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IPY/NSTA Web Seminar:

Polar Science, Global Discoveries: IPY Research Update for Teachers

Dr. Mary Albert

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Polar Science, Global Discoveries I
IPY Research Update for Teachers

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Overview

- Why are the polar regions important for global climate?
- What is one (of many) important climate discoveries from past ice coring science?
- How can teachers and students become engaged in IPY ice coring programs?
- Where can you get reliable information about climate change science?
Why are the polar regions important for global climate change?
Ice masses

Seasonal snow cover

Sea ice

Mountain glaciers

Ice sheets

From the Living Earth

Alaska Canada
The polar regions are important for global climate

Snow and ice are sensitive indicators of change

Snow and ice control feedbacks of the Earth's energy balance

Perovich
The polar regions are important for global climate

Ice sheets archive evidence of past environmental change

Ice sheets impact sea level

Burroughs, 1999
Which does what?

Which responds most rapidly to global warming – sea ice or an ice sheet?

Which contributes to global sea level rise – sea ice or an ice sheet?
Let’s Pause for Two Questions from the Audience
What is one thing (of many) that ice coring science has taught us about climate changes in the past?
Evidence from the past enables preparation for the future

Snowfall on cold regions of ice sheets leaves chemical and physical evidence of climate. Burial by subsequent snowfalls over the centuries create the climate archive found deep in the ice.
Precipitation

Surface snow
(top ~ 0-1 m)

Firn

Ice with bubbles
(~80-120 m & deeper)

Bedrock (~3000+ m)

Albert for NSTA 2008
Evidence from ice cores show temperature changes that we know impacted human lifestyles …

Cuffey and Clow reconstructions, 1997
But those changes were small compared to the climate changes before that! Climate change can occur abruptly, in less than 10 years!!

Cuffey and Clow reconstructions, 1997
Evidence from the past enables preparation for the future.

Ice coring science taught us that we need to think about climate change on timescales of decades or less, rather than millennia, when contemplating our future.
### Where is our water now?

Most of the world’s salt water is in the oceans. Where is most of the world’s surface fresh water now?

<table>
<thead>
<tr>
<th>Africa</th>
<th>Antarctica</th>
<th>Asia</th>
<th>Australia</th>
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</thead>
<tbody>
<tr>
<td></td>
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</tr>
<tr>
<td>Europe</td>
<td>North America</td>
<td>South America</td>
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</tbody>
</table>
Where is our water now?

Most of the world’s surface fresh water is locked up in the snow and ice of the Antarctic ice sheet. The Greenland ice sheet also has a lot.
Let’s Pause for Two Questions from the Audience
How can teachers and students become engaged in IPY ice coring programs?
Norwegian – U.S.A. Scientific Traverse of East Antarctica

http://traverse.npolar.no
Is East Antarctica growing or not?
How does global warming affect East Antarctica?
Join us in science and adventure!!
Activities for teachers and learners are on our website at:
http://traverse.npolar.no
The return traverse starts November 2008.

View Polar Palooza podcasts about our traverse at
http://passporttoknowledge.com/polar-palooza/pp06.php
High-resolution greenhouse gas records over the most recent 100,000 years

How stable is the West Antarctic Ice Sheet?

http://www.waisdivide.unh.edu/
How did the last interglacial period begin and end?

Look back 140,000 years at conditions warmer than the present.

(this project is in the early stages)
IPY Resources for Educators

- www.ipy.gov – the site for US involvement in IPY, includes lists of explore & learn sites
- www.ipy.org – the international IPY site, includes page for educators
- www.polartrec.org – U.S. teachers go to the field for IPY science
- http://passporttoknowledge.com/polar-palooza/ - podcasts, tours, educator’s corner, ..
- NOAA: www.climate.noaa.gov/education
Is there a lot of disagreement between scientists about global warming?

Use your Poll Voting Buttons to respond:
Yes (√)
No (X)
“The IPCC was established to provide …

...an objective source of information ...

... its role is to assess on a comprehensive, objective, open and transparent basis the latest scientific, technical and socio-economic literature...

... IPCC reports should be neutral with respect to policy, ...

... high scientific and technical standards, and aim to reflect a range of views, expertise and wide geographical coverage.”
Reliable climate science information

Where else can you go for reliable climate science information?

- IPCC:  [www.ipcc.ch](http://www.ipcc.ch)
- National Academies:  [www.nationalacademies.org/](http://www.nationalacademies.org/)
- NOAA:  [www.climate.noaa.gov/education/](http://www.climate.noaa.gov/education/)
Thank you

Thank you to the National Science Foundation for inviting me to do this web seminar!

Thank YOU, teachers, for using evidence-based science when teaching the scientists and engineers of tomorrow!
Thanks to our presenter, Dr. Mary Albert and to the NSF, NOAA, and NASA for sponsoring this program
Welcome to Your Professional Development

The Learning Center is NSTA's e-professional development portal to help you address your classroom needs and busy schedule. You can gain access to more than 2,600 different resources that cater to your preference for learning. Over 700 hundred resources, such as journal articles, science objects and web seminars are available for free. A suite of practical tools such as My Library, My Transcript, and My Professional Development Plan and Portfolio tool help you organize, personalize, and document your growth over time.

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- Life Science
- Physical Science

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- High School
- College

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Find resources based on their correlation to your state standards.
Coming Soon!

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Learn online from certified instructors with your colleagues. 1-2 hour seminars, week and month long courses are available. Earn state

http://learningcenter.nsta.org