

Welcome to *PolarConnect*



Seasonal Changes in the Sea Ice on the Ross Sea

With PolarTREC Teacher: Jennifer Bault

& Team Researchers Drs. Hongjie Xie, Yongli Gao & Stephen Ackley

Thursday, Nov. 2nd 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



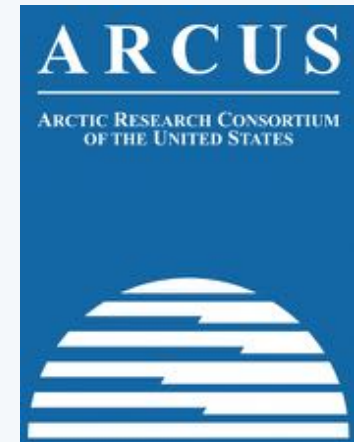
Participant Introductions

**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 administering 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.



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.

Welcome to Antarctica!



Meet the Team

Dr. Yongli Gao, Dr. Pat Langhorne (NZ), Dr. Hongjie Xie

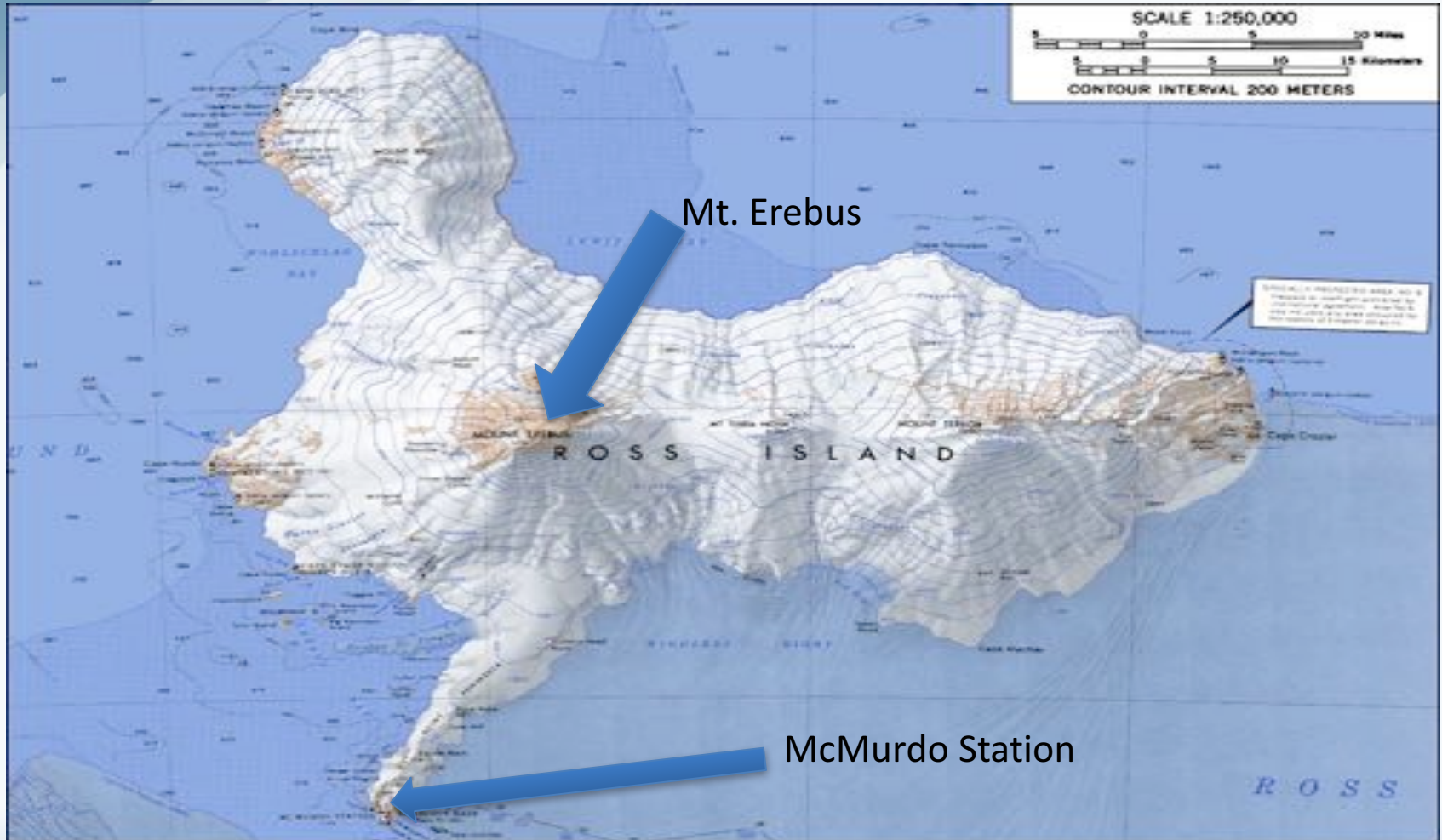


Antarctica, the frozen continent

- Southernmost continent
- 5th largest continent at 5.4 million miles², 1.5x the US
- >95% is covered in ice
 - 90% of Earth's ice is found here
- Windiest continent,
 - speeds >200mph have been recorded
- 1000-5000 human inhabitants work/study on Antarctica



Ross Island



McMurdo Station



Getting to McMurdo

C-17

Air Force Cargo Plane

5 Hour Flight

from Christ Church, NZ



Looking down from
the plane!



Transport Vehicle from Phoenix
Air Field to McMurdo



Life in McMurdo



Photo by Elaine Hood



Animals of Antarctica



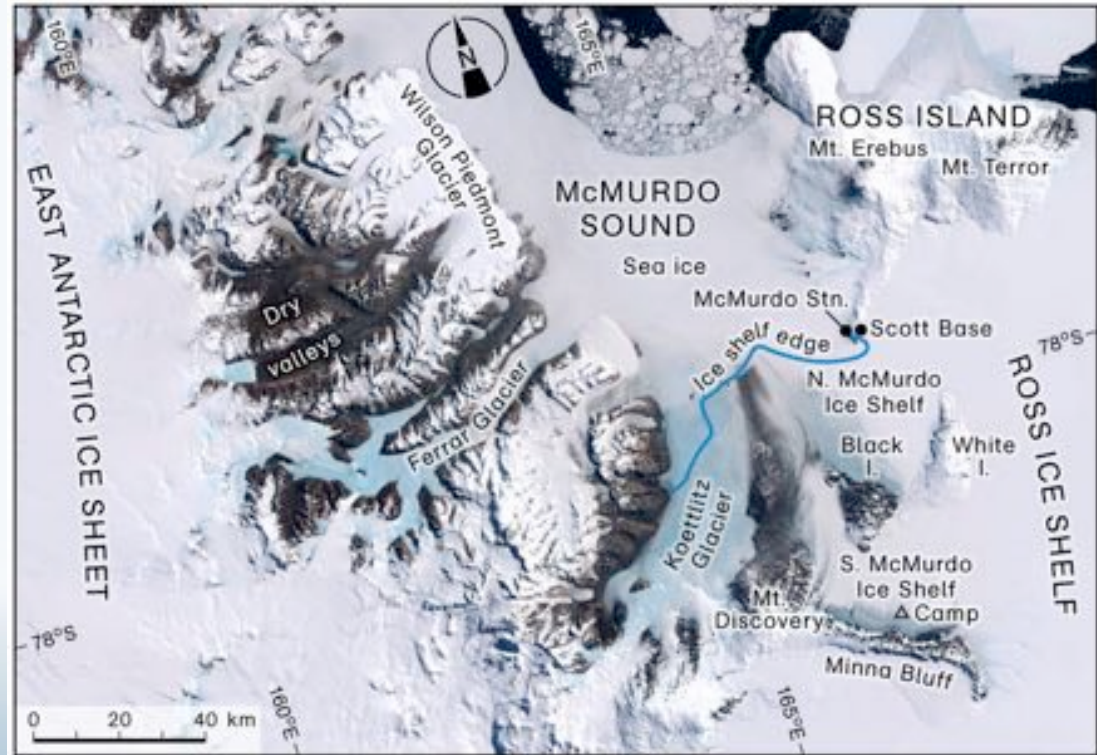
Penguin photos by Greg Neri

What is an Ice Sheet?

- An ice sheet is a mass of ice that covers more than 20,000 m² of land
- There are two ice sheets: Antarctica and Greenland (there were more during the ice age)
- 99% of the freshwater ice is contained in these two ice sheets
- Formed when snow doesn't fully melt so it builds up over time and turns into ice

What is an Ice Shelf?

- A thick, floating platform of ice that is attached to a land but extends out into the sea
- Formed from glacial ice or ice sheets flowing down a coastline and onto the ocean surface
- Generally, very thick - 20m to 1000m.



Ice Terminology

- **Sea ice** is any ice that originates from freezing sea water
- **Fast ice** is sea ice that is “fastened” to the land or some anchor point and does not move with wind or currents
- **Pack Ice** is sea ice that moves with wind and currents
- **Polynya** is an open area of water in an area of pack ice

**Data
Collection
Site**

Pack Ice

Polynya

Fast Ice

Ice Shelf



McMurdo Station

What are we doing in Antarctica?

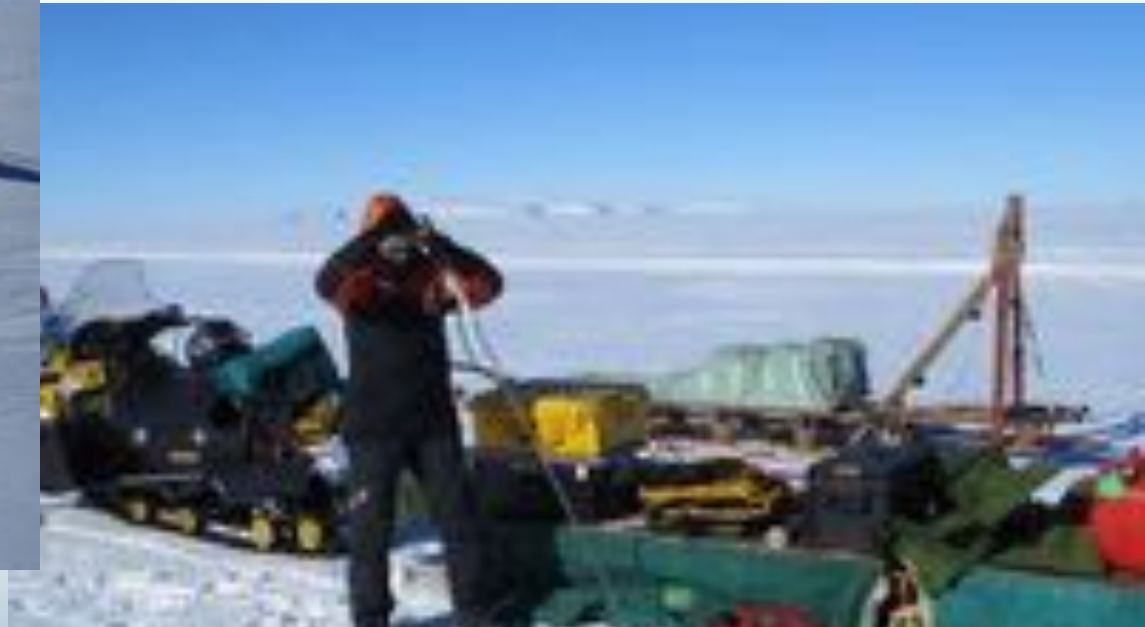
- Measuring sea ice (fast ice) thickness
 - data show increases in sea ice extent, duration, and concentration but it is not known how ice thickness, and thus volume, has changed
 - If sea ice production has increased, where and why?
 - Lack of in situ (actual field measurement) data in Ross Sea, our mission seeks to change this
- Ground Truthing
 - ensuring measurements from above (LC-130, Ice Pod Flights) match what is actually measured in the field
- Ice Pod Flights

Field Site

Sea Ice we are standing on
is approximately 2 meters
in thickness!

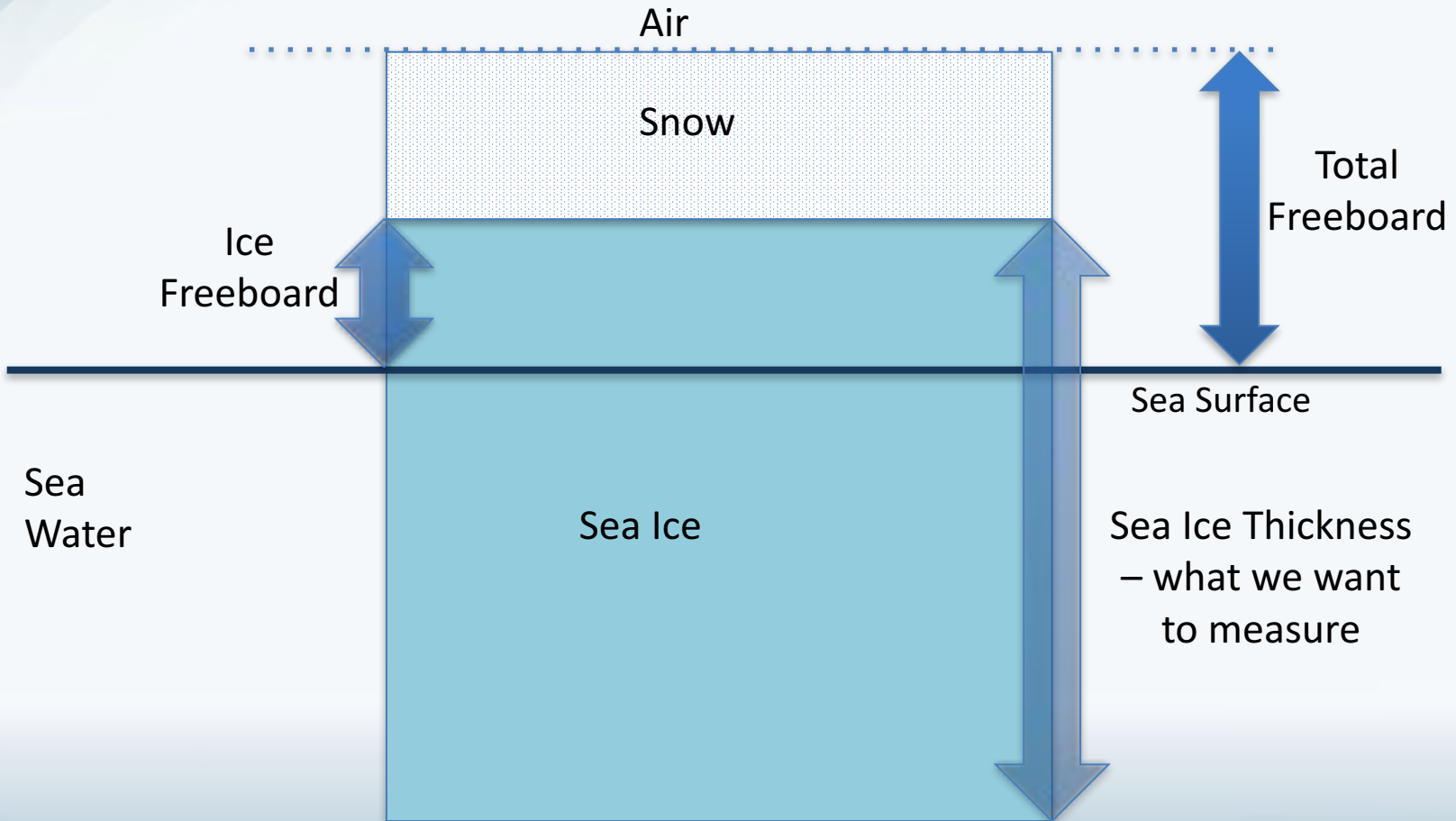


Mt. Erebus in the
background



Measuring the Ice

Freeboard – section of ice and snow above water

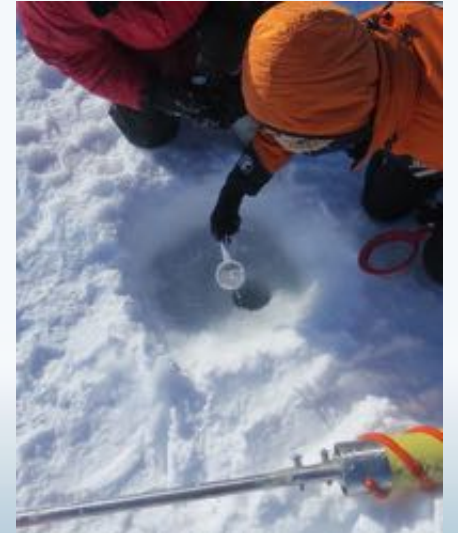


Drilling for Ice Cores

(video)



Fun In the Field!



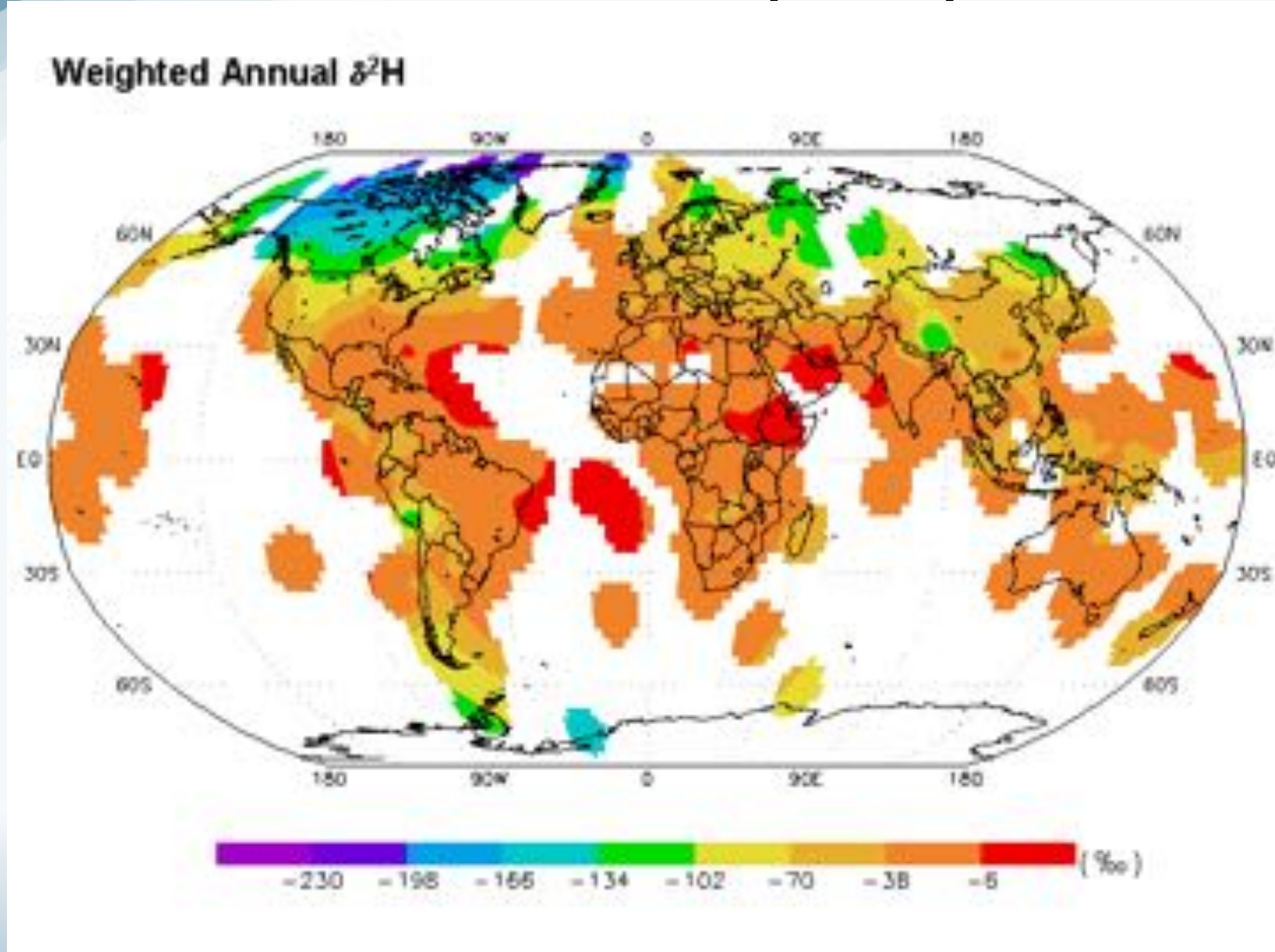
Ice Cores

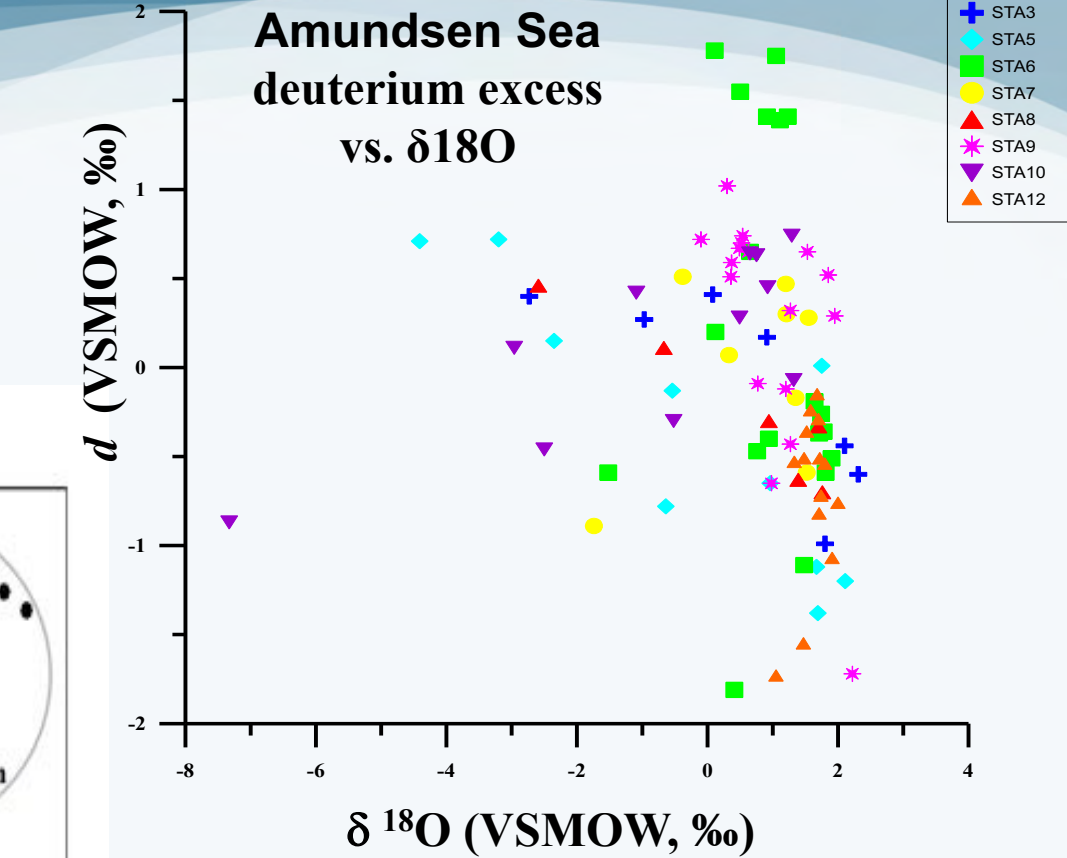
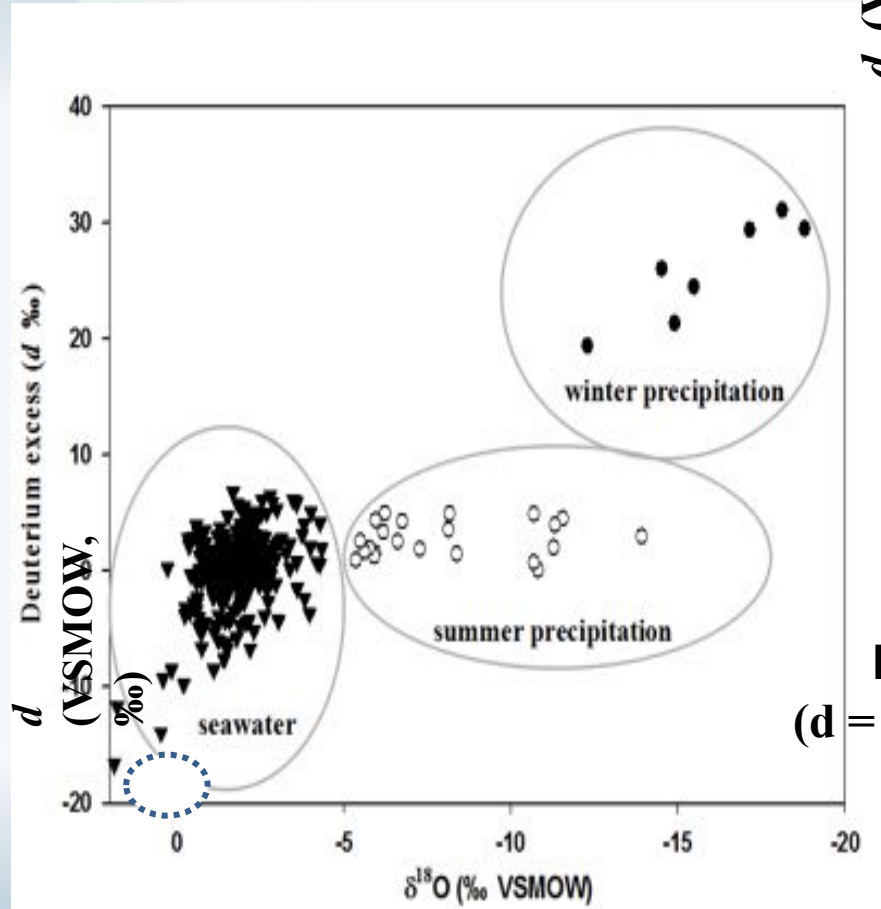


Lab Work on Ice Cores

- In the lab, following field measurements
 - Measure and cut ice cores at 10cm lengths
 - Melt ice core pieces
 - Measure salinity
 - Measure oxygen, carbon, uranium isotopes
- After returning home
 - Process data from Ice Pod Flights
 - Get big picture of ice thickness in Ross Sea
 - Compare this with past years

Amount-weighted annual precipitation deuterium (IAEA)



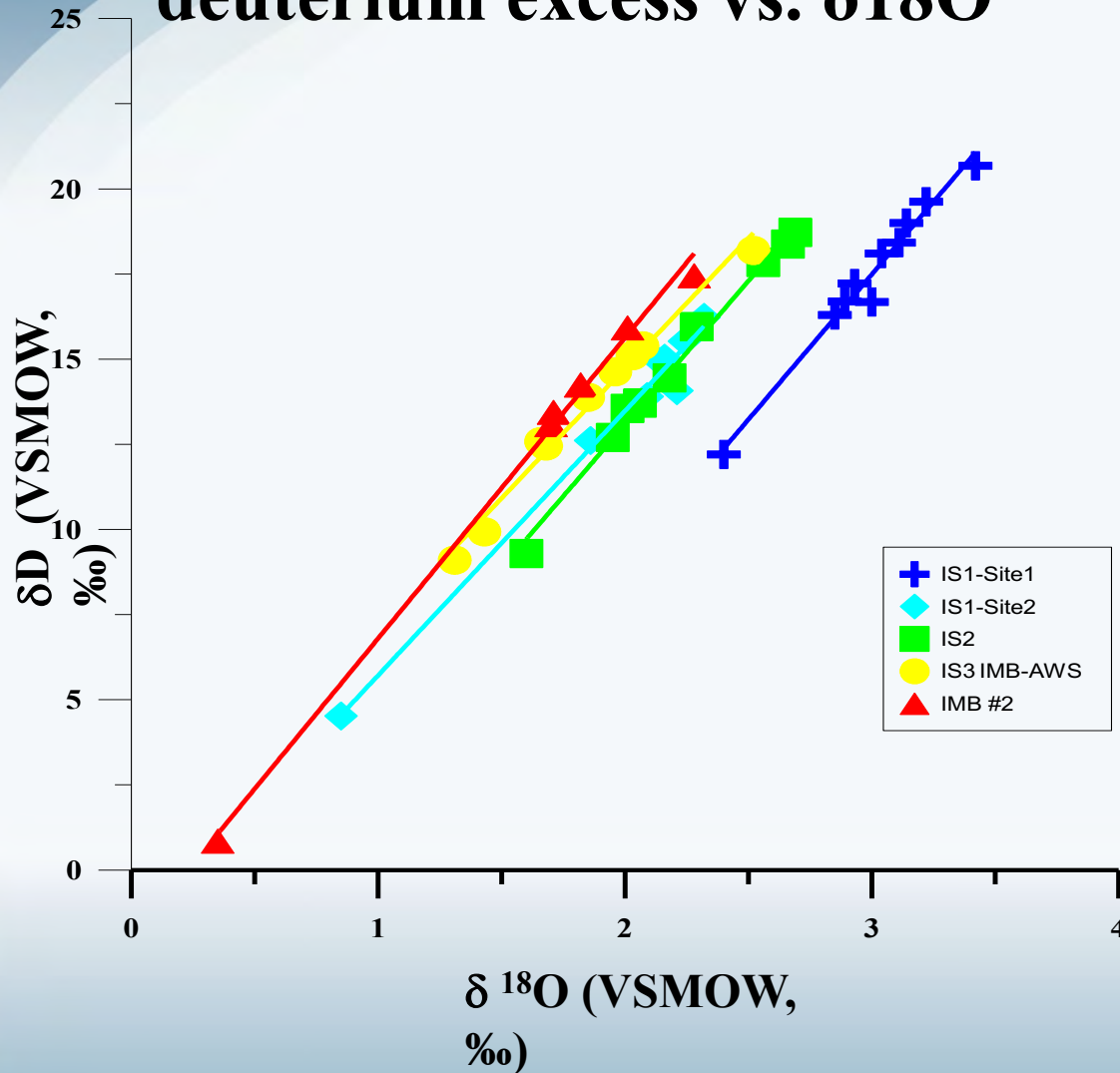


Arctic Sea Ice Deuterium excess

$(d = \delta\text{D} - 8 * \delta^{18}\text{O})$ vs. $\delta^{18}\text{O}$

Ross Sea

deuterium excess vs. $\delta^{18}\text{O}$



IS1-Site1
 $\delta D = 8.52 \delta^{18}O - 8.08$
 (N=10, R²= 0.98)

IS1-Site2
 $\delta D = 7.76 \delta^{18}O - 2.04$
 (N=8, R²= 0.98)

IS2 $\delta D = 8.43 \delta^{18}O - 3.77$
 (N=9, R²= 0.99)

IS3 IMB-AWS
 $\delta D = 7.64 \delta^{18}O - 0.54$
 (N=9, R²= 0.98)

IMB #2
 $\delta D = 8.83 \delta^{18}O - 2.03$
 (N=6, R²= 0.99)

Questions?

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.polar-trec.com/polar-connect/archive>



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