

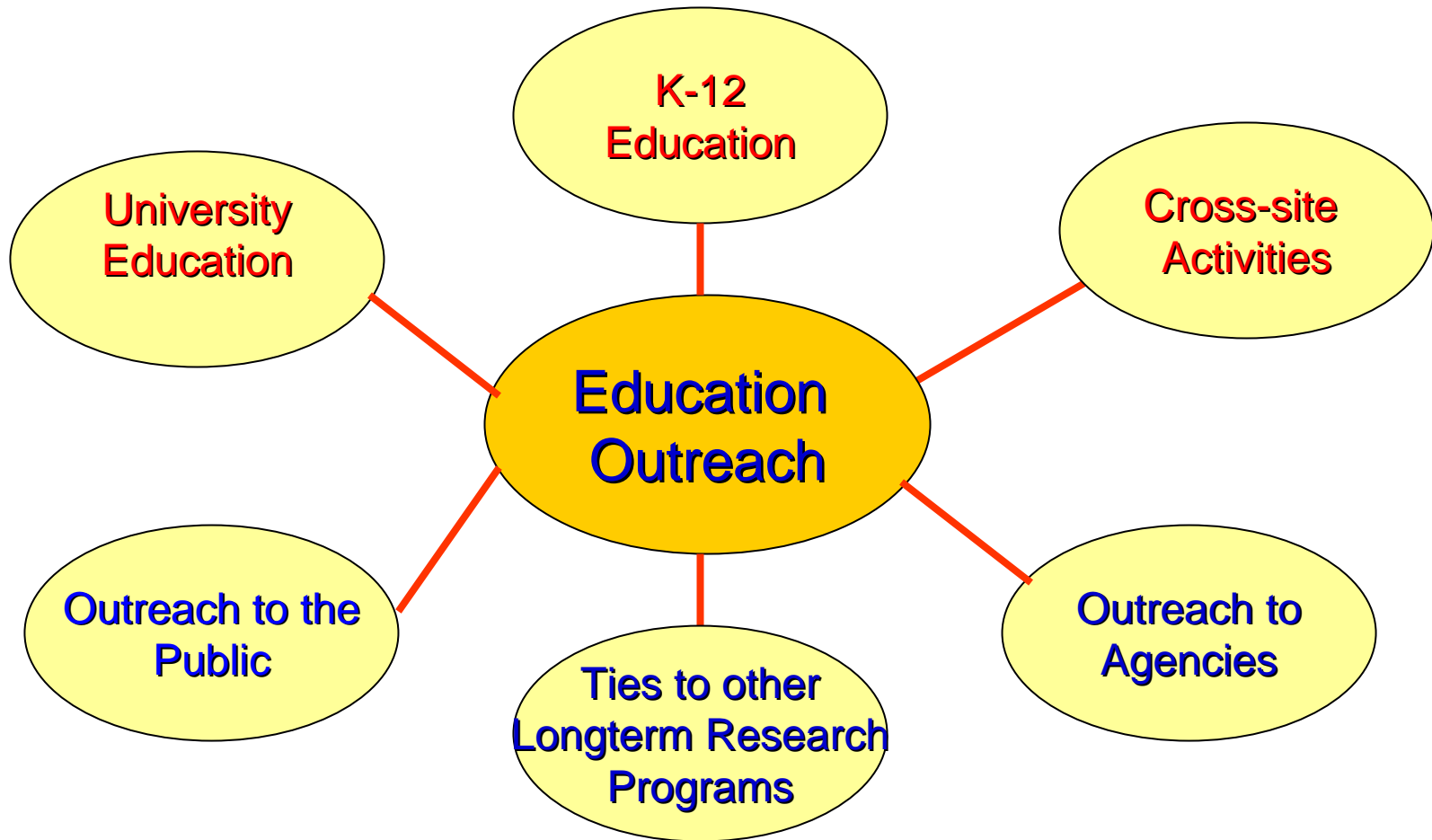


BNZ LTER Education and Outreach

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International Arctic Research Center and The Center for Global Change,
University of Alaska Fairbanks**





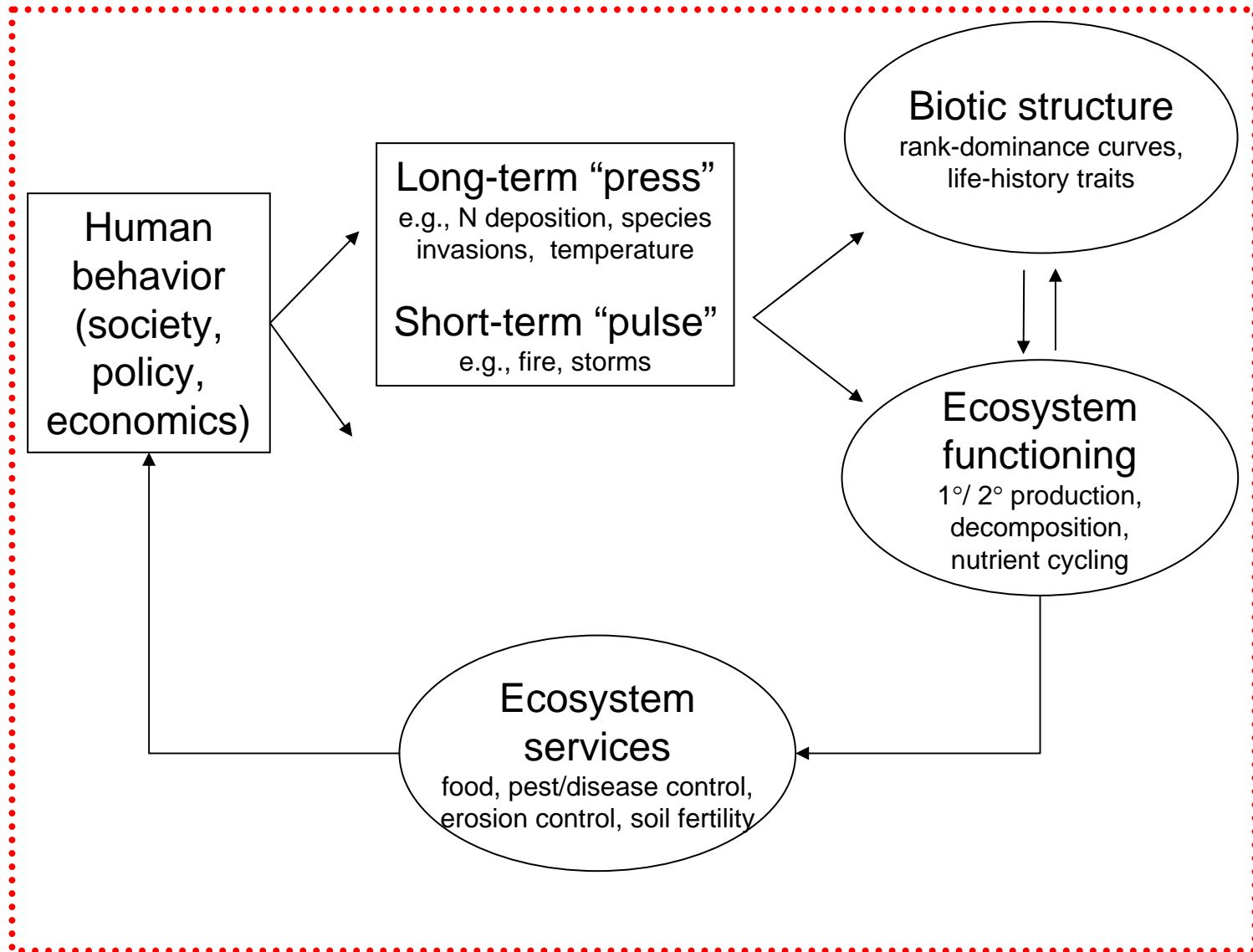
Cross-site Activities

- LTER Education Executive Committee-developed LTER ED strategic plan
- LTER Education, Outreach and Training Committee
- LTER Graduate Student Committee
- LTER cross-site synthesis project – E.Kane
- LTER ED cross-site proposal
- LTER Children's Book Series for primary students

Education & Outreach

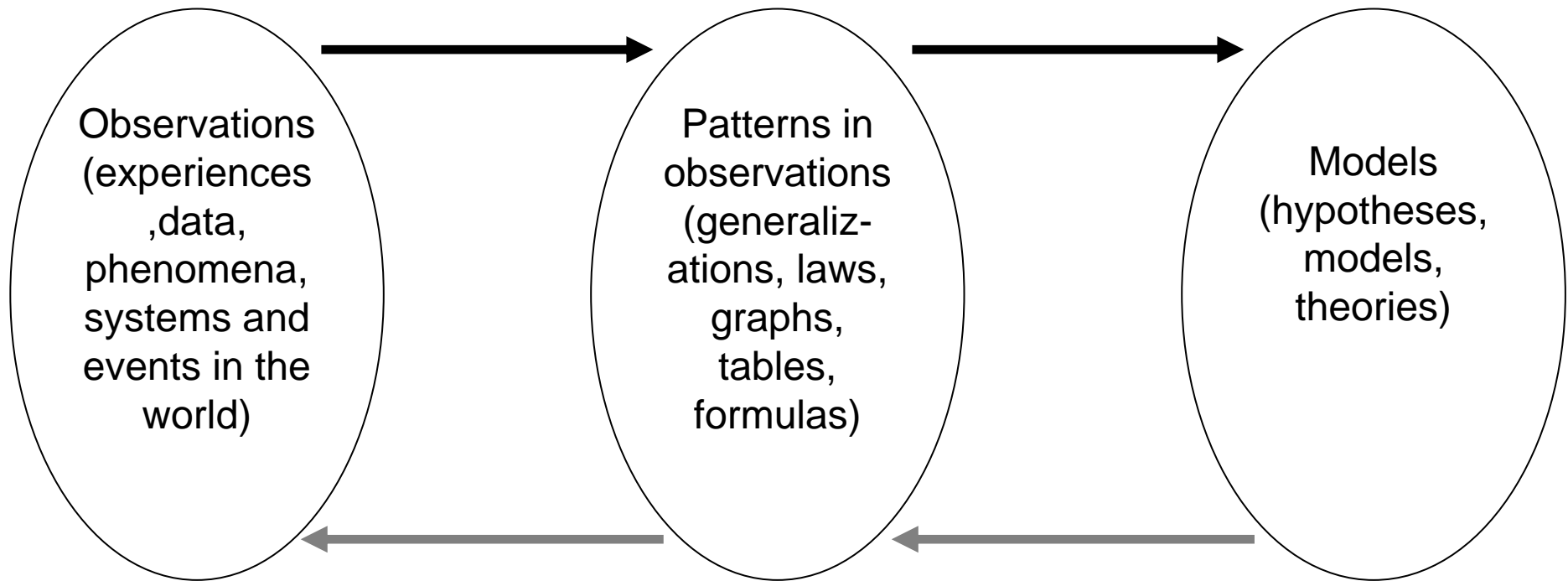
- EOT working groups suggests that an appropriate goal for LTER Education and Outreach efforts is to promote *environmental literacy* in students, teachers, and the general public.
- We define environmental literacy as having two dimensions: understanding *environmental content* (as defined by the LTER community) and *scientific practices*.

Understanding Science Content



Understanding Science Practice

Reasoning from evidence (inquiry): Finding patterns in observations and constructing explanations for those patterns



Reasoning from models and patterns (application):
Using patterns and models to describe, explain, predict, design



University Education

- Use of BNZ research sites for course field trips and field research experience
- Providers of courses for teacher continuing education
- REU – students develop & work on research projects
- IGERT program for graduate student training that links ecological, economic, & cultural aspects of sustainability and resilience



K-12 Education

- LTER PIs and grad students work in K-12 education as
 - resource providers: classroom presentations, research facility tours
 - science fair/symposium judges
 - mentors for teachers and students
 - partners with education specialists providing expertise in science curriculum writing



Alaska Boreal Forests and Climate Change

Museum of the North/LTER Educational Traveling Kits

Kits:	Introduction to Climate Change	(Any science class)
	What is Change?	
	Measuring Change	
	Patterns of Change	
	Biogeochemical Cycles	(Chemistry or Ecology)
	Trees of Alaska's Boreal Forest	(Biology or Ecology)
	Lakes and Land Cover	(Geography)
	Environmental Jobs and Job Skills	(Any science class)

Who: Middle and high school students, rural emphasis

Why: Supplement existing materials for rural science teaching
Educational materials based on actual research and collections
Address standards with Alaska-based content
Use actual research to illustrate scientific process

Partnership: Nenana City School Chemistry Class (Chuck Hugny)



K-12 Education

Vegetation phenology protocols and learning activities that we developed, are part of the Earth As a System Chapter in the GLOBE Teacher's Guide on the web (www.globe.gov) and on CD



Budburst and Green-up



Green-down



K-12 Education Program Partners

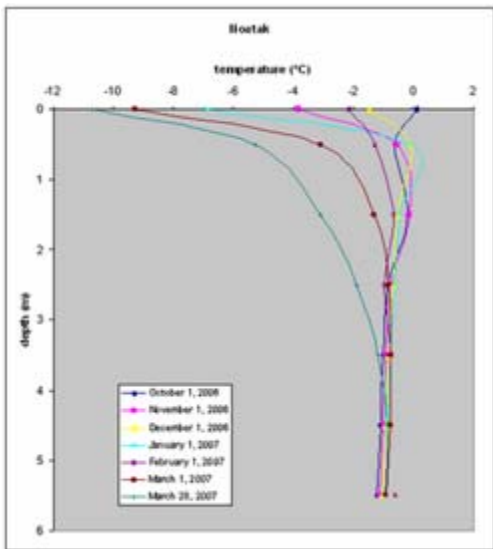
- GLOBE program
- Observing Locally, Connecting Globally Program
- EPSCoR Alaska Rural Research Partnership
- GK-12 Teaching Alaskans Sharing Knowledge
- Monitoring Seasons Through Global Learning Communities

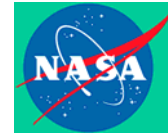
TASK Teaching Alaskans...
...Sharing Knowledge



A program that brings graduate students as STEM experts in K-12 classrooms to share their expertise and to learn from partner teachers how to communicate with diverse audiences and teach the process of science to pre-college students.

Permafrost Health Outreach Program AK EPSCoR Program, INE and IARC

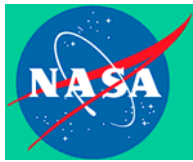




The **GLOBE** Program



The Global Learning and Observations to Benefit the Environment (GLOBE) Program is an international science and education program that brings together scientists, educators, K-12 teachers and students in studying the Earth as a System



The **GLOBE** Program

Inquiry and Science Processes

Inquiry Process and
Science Process

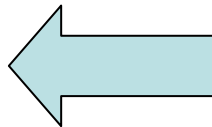
K-12 Teachers
and Students

**Learning
Science**

Ask Question
Hypothesis
Methodology
Data Collection
Data Reporting
Analysis
Conclusions
Report Results
and Peer Review

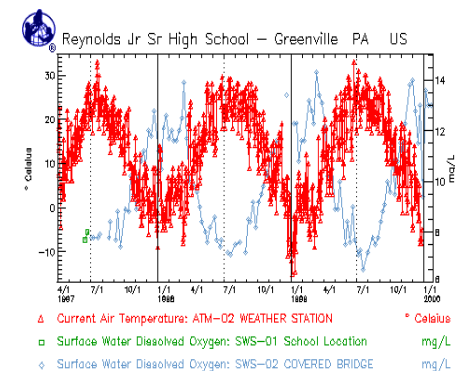
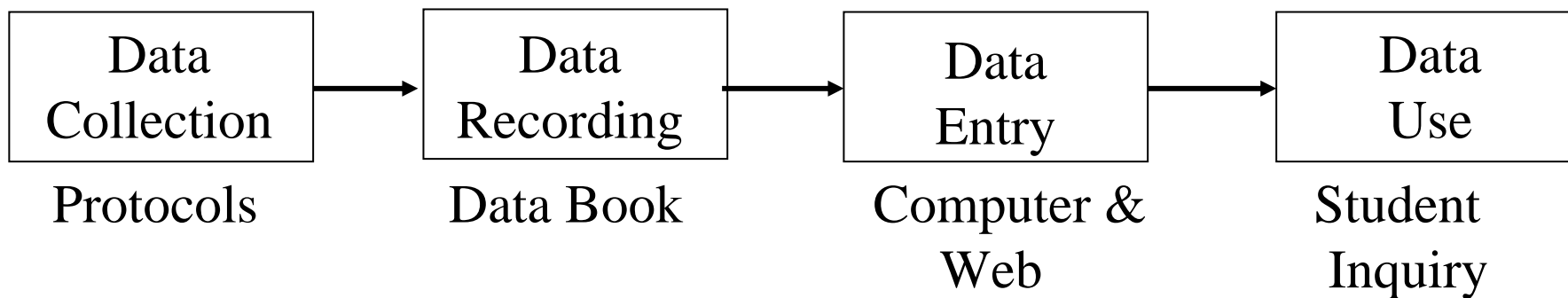
Research
Scientists

**Generation
of Knowledge**





GLOBE Data Process and Flow in Schools





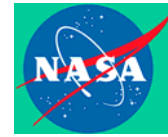
Global Change Education Using Western Science and Native Observations Program (OLCG) www.uaf.edu/olcg



Teachers and students conduct climate/environmental change studies based on local observations and knowledge, work with Native elders, scientists and educators, and use GLOBE methods and best teaching practices. More than 60 Alaska teachers and over 1200 students have participated in this program.



The **GLOBE** Program



IPY Seasons and Biomes



Dr. Elena Sparrow¹, Dr. Jessica Robin², Dr. Leslie Gordon³, Dr. Elissa Levine⁴, Ms. Kim Morris¹, Dr. Martin Jeffries¹, Ms. Martha Kopplin¹ Dr. David Verbyla¹ and Dr. Becky Boger⁵

¹ University of Alaska Fairbanks

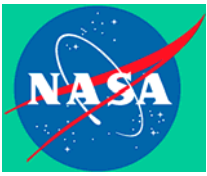
² Science Systems Applications, Inc./NASA-GSFC

³ Gordon Consulting, Neskowin, Oregon

⁴ NASA Goddard Space Flight Center

⁵ GLOBE Program Office



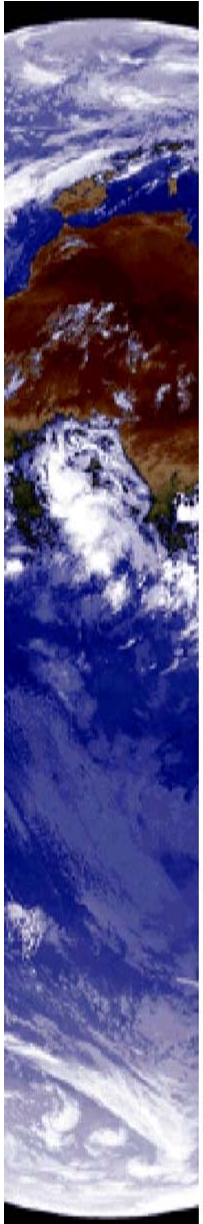


The **GLOBE** Program



What is IPY Seasons and Biomes?

- Seasons and Biomes is an inquiry- and project-based initiative that monitors seasons, specifically their interannual variability to increase K-12 students' understanding of the Earth system.
- The project connects GLOBE students, teachers, and communities with educators and scientists from Earth Systems Science Programs (ESSP)
 - International Arctic Research Center (IARC)
 - NASA Landsat Data Continuity (LDCM)
 - NASA Terra
 - LTER

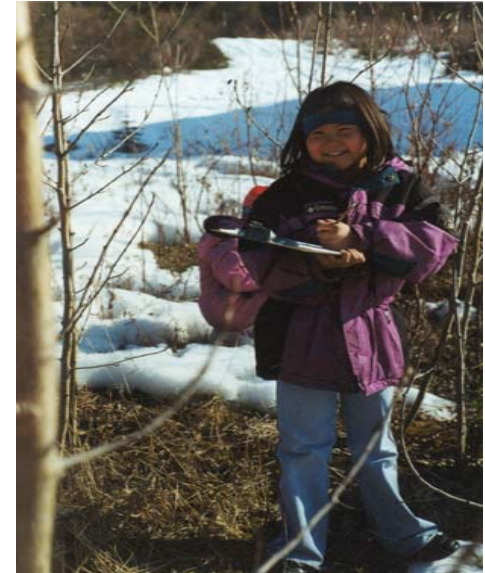




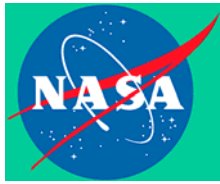
The **GLOBE** Program



Seasons & Biomes will organize GLOBE schools into Global Learning Communities.



Photos courtesy of GLOBE Bahrain, Ghana, and USA

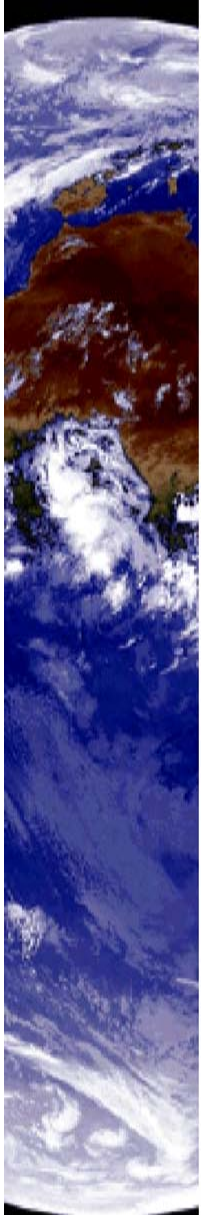


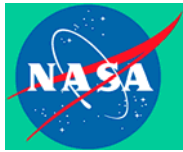
The **GLOBE** Program



What will students do in Seasons and Biomes ?

- Students in each GLC will monitor their seasons through field campaigns using GLOBE protocols that have been adapted specifically for their biomes
 - Phenology (budburst, green-up & down)
 - Atmosphere (air temperature, precipitation)
 - Soils (soil temperature, characterization)
 - Hydrology (water temperature)
- In addition, ice and mosquito phenology protocols will be adapted for Arctic and Tropical regions, respectively.

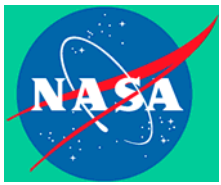




The **GLOBE** Program



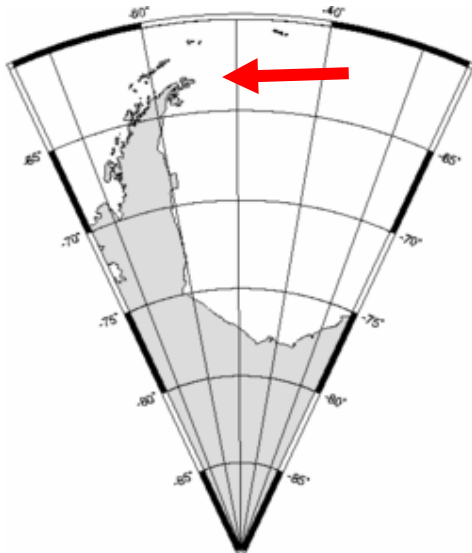
Photos courtesy of the GLOBE, Alaska GLOBE and ALISON



IPY Pole to Pole Videoconference



March 5, 2007: Linking scientists to students via a Pole to Pole Video conference and follow-up web chat & forums.





Workshop on Climatic Change for Alaska Youth

- 16 students mostly Alaskan Natives
- 5 teachers and a parent
- Co-sponsored with IARC





Workshop on Climatic Change for Alaska Youth

There was an overall strong positive response

- relevance of climate change issues to them and their hometown
- importance of discussions with scientists
- whether they learned a lot
- whether they would recommend it to others

High School Summer Research Internship

- 10 high school students
- 8 Alaska Native, 1 Caucasian from rural schools (Brevig Mission, Holy Cross, Huslia, McGrath, Shaktoolik, Stebbins)
- 1 Chinese student from Fairbanks
- Students were housed with RAHI students and participated in night and weekend activities
- LTER mentored 5 Interns
- Co-funding with Alaska EPSCoR





High School Summer Research Internship

Strong positive response

1. I really like working with my researcher(s)
2. I learned a lot from this internship
3. I learned how to do scientific procedures and life skills as well
4. I think working with scientists is really important
5. This experience will influence my decision to go to college
6. I will recommend this program to my friends

High School Summer Research Internship





Highlights of LTER K-12 EO



- Improved student attitude toward science & content knowledge
- Native Elder/Expert involvement
- More LTER scientist involvement
- Research experience for H.S. Alaska Native students
- Active participation in IPY 4



K-12 Education

- Continued to leverage limited SLTER funding
- Expanded SLTER activities to 14 schools in Fairbanks and 34 other schools in Alaska
- Broadened our reach to 112 schools in 16 countries
- Engaging in the International Polar Year, K-12 students from polar and non-polar countries



K-12 Education

- Continued to provide professional development workshops & other university courses for teachers
- Mentored students have successfully competed in statewide, national competitions
- Mentored students have presented internationally
- LTER Teachers have become teacher leaders-master trainers or co-teachers in science courses for pre-service teachers
- LTER Teachers have garnered state and national teacher awards



Plan for Future Education Outreach

- Promote *environmental literacy* in students, teachers, and the general public
 - *environmental content* as defined by LTER community
 - *scientific practices*

That helps develop an understanding of

- coupled human-ecosystem interactions
 - integrated research and synthesis
- Continue to engage diverse populations & include diverse perspectives

