



SCIENCE ACTIVITIES FOR YOUR CLASSROOM

<http://www.ldeo.columbia.edu/polareducation>

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The following is a partial list of activities developed from NSF, NASA and NOAA funded science and education initiatives. They are available in student and teacher versions on our Polar Education page (web link above). They are NGSS mapped.

Bergy Bits: Short, easy to use activities that introduce science concepts through student experimentation. Each involves a physics concept that is tied to real glacier behavior.

- * **Exploring Gravity** – What drives glacier movement?
- * **It's Friction (basal)** – Why does the glacier surface move faster than the base?
- * **It's Friction (channel)** – Why does the center of the glacier flow faster than the edges?
- * **What a Drag** – Drag of mountains and ice rises can redirect ice flow.
- * **A Bit of Force** – The backpressure force of an ice shelf, or of sea ice slows ice flow.

Careers: Explores a series of STEM careers that includes scientists (geophysicist, oceanographer) engineers (electrical, aviation systems, data systems), and careers with the Air National Guard (navigator, pilot, flight engineer, loadmaster). Students create a matrix of careers, necessary training and skills and then pick one career to explore in depth.

Sea Level: Activities that focus on what sea level is and its changes throughout history.

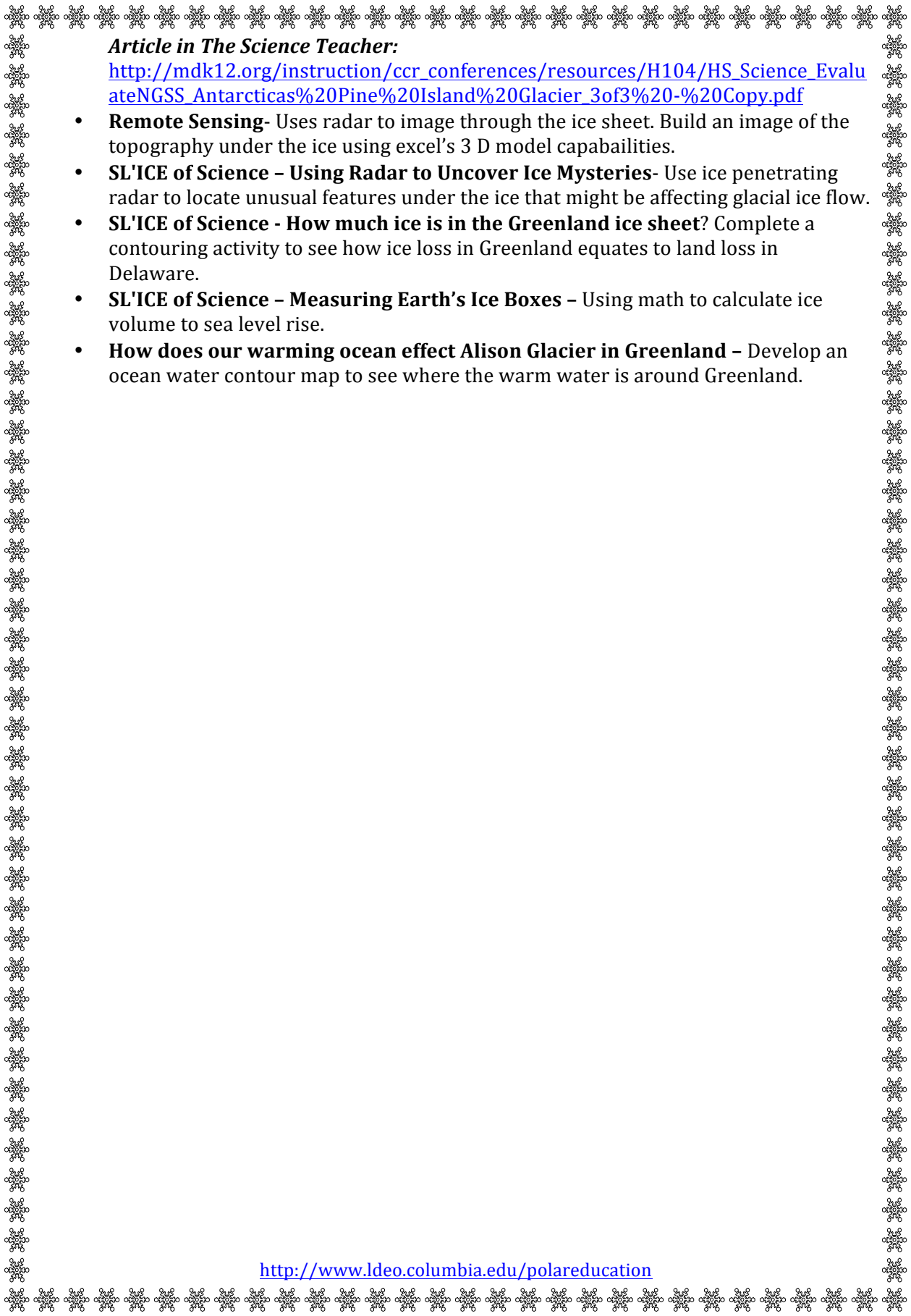
- **Measuring Sea Level** – Students use map based data visualizations, charts and graphs to examine changes in sea level through Earth's history.
- **Polar Explorer: Sea Level app free from (www.polarexplorer.org)**
 - **"Quests"** – Science 'big idea' storylines that take the user through sections of the app
 - **Series of Science Interactives -**
 - *Sea Level & Glacial Rebound Interactive*
 - *Rising Water Level Interactive*
 - *Calving Glacier*
- **Hands on Activities:**
 - **The Hydrosphere** – The ocean to ice connection – its all about the climate.
 - **The Cryosphere** – just how much ice is there in the polar ice sheets?
 - **Geologic Time** – time travel and examine sea level –check the Eemian, the Pleistocene, the Holocene
 - **Predicting future sea level** – How much do you think sea level has changed in the last 100 yrs? How might it change in the next 100 years? What do scientists estimate will be the change?

Measuring Change in the polar-regions: Activities that explore changes in the ice using data collected from satellites, radar and lidar.

- **Pine Island Glacier a 'climate canary'** - uses IceSat data to measure ice loss Antarctica. Main activity and 2 labs.
- Lab 1: Developing a model to support data
- Lab 2: Collecting measurements: compare your glacier to P.I.G.

Youtube from AGU GIFT workshop for teachers

<https://www.youtube.com/watch?v=DWorq8f2M0A>



Article in The Science Teacher:

http://mdk12.org/instruction/ccr_conferences/resources/H104/HS_Science_EvaluateNGSS_Antarcticas%20Pine%20Island%20Glacier_3of3%20-%20Copy.pdf

- **Remote Sensing-** Uses radar to image through the ice sheet. Build an image of the topography under the ice using excel's 3 D model capabilities.
- **SL'ICE of Science - Using Radar to Uncover Ice Mysteries-** Use ice penetrating radar to locate unusual features under the ice that might be affecting glacial ice flow.
- **SL'ICE of Science - How much ice is in the Greenland ice sheet?** Complete a contouring activity to see how ice loss in Greenland equates to land loss in Delaware.
- **SL'ICE of Science - Measuring Earth's Ice Boxes -** Using math to calculate ice volume to sea level rise.
- **How does our warming ocean effect Alison Glacier in Greenland -** Develop an ocean water contour map to see where the warm water is around Greenland.

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