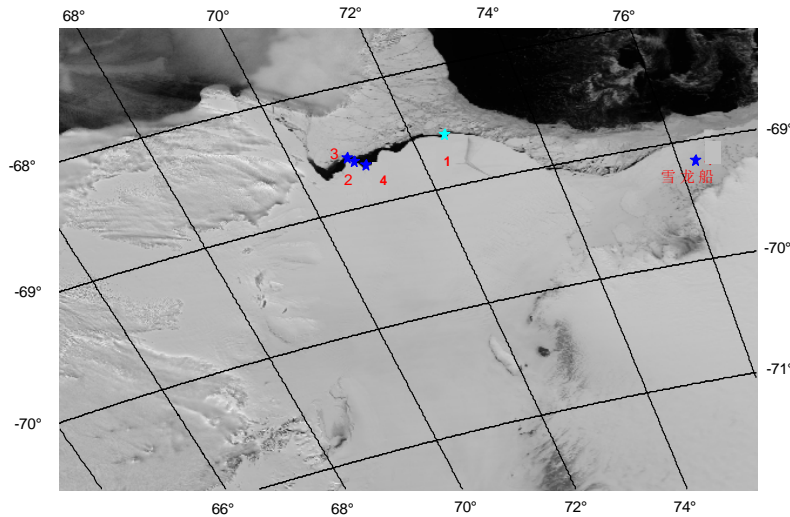


# XCTD launched from Helicopter

- #1: Dec. 11, 2007; #2~4: Dec. 17, 2008;

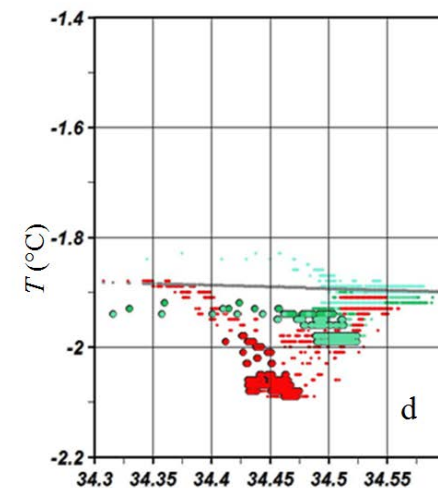
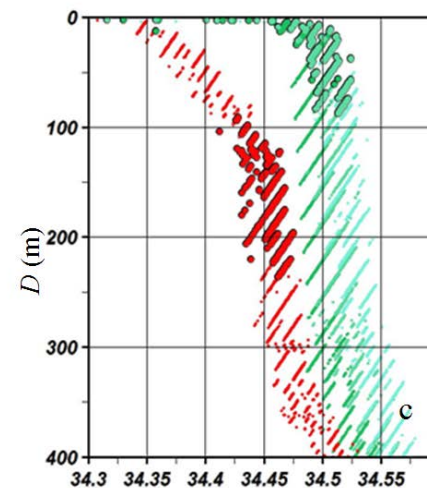


Model Zhi-9, ~AS365 Dauphin

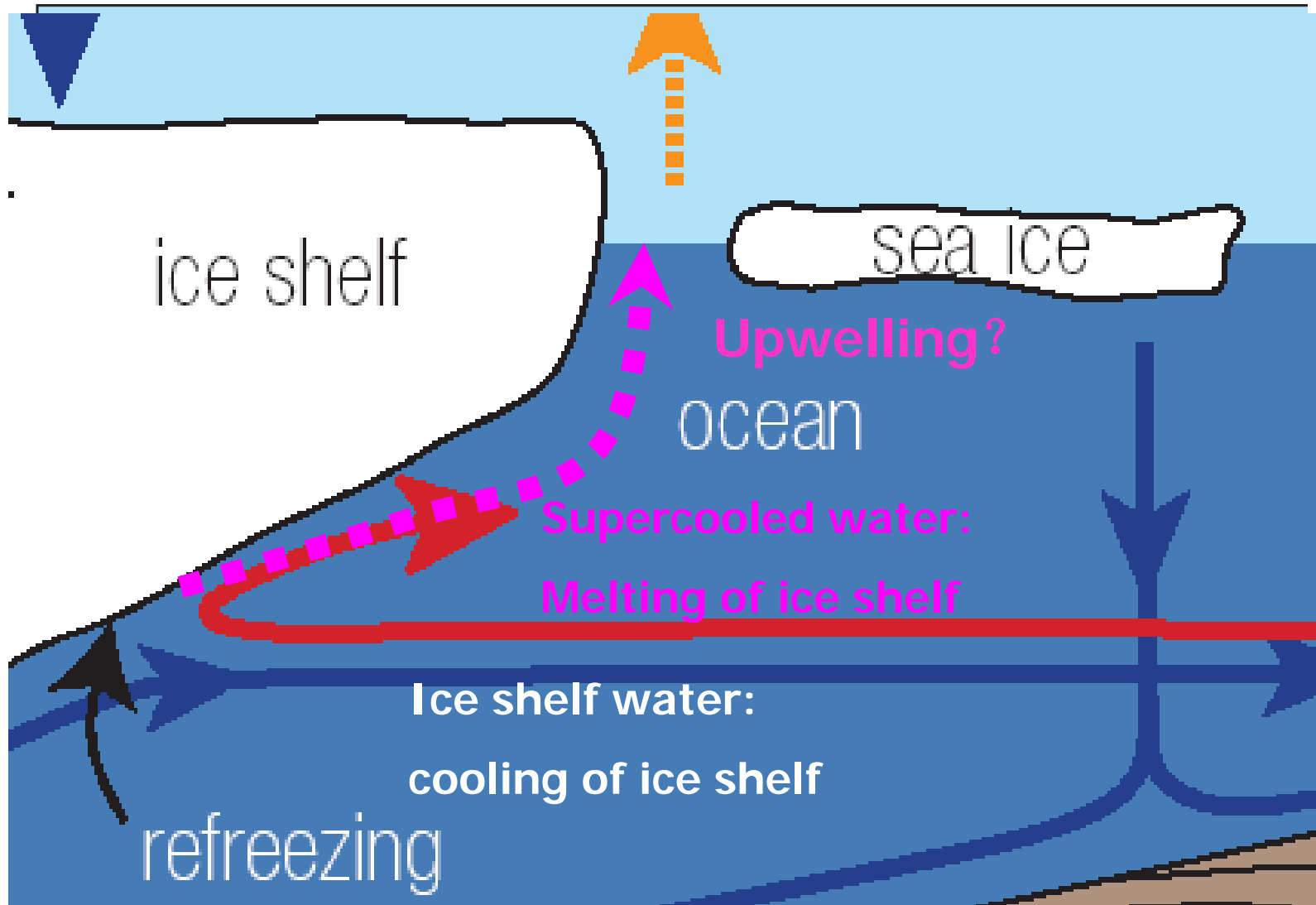
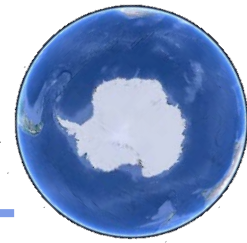


- Ice shelf water/Supercooled water

- 2007
  - $T_{SCmin} = -0.09^{\circ}\text{C}$ , 128m
- 2008
  - $T_{SCmin} = -0.04^{\circ}\text{C}$ , <34m
  - $T_{SCmin} = -0.07^{\circ}\text{C}$ , <85m



# Formation of supercooled water



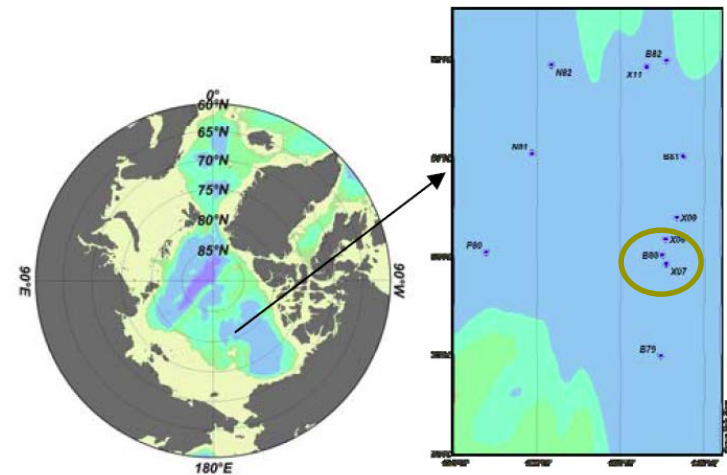
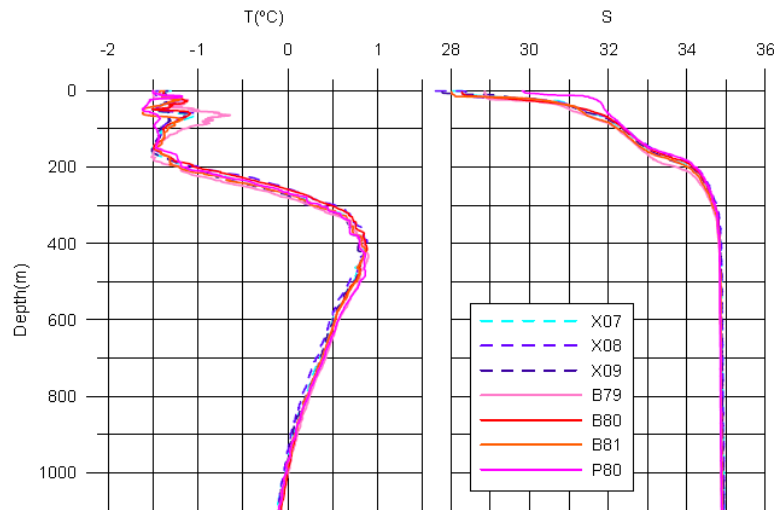
(Shi et al., 2011)

# Comparison with CTD in Canada Basin, Arctic Ocean

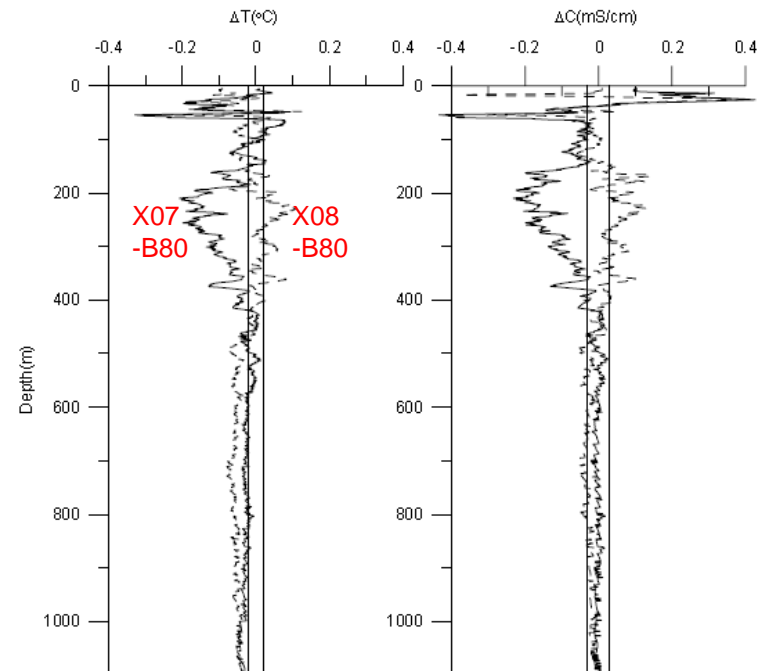
- TSK (Tsurumi-Seiki Co.)
- TS-MK-130 System, XCTD-7

$$d(t) = at - bt^2$$

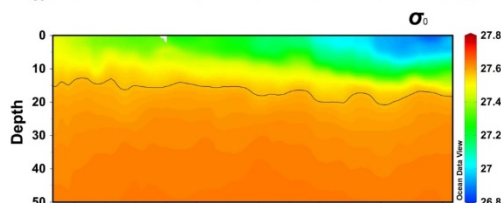
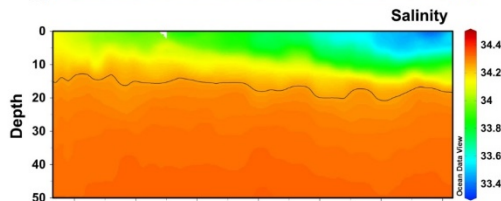
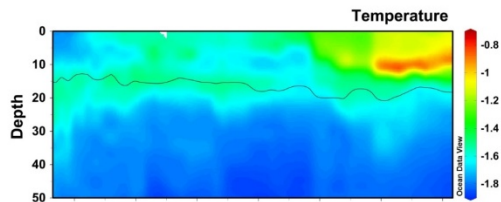
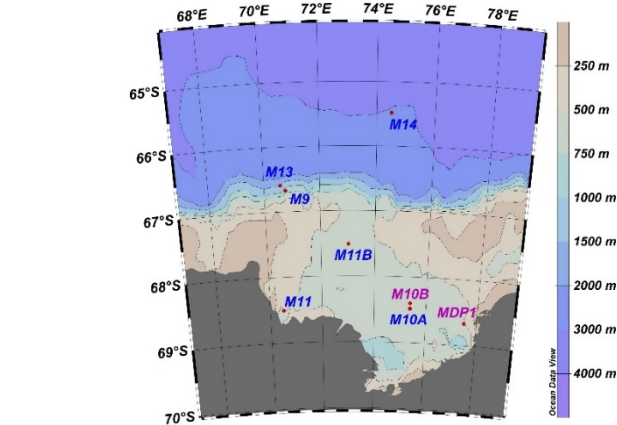
$$a = 3.42543, b = 4.7026 \times 10^{-4}$$



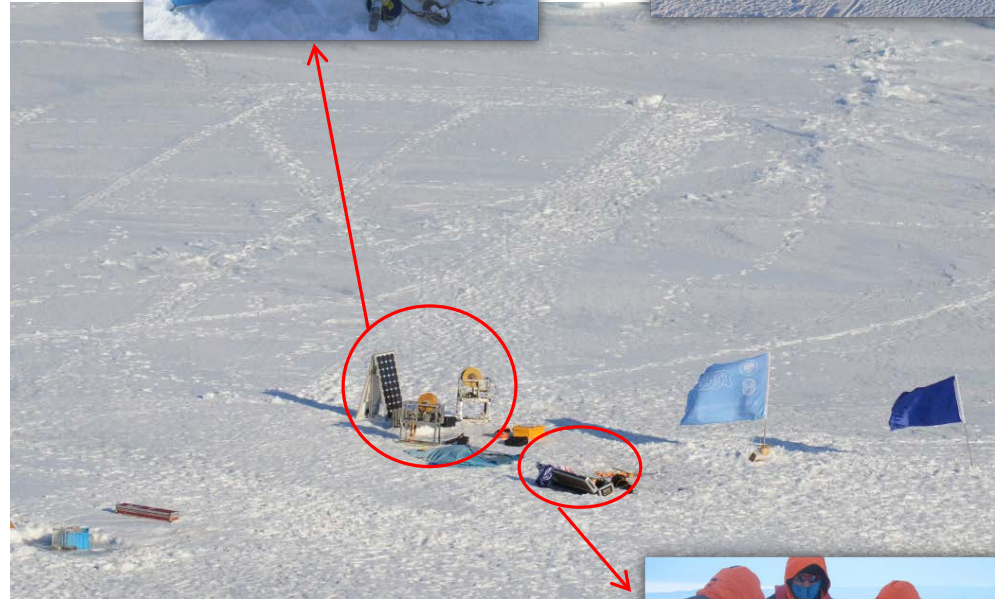
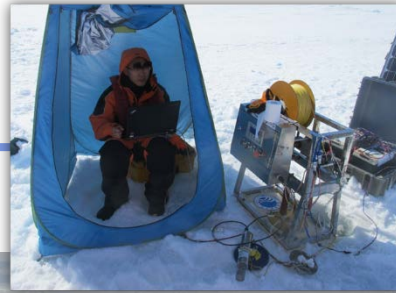
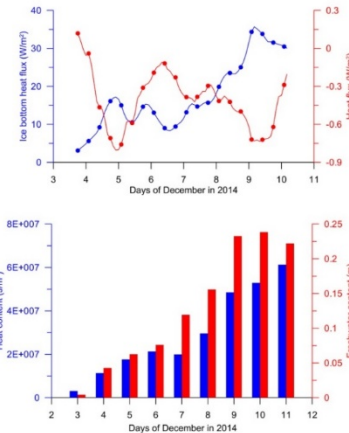
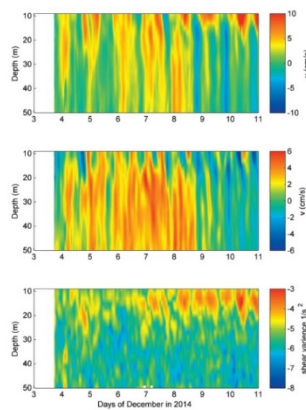
Locations of XCTD and CTD in 2008



# CTD driven by programmed winch

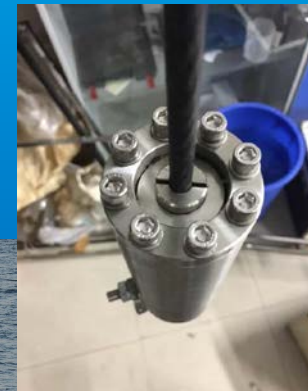
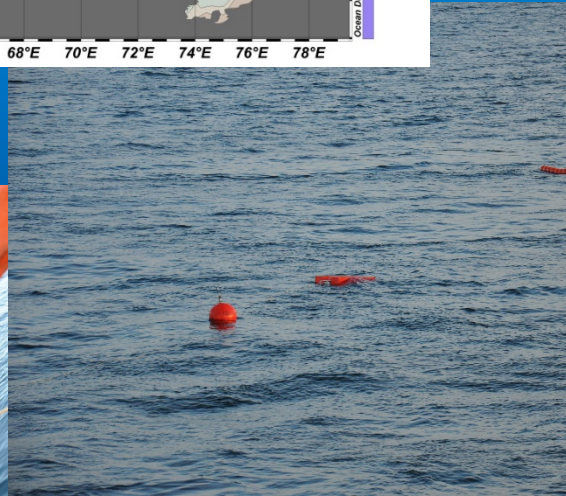
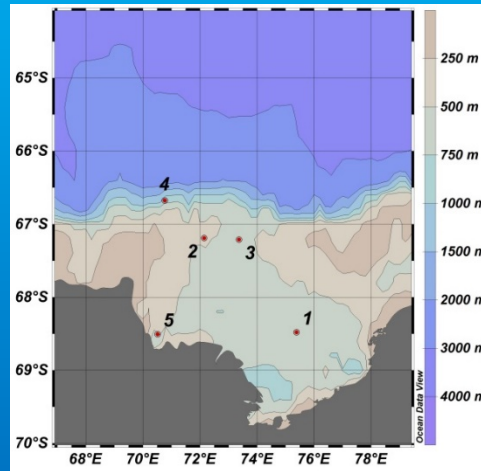


Days of December in 2014





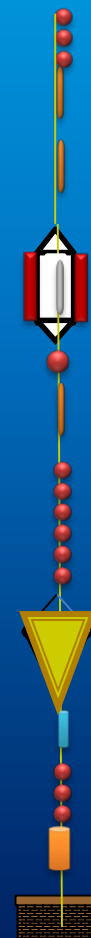
# Mooring with breakable-connector



Jimmy Johnson:  
sacrificial mooring  
in Bering Strait

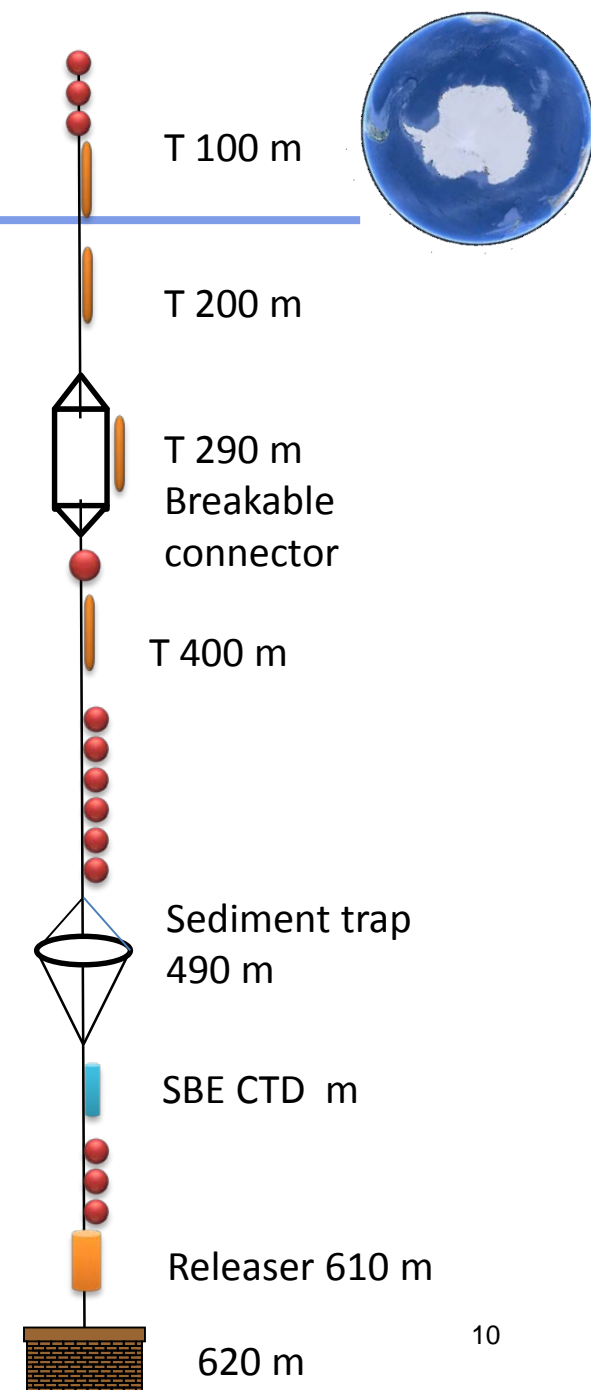
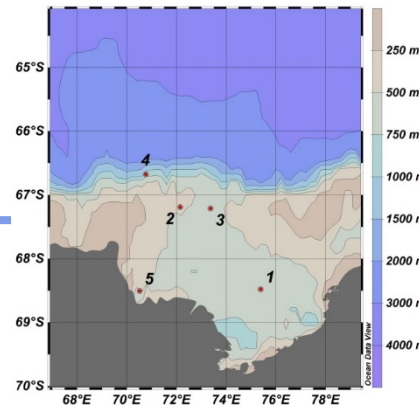
SBE37  
Inductive

Date logger



# 1<sup>st</sup> depolyment

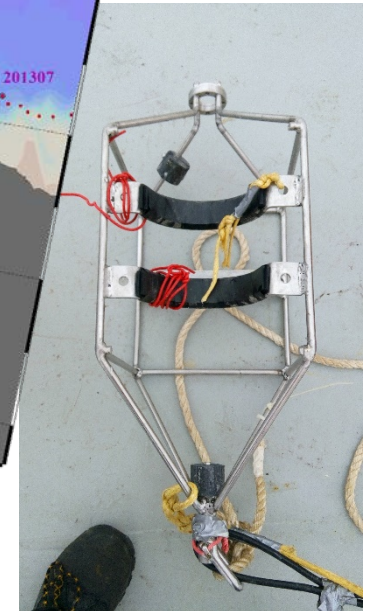
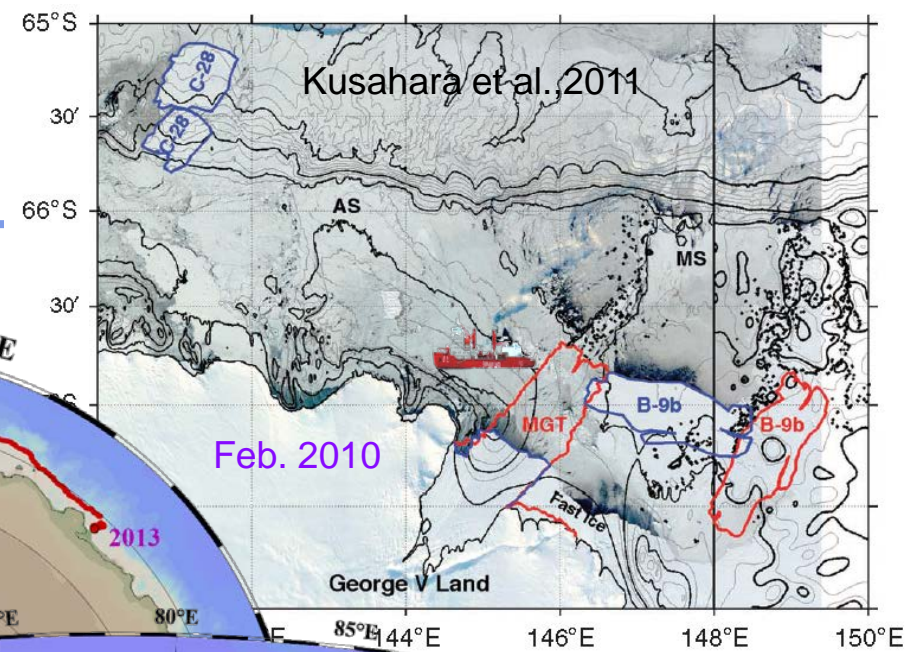
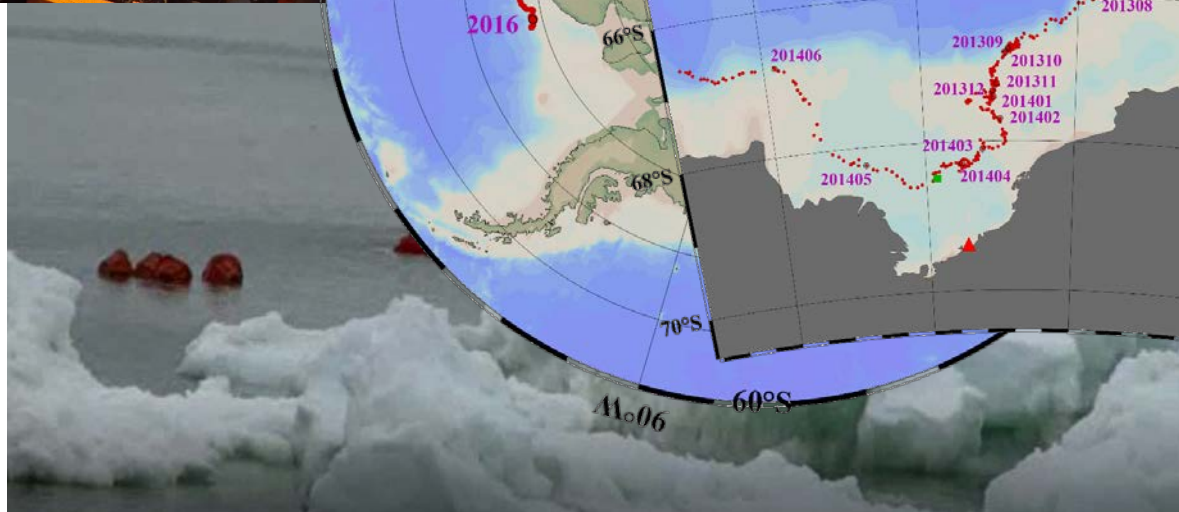
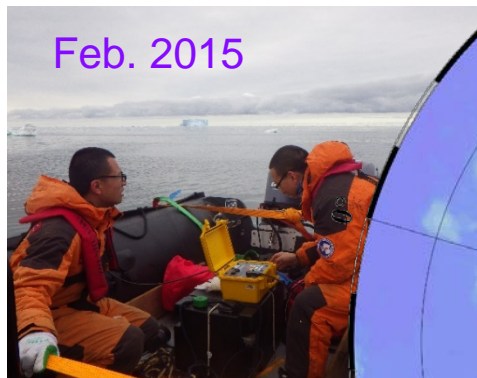
- CHINARE-30



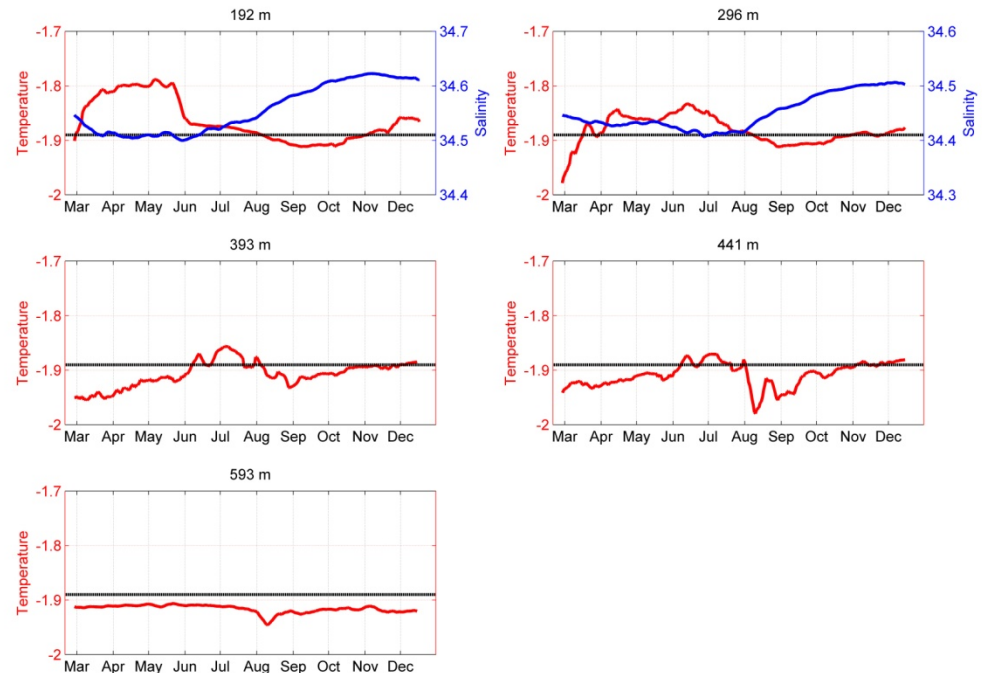
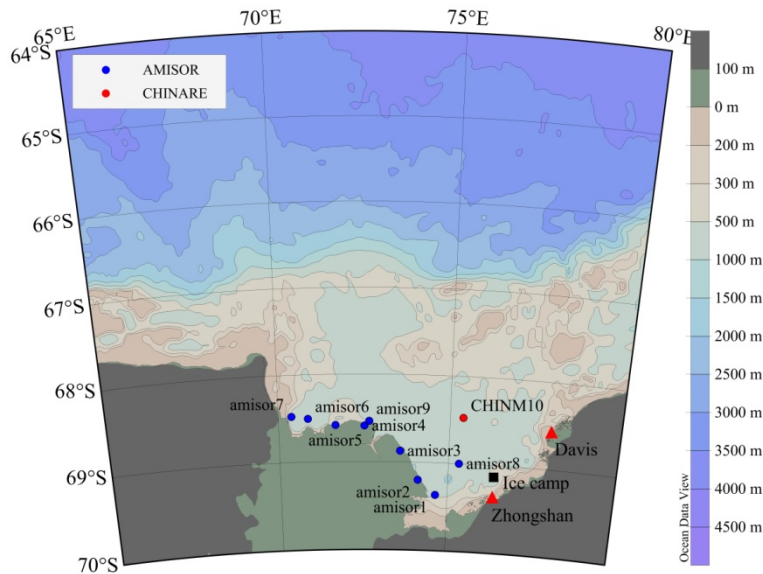
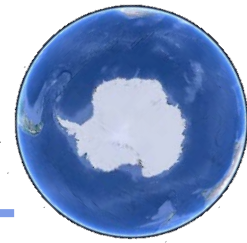


# Recover

- CHINARE-31



# Mooring data in 2015



mCDW warm water

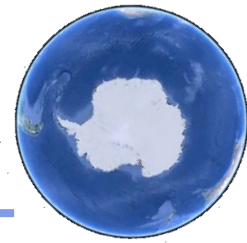
At 200: Mar-June, at 300 m: Mar-Aug

Convection reach 200 m in June, then reach 300 m in August

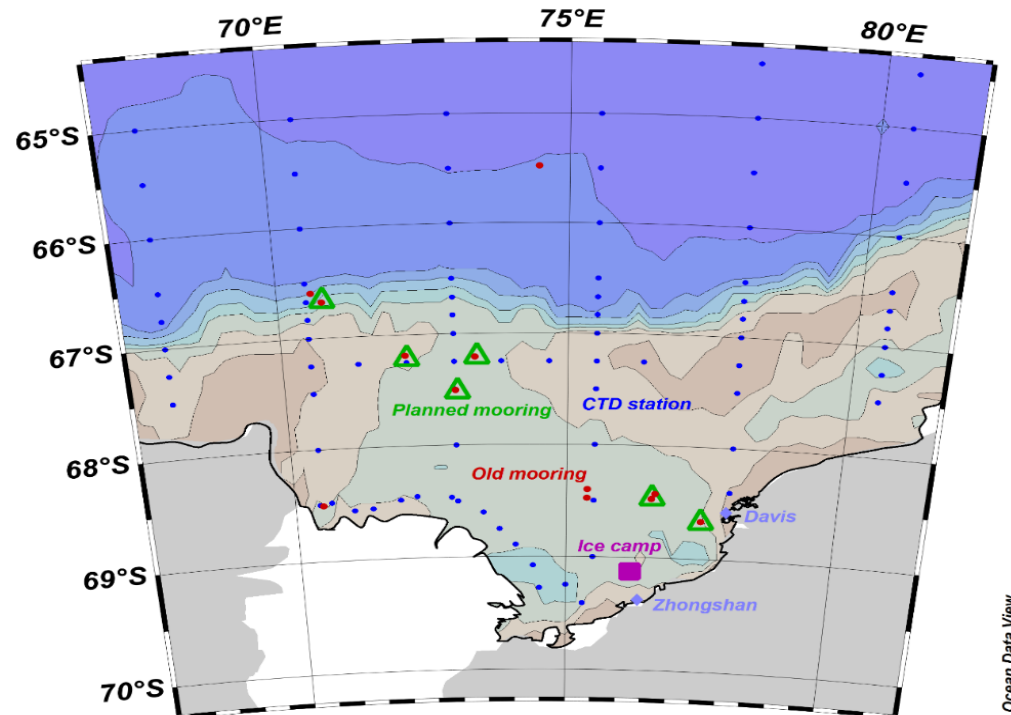
Did mCDW contribute to polynyas in eastern Prydz Bay? Sensible heat polynyas?



# Future field plan in Prydz Bay by CHINARE



- Oceanographic section in summer
  - Meridional sections and Amery ice shelf front section
  - CTD/LACP/turbulence
- Mooring
  - In western slope, central trough and eastern polynyas
  - CTD/ADCP/Current meter/sediment trap
- Ice camp in late spring
  - On fast ice
  - CTD/ADCP/turbulence
  - Radiation
  - Snow&ice thickness





Thanks! 谢谢!