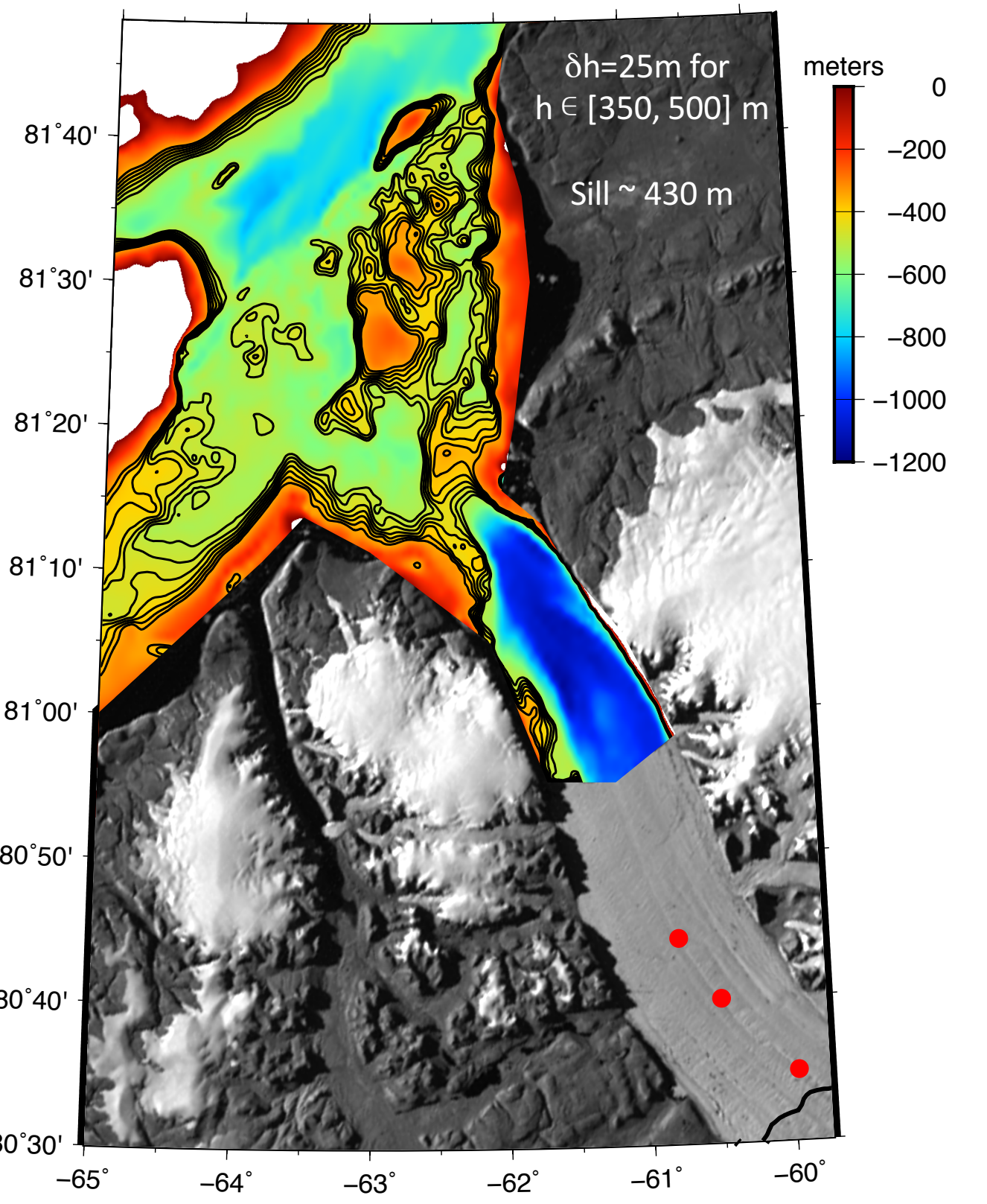
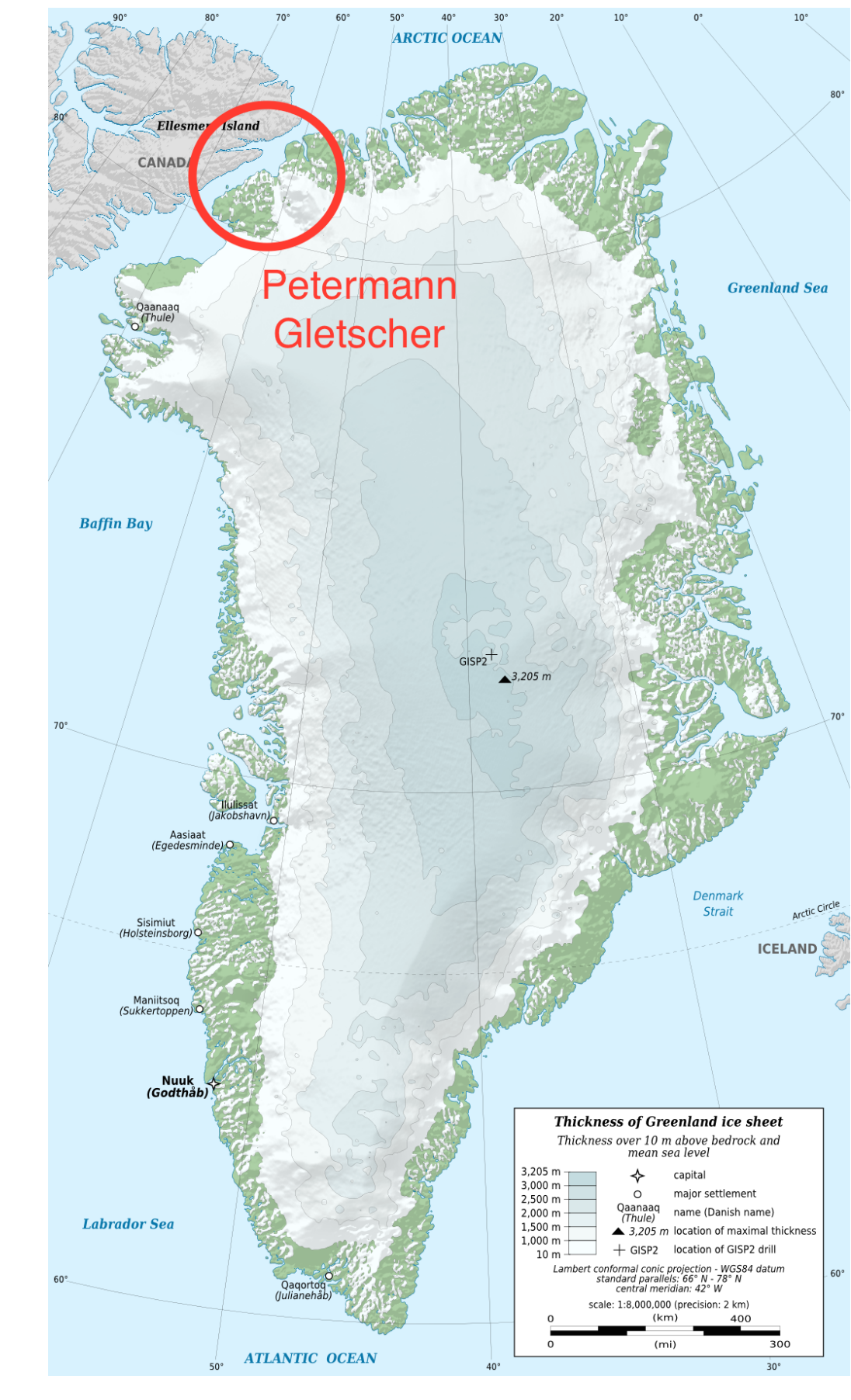


Ocean Observations from Below Petermann Gletscher, Greenland



- Swedish icebreaker Oden visits Petermann Fjord Aug.-2015
- Moorings below ice shelf extend Oden survey data in space + time
- Ice shelf moorings measure ocean properties below floating glacier hourly

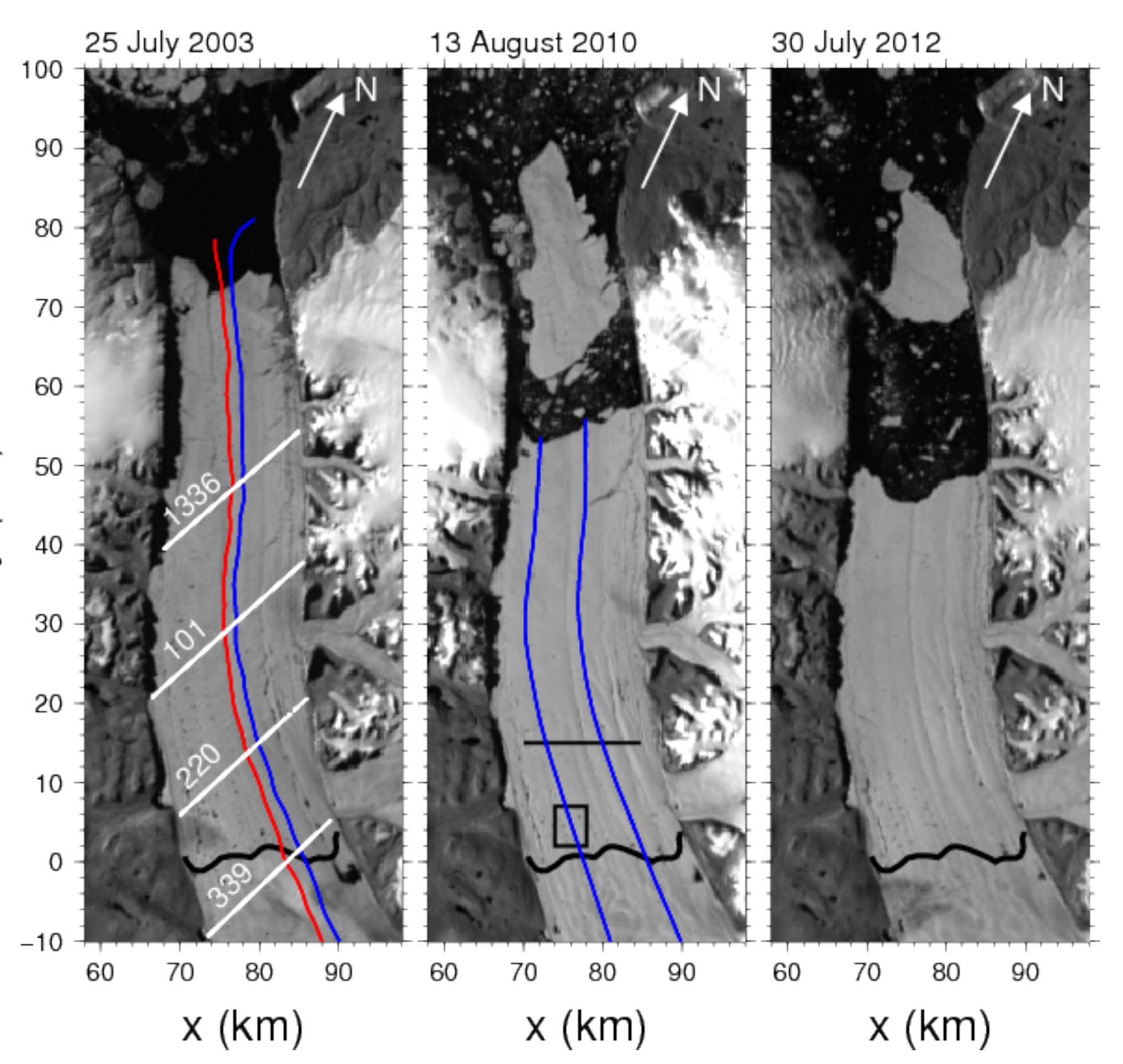
Andreas Münchow	University of Delaware	USA
Keith Nicholls	British Antarctic Service	UK
Céline Heuzé	University of Gothenburg	Sweden
Anna Wåhlin	University of Gothenburg	Sweden
Alan Mix	Oregon State University	USA
Laurie Padman	Earth & Space Research	USA

Data: <http://ows.udel.edu>

Web logs: <http://lcyseas.org>
<http://PolarFever.com>
<http://PetermannsGlacialHistory.wordpress.com>

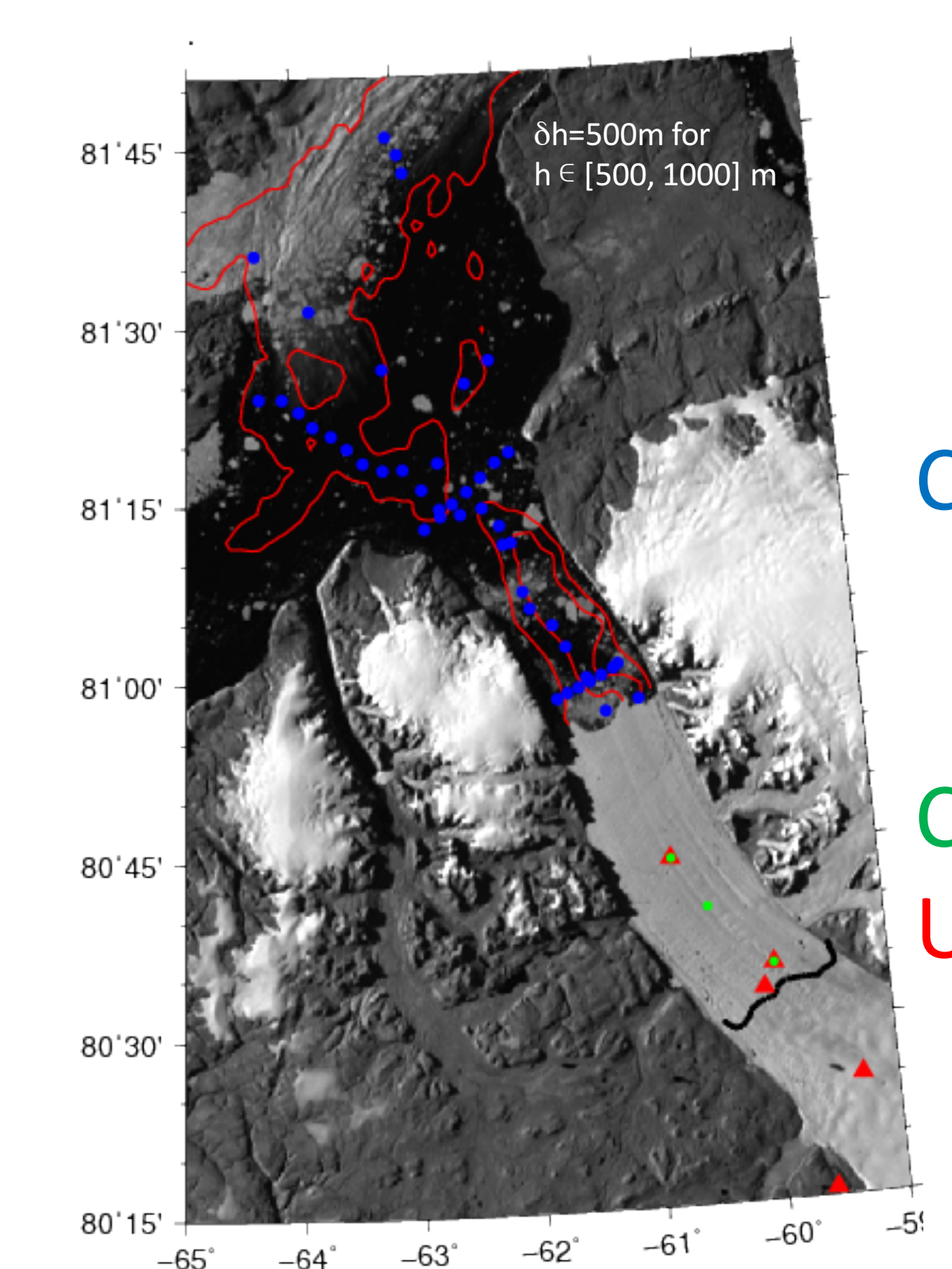
Funded by NASA, NSF, and Swedish Polar Secretariat

Petermann Gletscher

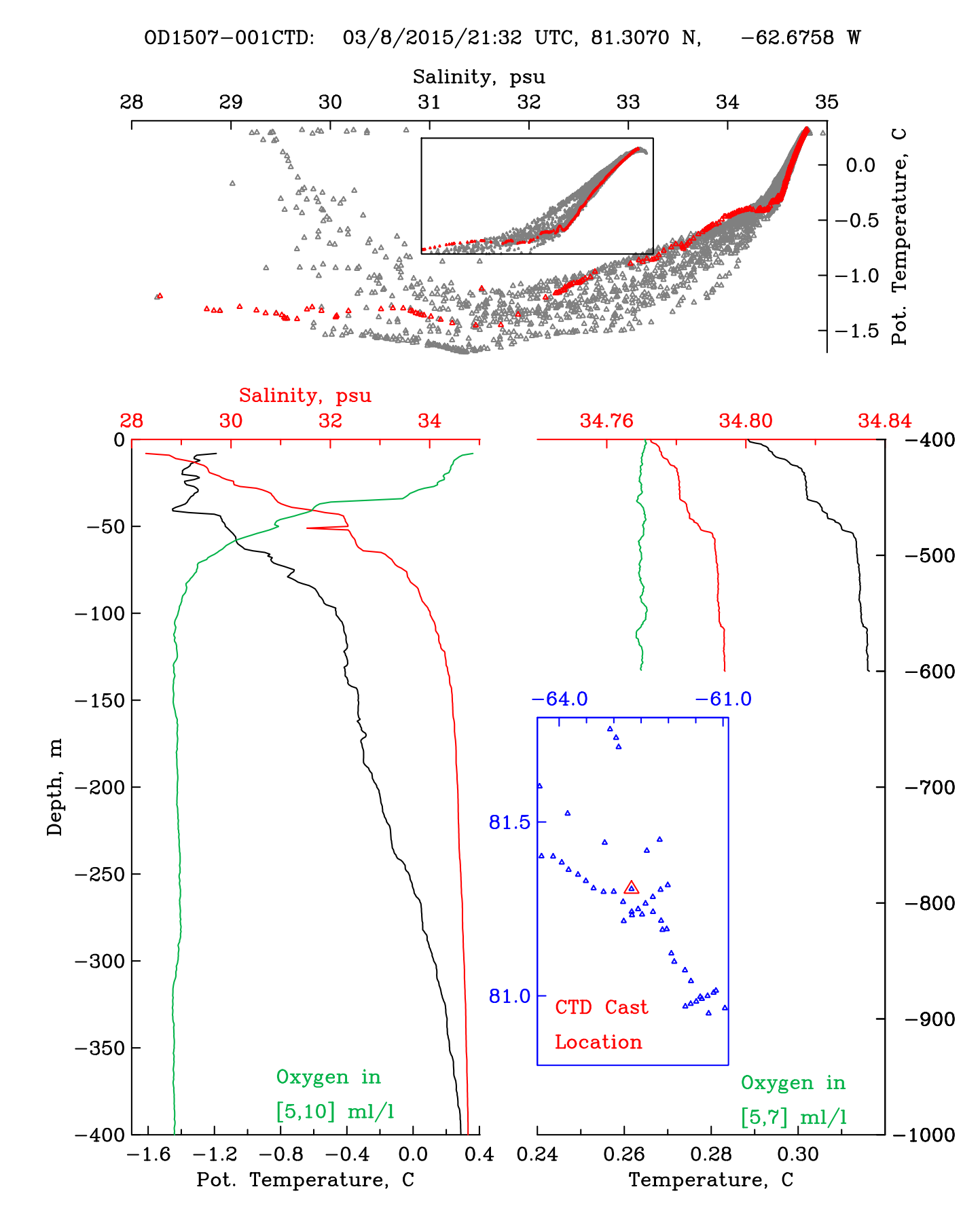


- Drains 4% of the Greenland ice sheet
- Large break-ups in 2010 and 2012
- Fjord mostly ice-free in August
- Warming Atlantic waters fill ocean below floating glacier
- Large temperature and salinity variations near ice-ocean boundary

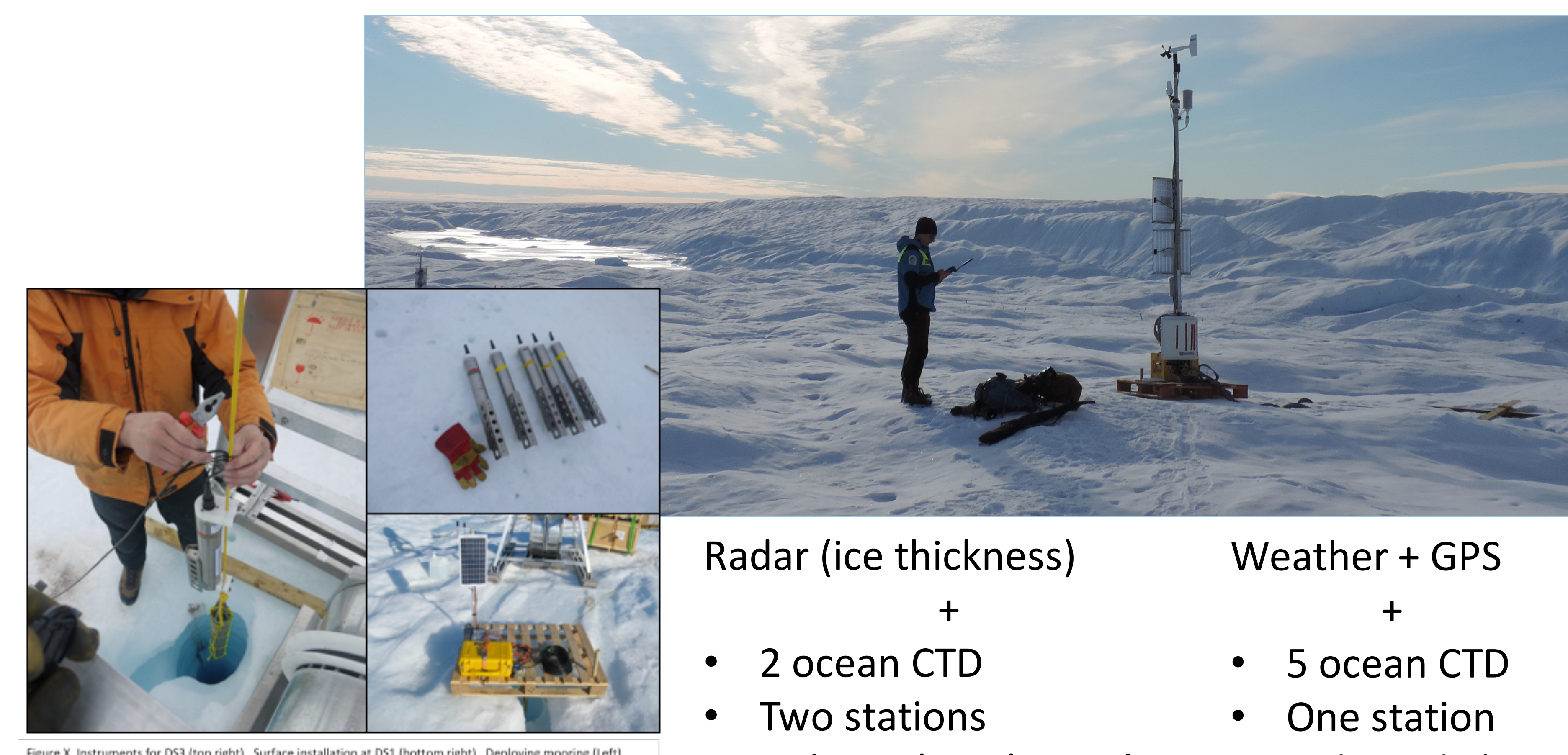
Petermann Fjord and Nares Strait



CTD-ship
CTD-glacier
UNAVCO GPS

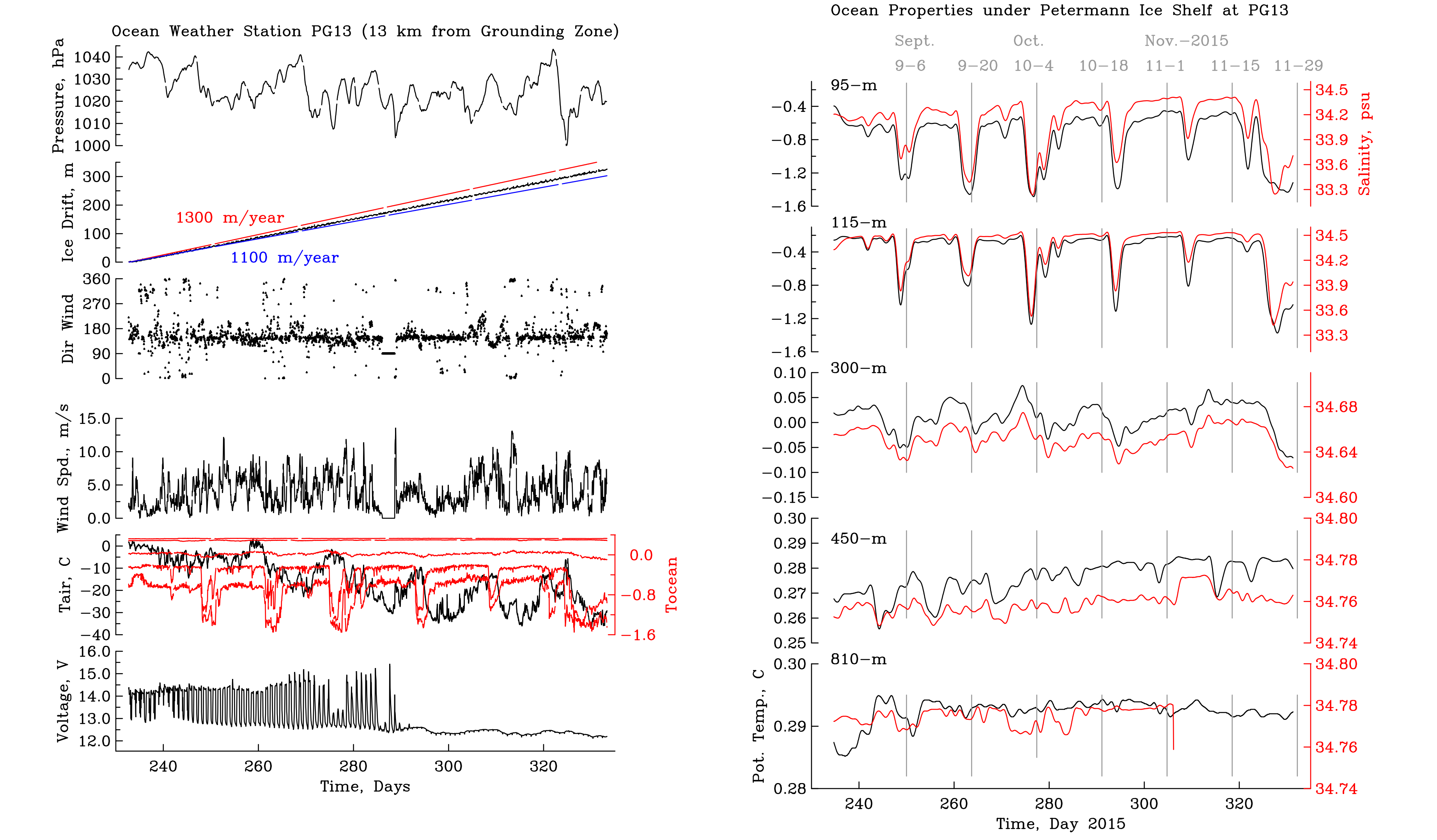


Petermann Ocean Weather Stations

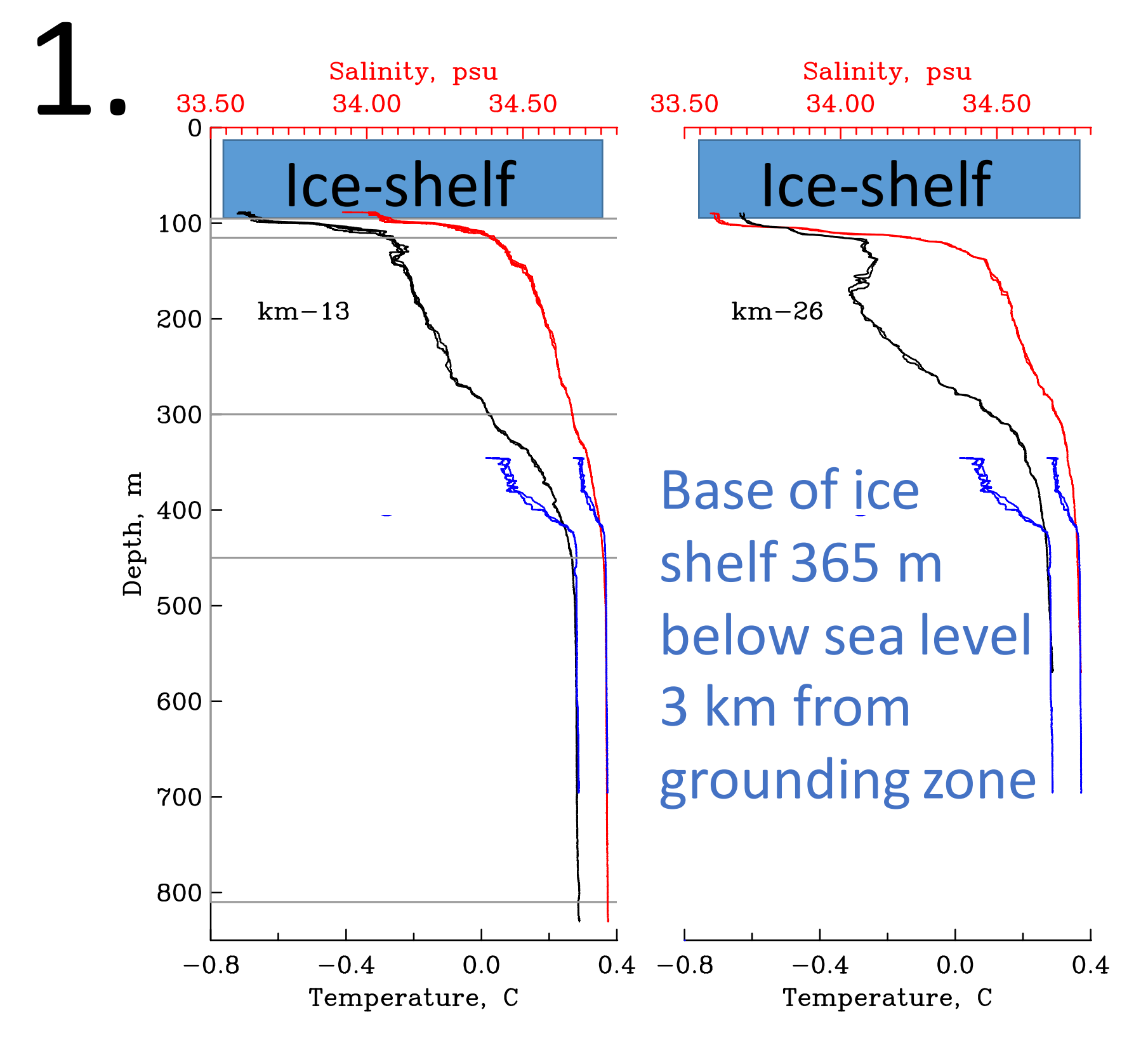
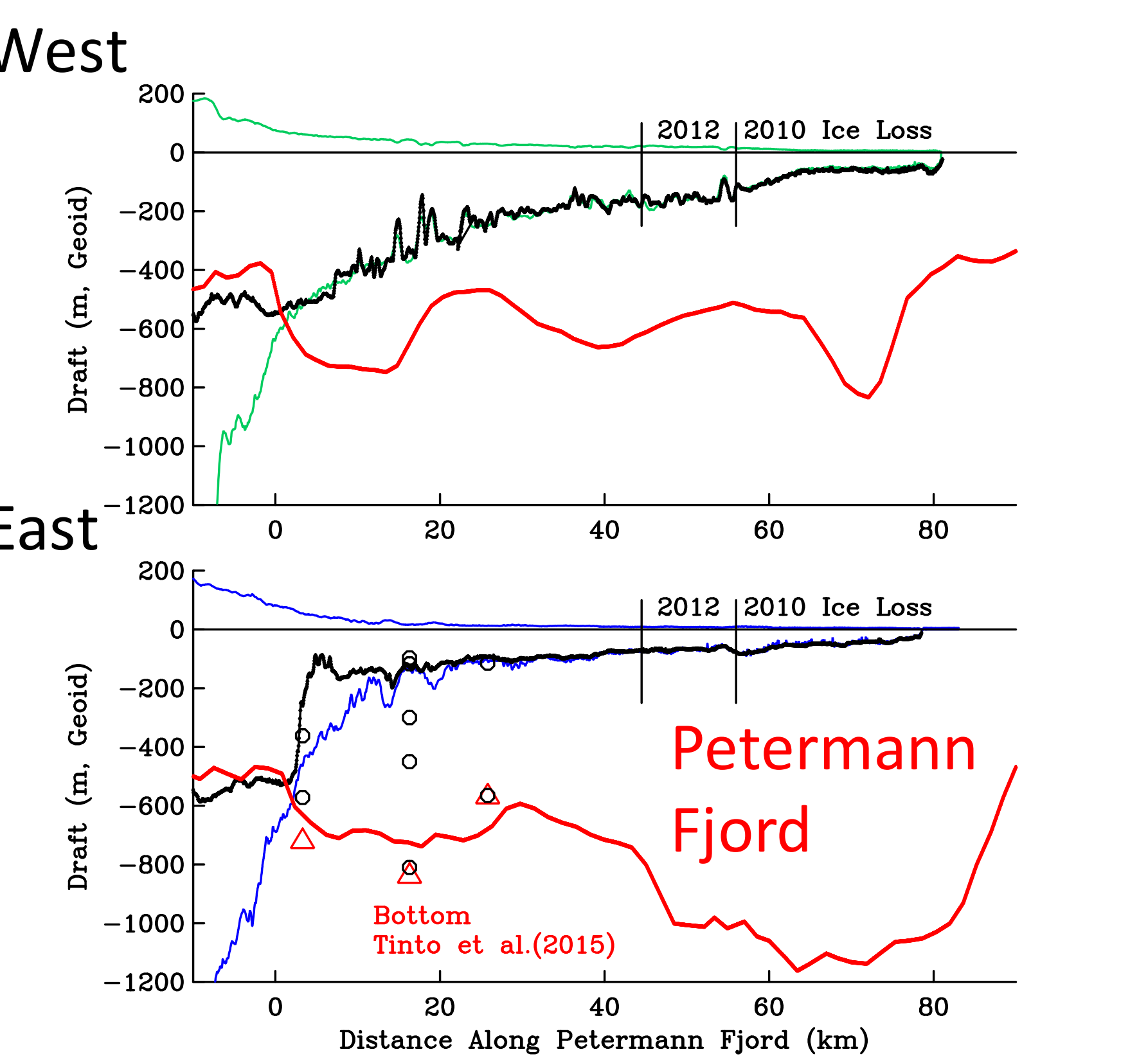


- Radar (ice thickness) + Weather + GPS
- 2 ocean CTD
 - Two stations
 - Iridium short-burst data
 - 5 ocean CTD
 - One station
 - Iridium dial-up

First 100 days of ongoing ocean, air, and glacier properties with last data from Nov.-29, 2015 8:00 am UTC:



- Glacier ice drifts ~ 1190 m/year
- Bi-monthly air temperature maxima
- Down-glacier winds dominate
- ~ 1.2 °C bi-monthly cold pulses
- Strong ocean T-S correlation
- Pulses coincide with neap tide

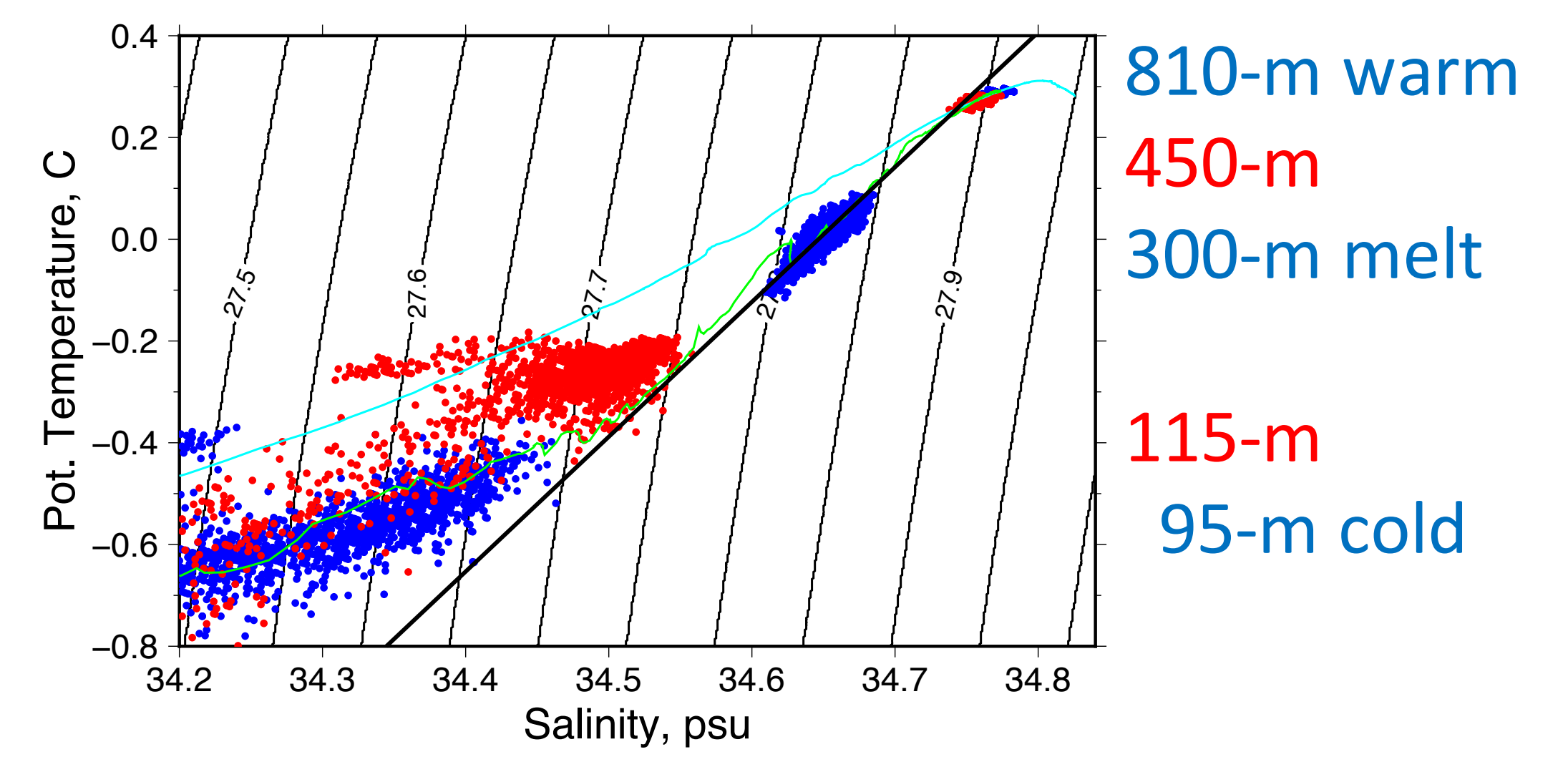
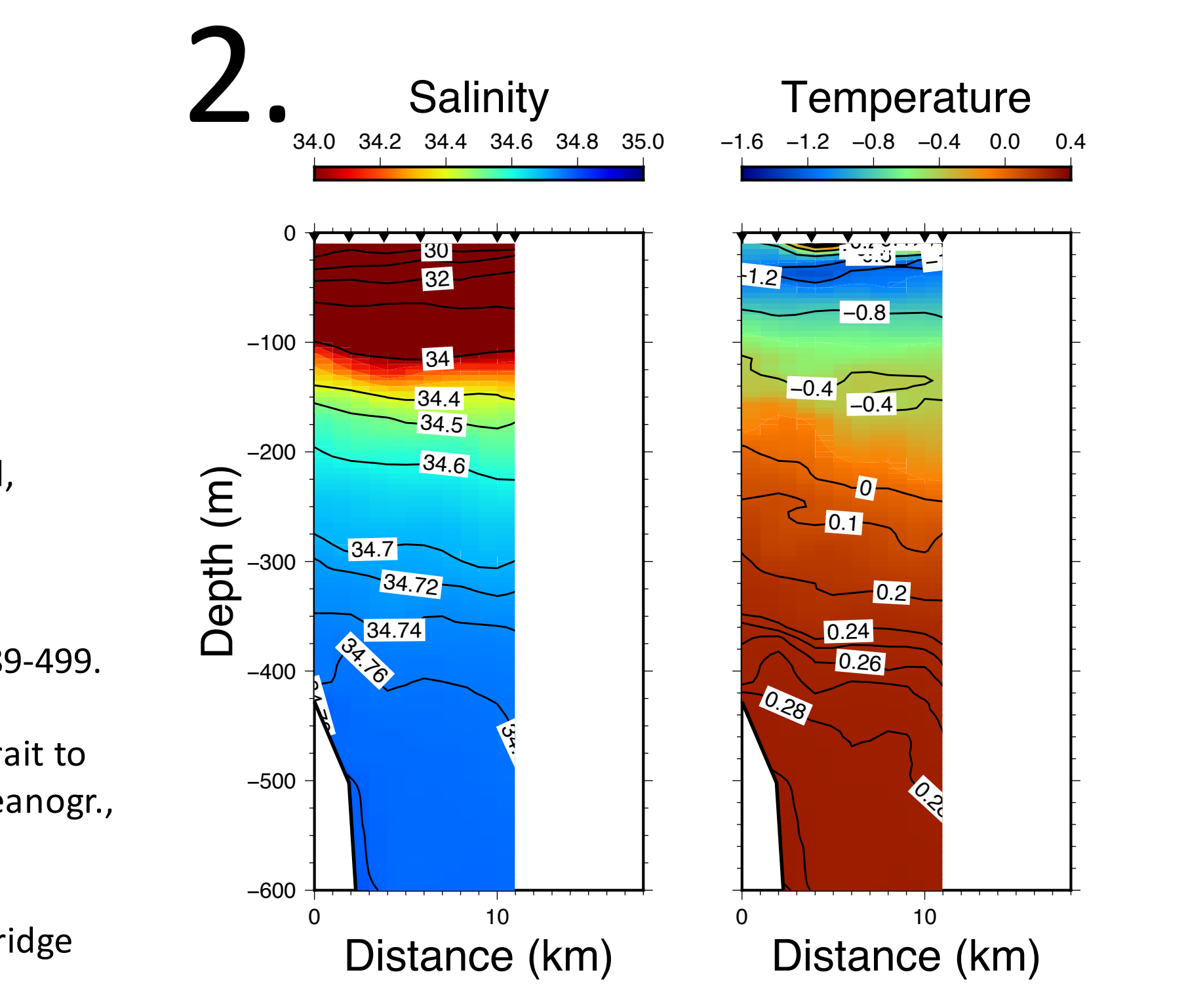


- Ocean surveys August 2015
1. Under floating ice-shelf
 2. Across-fjord at glacier terminus
 3. Along-fjord into Nares Strait
 4. Across-fjord at entrance

Glacier CTD
Ocean Moorings
Ocean CTD
Sections 2. & 4.

References:

- Johnson et al., 2011: Ocean circulation and properties in Petermann Fjord, Greenland. *J. Geophys. Res.*, 116, C01003, doi:10.1029/2010JC006519.
- Münchow, A. et al., 2014: Interannual changes of the floating ice shelf of Petermann Gletscher, North Greenland from 2000 to 2012. *J. Glac.*, 60, 489-499.
- Münchow, A., 2015: Volume and freshwater flux observations in Nares Strait to the west of Greenland at daily time scales from 2003 to 2009. *J. Phys. Oceanogr.*, in press.
- Tinto, K. et al., 2015: Bathymetry in Petermann fjord from Operation IceBridge aerogravity. *Earth Plan. Sci. Lett.*, 442, 58-66.



- Mooring data: red/blue symbols
- Survey data: green/azure lines
- Ocean density: thin black line
- Glacier-Ocean mixing: thick black line

