TEACHERS AND RESEARCHERS EXPLORING AND COLLABORATING

POLAR TREC

Welcome to *PolarConnect*

15th Joint Ocean Ice Studies (JOIS) 2017 aboard the CCGS Louis S. St. Laurent

With PolarTREC Teacher Dave Jones

& Team Researcher Mike DeGrandpre

1 November 2017

Getting to Know Adobe Connect

Slides will be shown here

Exit presentation

Mute your speakers

Raise your hand

List of all participants

Follow the chat

Find out more about the presentation

Chat here

Participant Introductions

In the Chat box, please introduce yourself by typing in your:

- ✓ Name
- ✓ School or Institution
- ✓ The number of students and adults participating with you in the same location

What is PolarTREC?

- Since 2004, the Arctic Research Consortium of the United States (ARCUS), a non-profit organization, has been administrating the PolarTREC Program.
- PolarTREC is professional development for K-12 teachers. They are paired with researchers for 2-6 week research experiences in the polar regions.
- Over 150 teachers from around the United States have joined scientists in the Arctic and Antarctica to learn about science, the polar regions, and to share what they have learned with their students and communities.

ARCUS
ARCTIC RESEARCH CONSORTIUM OF THE UNITED STATES

25 Years of Connecting Arctic Research
www.arcus.org

Questions

During the Presentation:

- Type your question in the text chat box

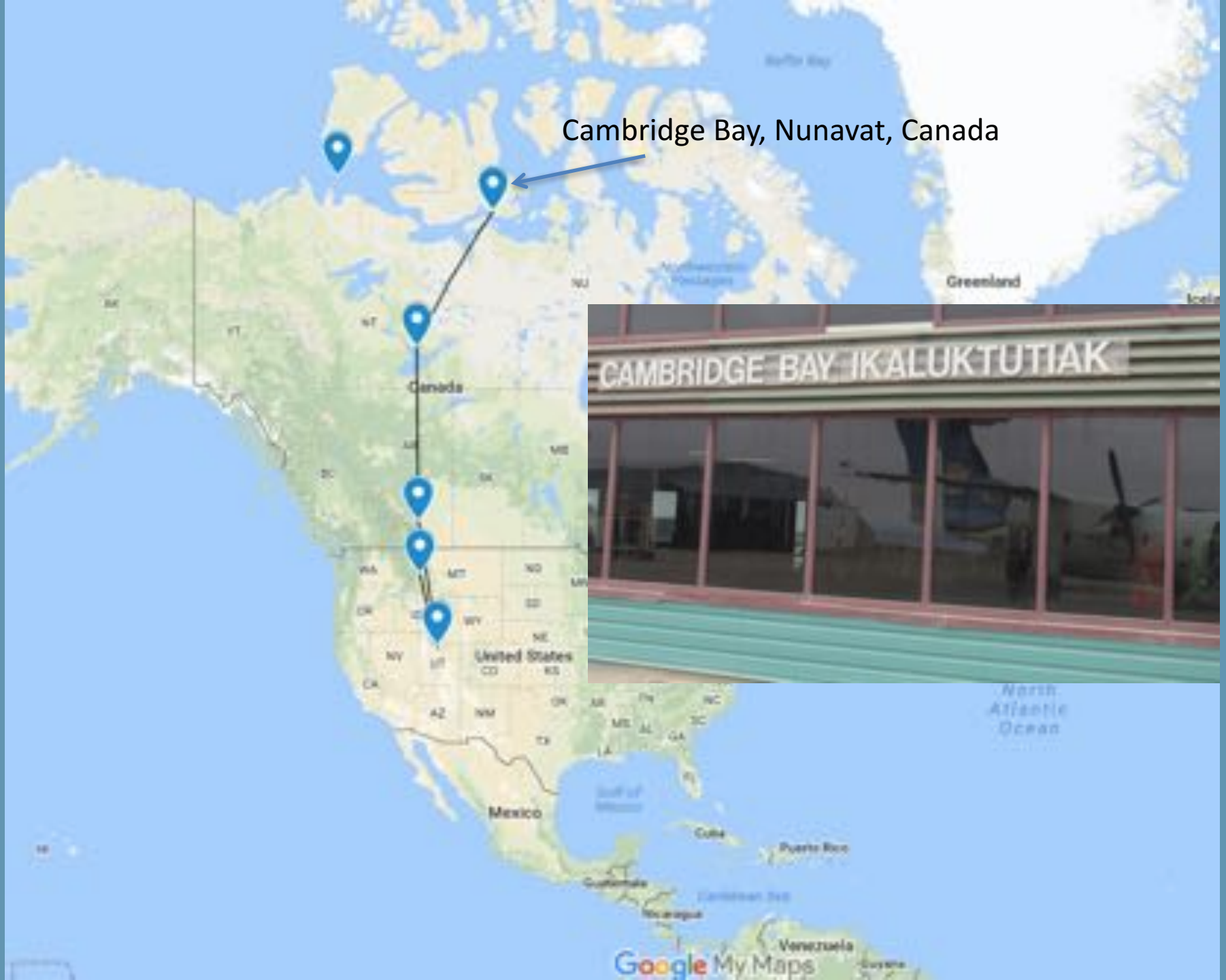
At the End of the Presentation, two options:

1. Type your question in the text chat box, or
2. Raise your hand with the "hand button".

- PolarTREC staff will call on you and activate your microphone.
- Speak loud and clear, directly into the computer microphone or the phone to ask your question.

*Arctic Observing Network (AON) – Beaufort Gyre Observing System (BGOS)

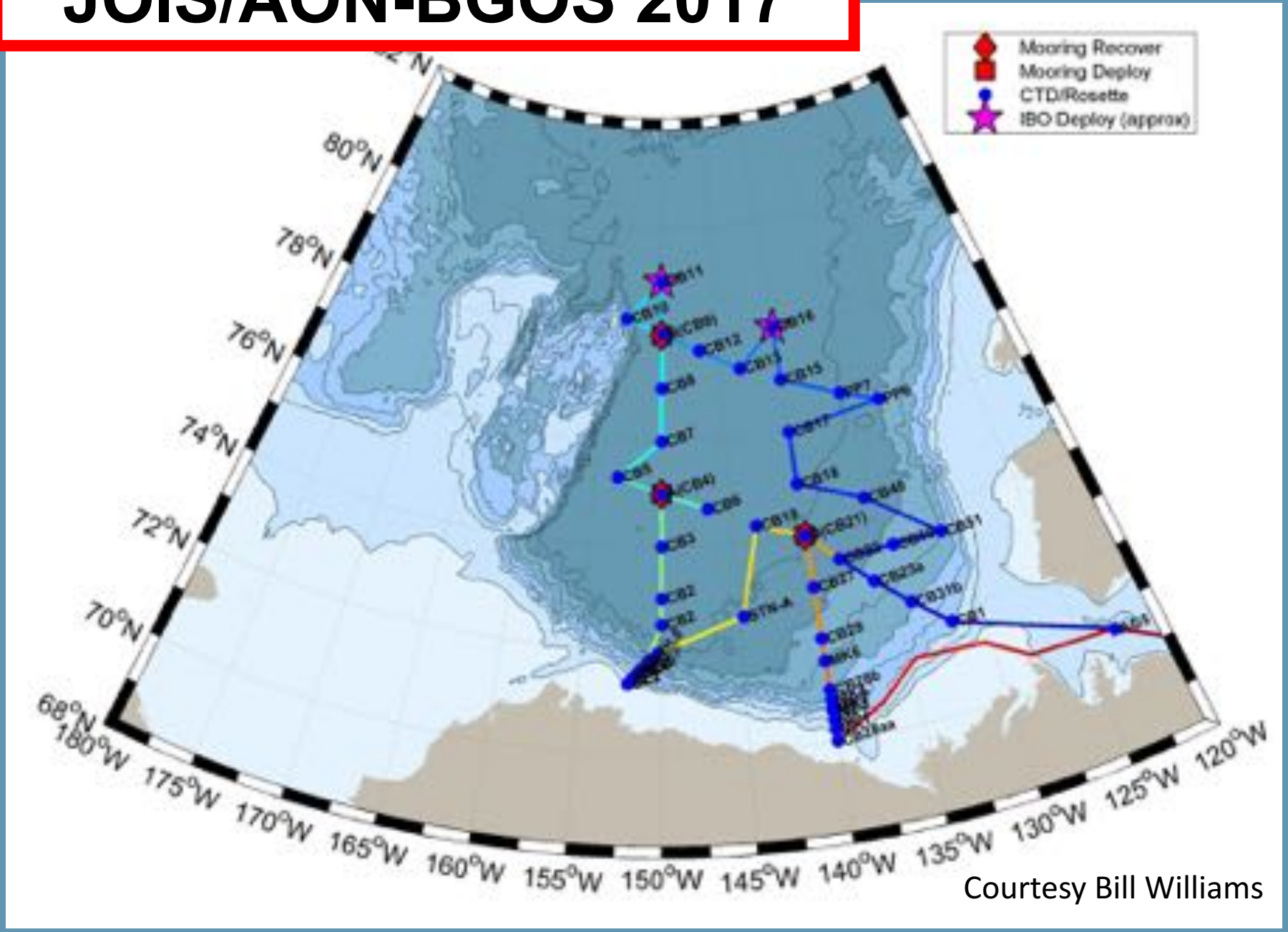
*CO_2 and pH Studies of the Arctic Ocean


Cambridge Bay, Nunavat, Canada
CAMBRIDGE BAY IKALUKTUTIAK
Greenland
Canada
United States
Mexico
Google My Maps

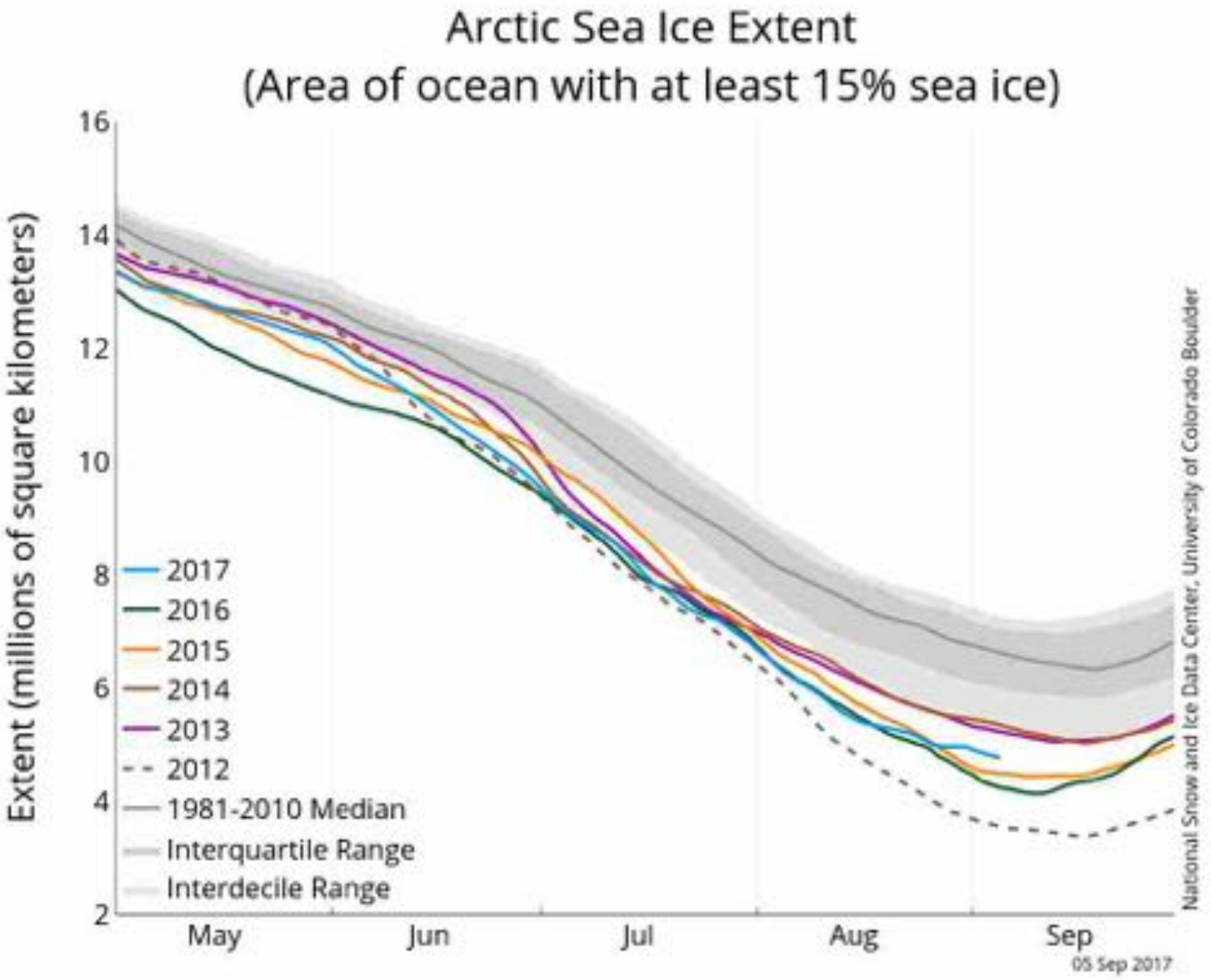
Home for 4 weeks!

Photo: Mary-Louise Timmermans

JOIS/AON-BGOS 2017



Courtesy Bill Williams


Arctic Sea Ice Extent
(Area of ocean with at least 15% sea ice)
Extent (millions of square kilometers)
16
14
12
10
8
6
4
2
2017
2016
2015
2014
2013
2012
1981-2010 Median
Interquartile Range
Interdecile Range
May
Jun
Jul
Aug
Sep
05 Sep 2017
National Snow and Ice Data Center, University of Colorado Boulder

Courtesy of Jasmine Wietzke

CTD Rosette Casts

Electronic measurement
of:

Temperature
Salinity
Pressure (depth)
Chlorophyll fluorescence
Transmission (water clarity)
Nitrate
Photosynthetically Active Radiation

24 Niskin bottles can be closed at chosen depths
to collect water samples.

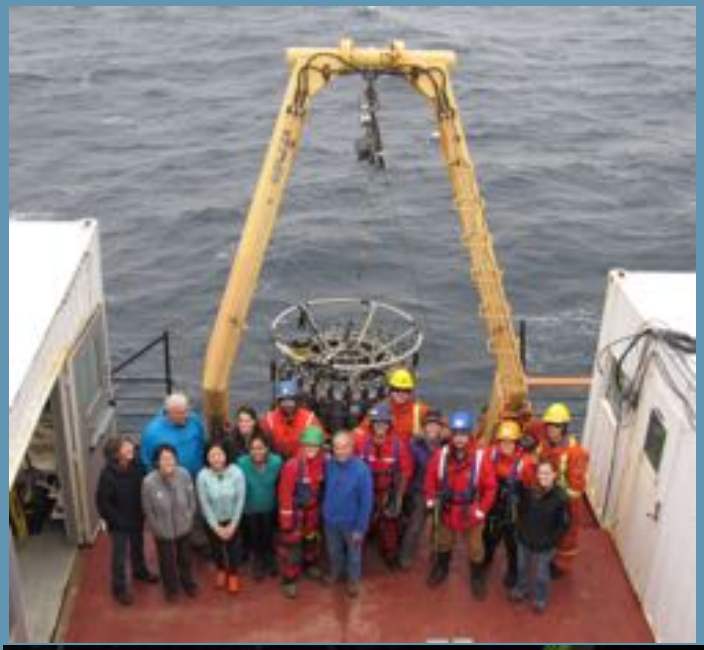


Photo by Gary Morgan

Water samples from the Rosette:

Dissolved Oxygen

DNA/RNA

N_2O

DIC/Alk

Chl a

Bacteria

Micro-plastics

CDOM

Nutrients

Salt

Oxygen-18

Barium

Ammonium

Iodine-129

Caesium-137

Courtesy Bill Williams

Bongo Nets

*Sample for Zooplankton and other biota

* Lowered to various depths usually no more than 1000 meters

Ice Operations

Ice Tethered Profiler (ITP) deployment

*left in situ and not recovered

Ice Characterization Survey

*done on ice during ITP deployment

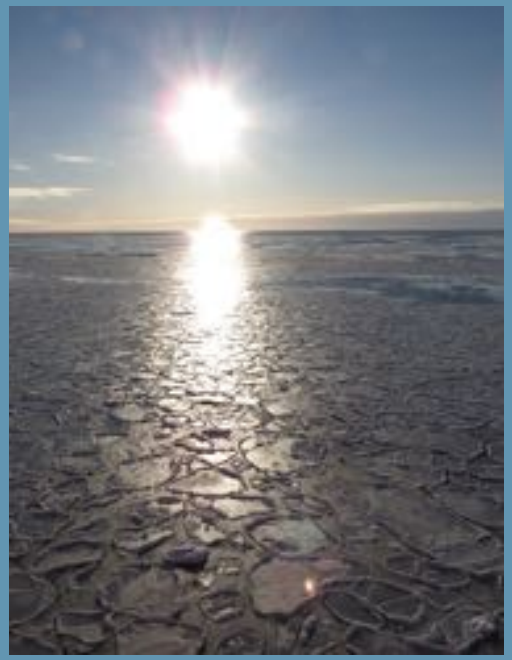
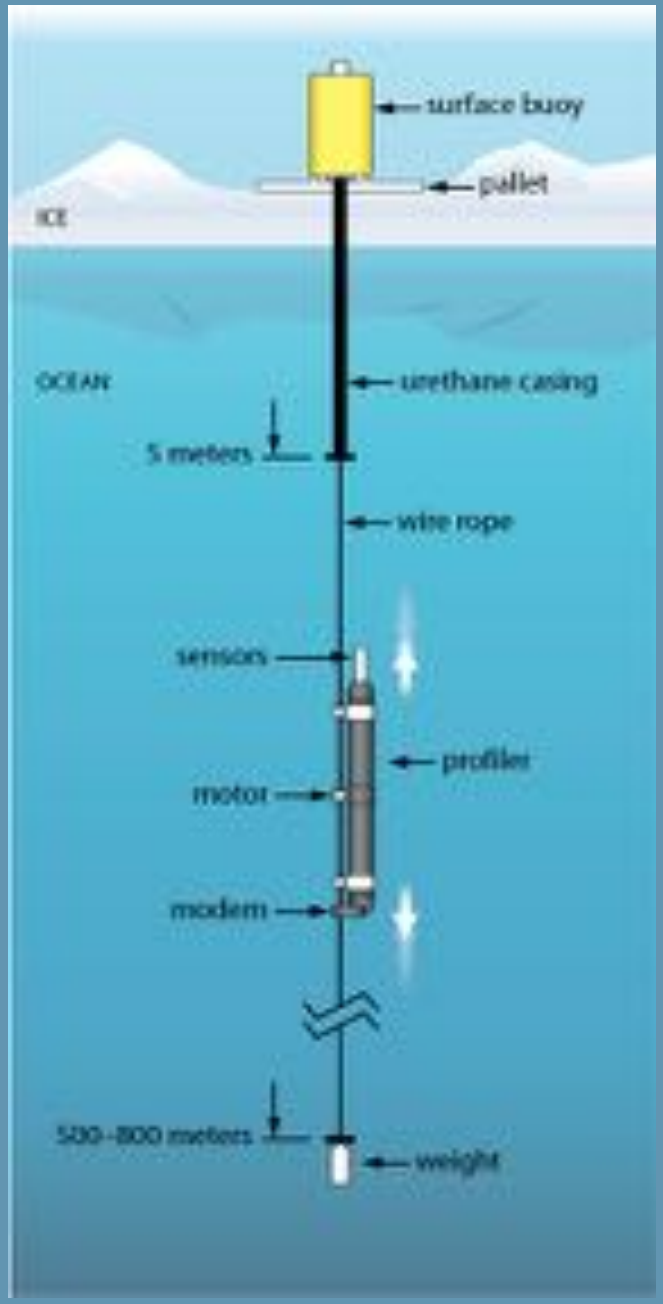


Photo by Mike DeGrandpre


Coast Garde
Guard côtière



Ice-Tethered Profiler

Sensors: temperature, salinity and O2 now, prototypes with fluorometer, OBS, PAR, with a MAVS current probe.

Data acquisition: 2-4 profiles per day between 10 and 760 m.

Real-time data telemetry:
Inductive modem profiler -> surface
Iridium from surface -> lab

Duration: 3 years (1.5 million meters)

http://www.whoi.edu/itp

Courtesy of Rick Krishfield

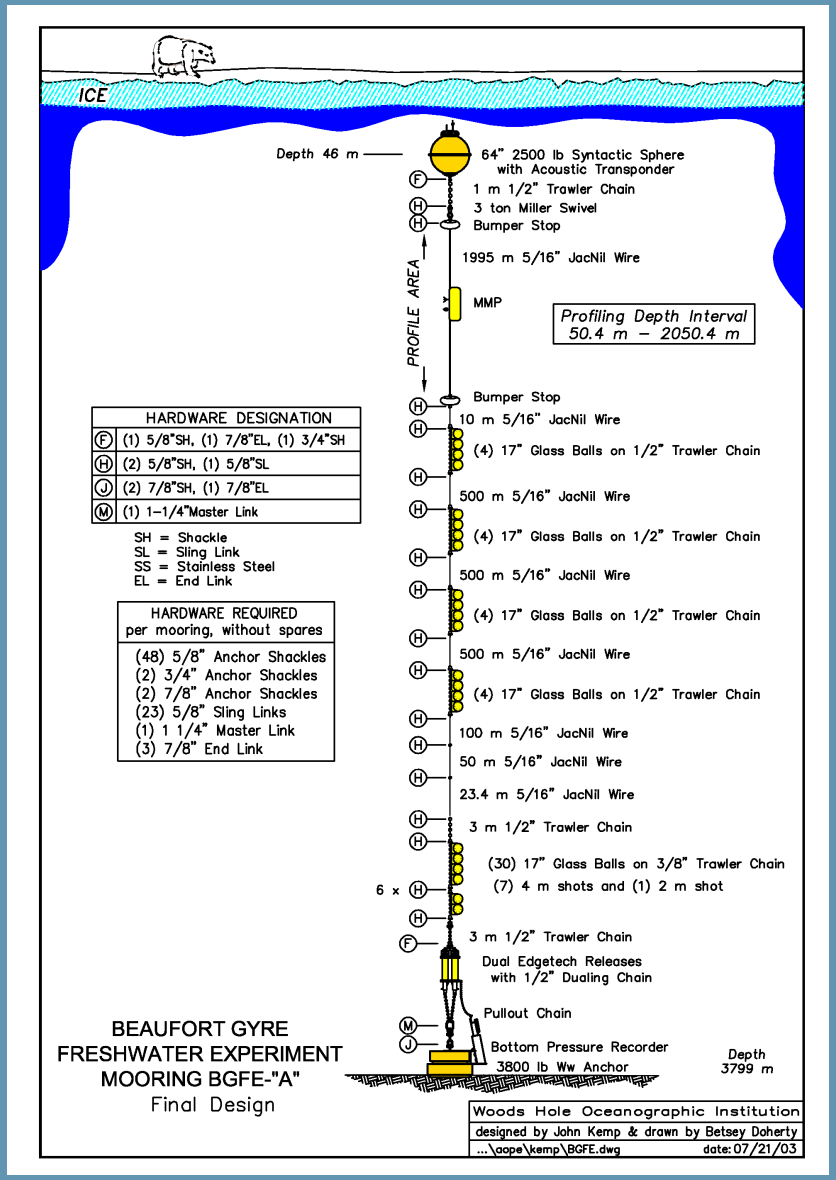
Photo by Gary Morgan

Photo by Gary Morgan

Mooring Operations

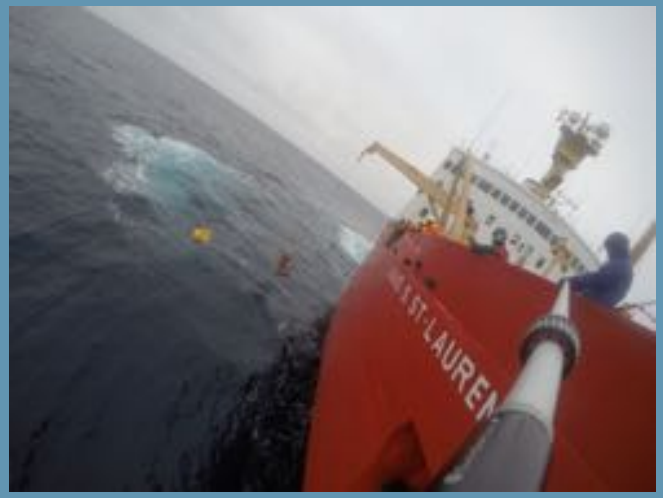
Recovery and redeployment of sea floor anchored buoys and associated instrumentation

Moorings



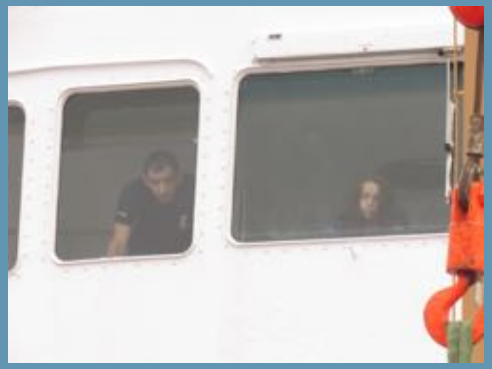
- Top float (2500 lb. buoyancy) with Upward Looking Sonar (ULS) and Transponder ~50m below surface.
- McLane Moored Profiler (MMP) on 2000 m wire.
- Dual Edgetech releases.
- Bottom Pressure Recorder (BPR) on 3800 lb. anchor (3700-3800 m deep).

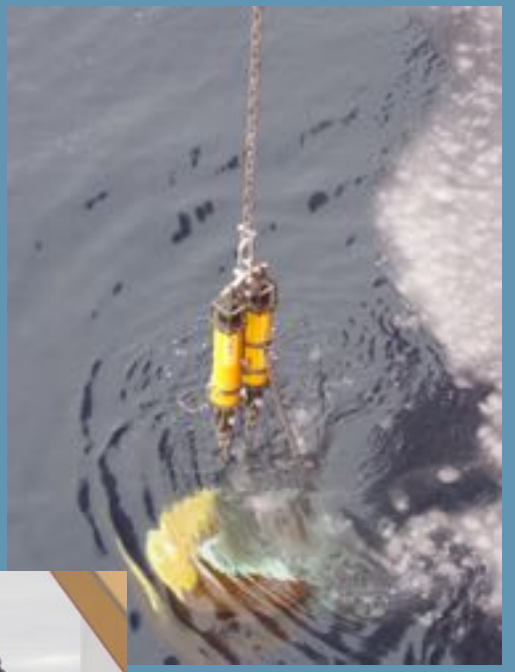
Courtesy of Rick Krishfield

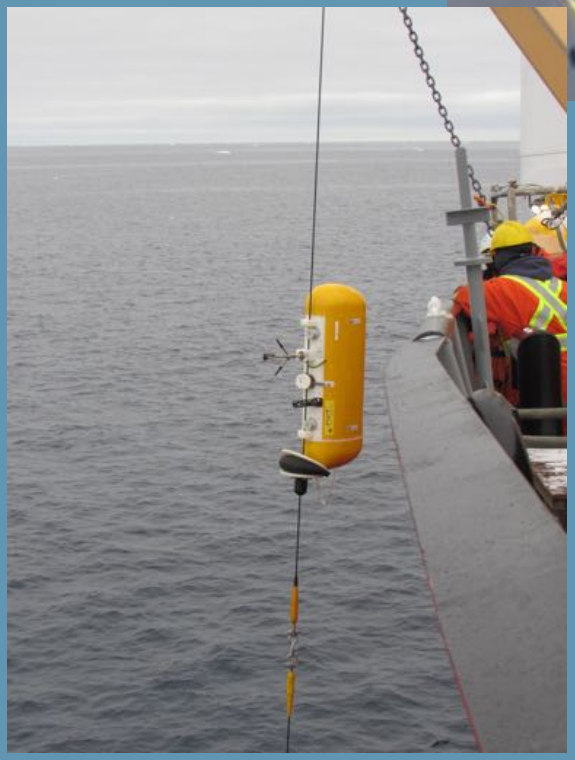


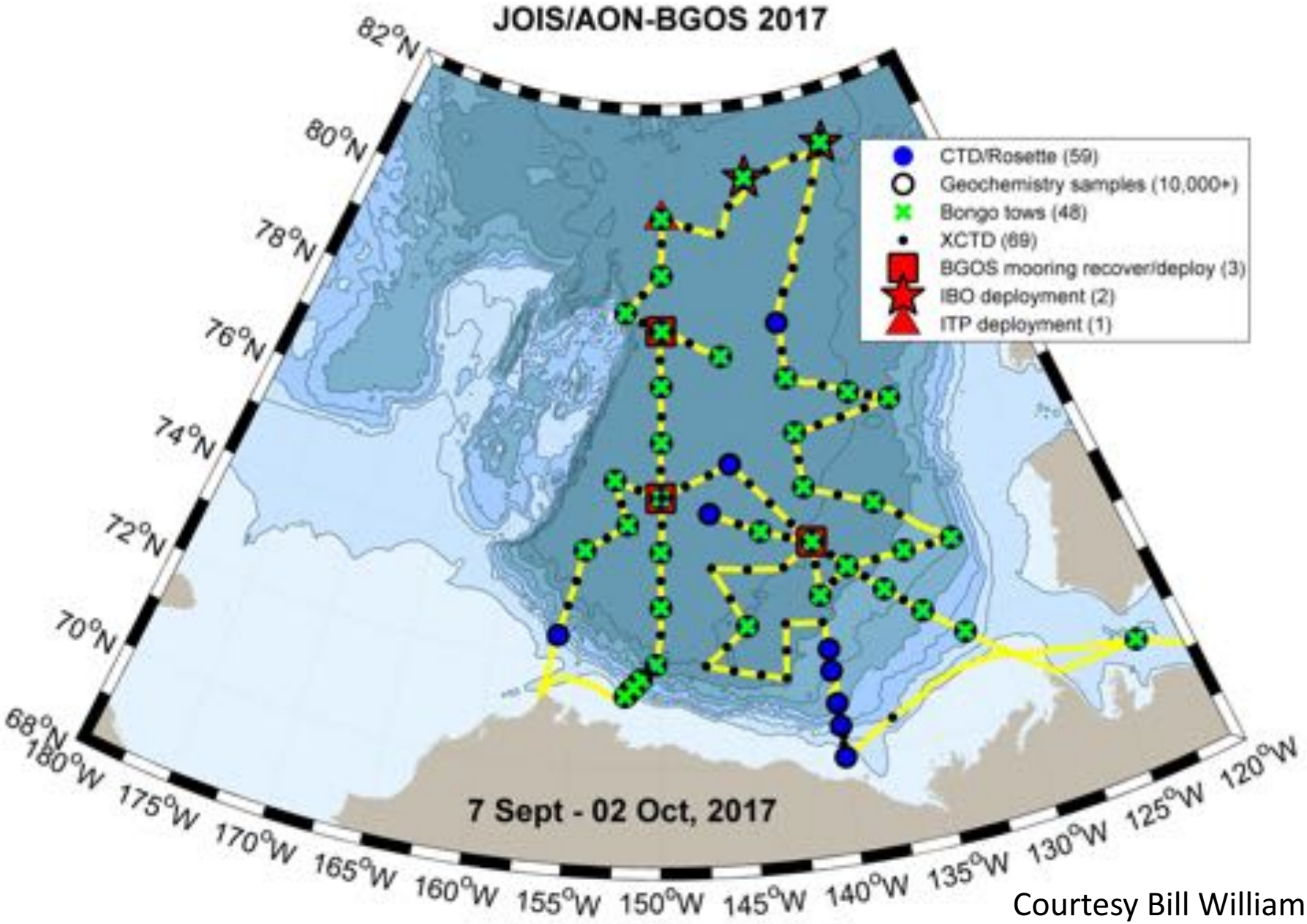
SAMI: **S**ubmersible **A**utonomous **M**oored **I**nstrument

* Measures and logs pH or pCO_2 in marine and freshwater environments over long periods (12 months +)
*Developed by Mike DeGrandpre
*Produced by Sunburst Sensors in Missoula, Montana.
*Winner of Wendy Schmidt Ocean Health XPRIZE









Courtesy Bill Williams

What has been learned in 15 years:

*Liquid fresh water in the BG in summer has increased

-2016 absolute maximum of 25,100 cubic km was reached

- 6500 cubic km over climatology of the 1950s-1980s.

*Ice depth and coverage has decreased, while open water fraction has increased

What has been learned in 15 years:

*Ocean Acidification in BG surface water has increased (pH has decreased)

*decreased aragonite (calcium carbonate) from 2008 forward

*The deeper BG water is also under-saturated in aragonite.

- coincide with reduced sea-ice extent (~30%), increased sea-ice melt (~30%), and increased anthropogenic CO_2 (~40%)

Join PolarTREC!

www.polartrec.com/about/join

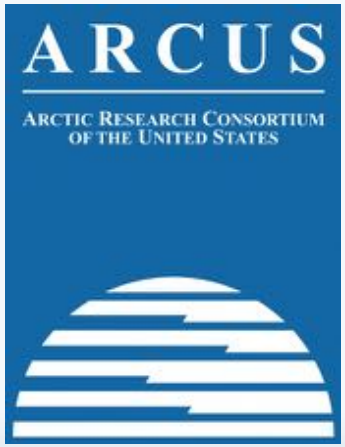
Everyone can participate in different ways:

- **Follow Expeditions**
- **Participate in PolarConnect Events**
- **Join the Polar Education Email List**
- **Check out the great resources**
- **Become a PolarTREC Teacher or Researcher**
- **Become a member of ARCUS**

Thank You!

An archive of the event will be available shortly.

http://www.polartrec.com/polar-connect/archive



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