Objective – to develop a consensus framework for enhancing atmospheric science and climate literacy

Intended to be a resource for formal and informal educators, outreach specialists, program managers and resource developers

Part of a broader effort to define Earth System Science Literacy through a set of frameworks

Builds on previous community efforts and documents, including draft Climate Literacy Framework in development by NOAA, AAAS Benchmarks/Atlas, NSES,…

Funded by NSF (and NOAA)

Co-sponsored by NAGT, NESTA, AGU, and AMS

Co-convened by UCAR and CIRES
• Emphasis on bringing together broad community of scientists, educators, and policy makers to develop consensus
• Live and archived webcasts of primary presentations and discussions
• 8-10 slots available for participants from the scientist/educator/policy maker community
• Individuals interested in participating in the workshop will be able to apply at http://www.eo.ucar.edu/ascl/ by Monday, October 15 (open until October 26). Selected participants will be notified by November 2.
• Framework will be revised based on broad community comment and will be submitted to NSF by the end of July, 2008.
• **PI – Roberta Johnson**, director, UCAR Education & Outreach; executive director, National Earth Science Teachers Association

• **Co-PI – John Snow**, dean, The University of Oklahoma’s College of Atmospheric & Geographic Sciences; director, OK Weather Center Program

• **Organizing Committee**
  – **Wendy Abshire**, chair, AMS Board of Public Education; Educator, UOP/UCAR’s COMET Program
  – **Susan Buhr**, director, Education & Outreach Program, CIRES, Univ. of Colorado
  – **Heidi Cullen**, climate scientist, The Weather Channel
  – **Scott Denning**, professor, Department of Atmospheric Sciences, Colorado St. Univ.
  – **Marika Holland**, climate scientist, Climate & Global Change Division, NCAR
  – **Cathy Manduca**, chair, AGU Committee on Education & Human Resources; executive director, National Association of Geoscience Teachers; Carleton College
  – **Parker Pennington**, president, National Earth Science Teachers Association
  – **Sarah Schoedinger**, senior education policy analyst, Office of Education, NOAA
  – **Peter Schultz**, director, Climate Change Program Office
  – **J. Marshall Shepherd**, associate professor, physical meteorologist/climatologist, University of Georgia

• **Staff Support**
  – **Susan Foster**, deputy director, Education & Outreach, UCAR
  – **Mark McCaffrey**, science communicator, Education & Outreach, CIRES
  – **Frank Niepold**, climate education coordinator, NOAA Climate Program Office
• Education Forum ASCL Discussion

Objectives:

– To inform about the workshop and solicit participation from UCAR community
– To gain community insight on Essential Principles
– Recommendations for gaining community comment, dissemination, and ways to encourage subsequent use by the community
Discussion

• Recognition that Essential Principles may overlap significantly between the frameworks because of the interconnected nature of our science
• Take into account studies on how people learn and student misconceptions
• Emphasis on scientific method and system science
• Nested literacy frameworks
• Suggestions to disseminate/receive comments through breakout group, existing listserves (AMS, GLOBE, AGU, NAGT, NESTA, W2U, others)
• Value of comments from undergraduate faculty as well as “alpha” teachers
• Role of UCAR Member and Affiliate universities to help disseminate and comment
• Opportunity for interested participants to host a videoconferencing site – need technology and group of people interested in participating in the effort
Preparation for next generation of atmospheric and climate scientists

• What are the workforce skills needed in the future?
• Undergraduate and graduate levels
• What is the right balance of course work and research in disciplinary and interdisciplinary contexts?
• How can the community work together to optimize this preparation?
Discussion

- Disciplinary focus at universities, specialization, teaching the way they were taught - Need for continuing faculty preparation to implement new pedagogy as well as broaden understanding of/keep up with Earth system science
- Value of interdepartmental faculty appointments (e.g., geology, math, biology)
- Interdisciplinary instrumentation course at Albany
- A new kind of scientist? How to provide interdisciplinary preparation? Could we prepare students with a specialization in Earth system science? What would that look like?
  - Now, a focus on the interdisciplinary Earth system when too young could prevent tenure. Need to get disciplinary credentials first, then generalize to ES after tenure/established career.
  - Value of problem-based learning to bring in interdisciplinary aspects
  - Student teams model how science is done today, in large teams, with individuals with specialized expertise
  - Important to bring Earth system language and focus out in pre-college preparation
  - Higher level of abstraction – teach the commonalities among earth, atmospheric, ocean sciences – systems, processes, analysis
- Engage students in research as early as possible – promotes retention and brings in interdisciplinary science
- UCAR/NCAR is well-suited to maintain this interdisciplinary focus
General Discussion

• What motivated us to become (geo, atmospheric, Earth system) scientists?
  – Recognition of importance of experiences outside the classroom – how can we build on that?
  – Connection of our science to reality and experience – we should have an advantage
  – Brain chemistry – we are all OCD! – made us stick with it

• We force students to specialize too early – lose the chance of exposure to our science

• Importance of keeping youth on the math track, so they can be there at the undergraduate level (particularly females, minorities)

• Need to remember that not everyone needs to become an PdD atm sci – use of preparation in our field for other roles in society
• Individuals interested in participating in the workshop will be able to apply at http://www.eo.ucar.edu/ascl/ by Monday, October 15 (open until October 26). Selected participants will be notified by November 2.
Similar to Ocean Literacy framework*, the goal is to develop consensus on a set of Essential Principles and supporting Fundamental Concepts that a literate person should know about atmospheric science and climate.

Following this approach, a person who is literate about the atmosphere and climate should be able to:

- understand the Essential Principles and Fundamental Concepts about the atmosphere and climate
- communicate about the atmosphere and climate in a meaningful way; and
- make informed and responsible decisions regarding the atmosphere and climate

*Available at
http://www.coexploration.org/oceanliteracy/documents/OceanLitChart.pdf
Formal Education

• Learning that takes place within a structured educational system in which children or adults are required to demonstrate proficiency, i.e., tested and graded, in the process of reaching a certain level of achievement, degree, certification, continuing education credits, etc.

• Typically classroom-based, but it can be home-based via the web, TV, or the post. Teacher workshops are often offered in unique environments such as museums

• Addresses multiple intelligences and education standards

• Provides a long-term opportunity to acquire basic literacy and deepen understanding of fundamental concepts that are useful in contributing to and interpreting the world
Informal Education

- Learning outside the established formal system that meets clearly defined objectives through organized educational activities. This mode of education may be voluntary, self-directed (e.g., a museum or aquarium exhibit, a web site), or systematic and guided (e.g., a field trip)

- Thought of as glue between the realms of Formal Education and Public Outreach, providing strong linkages to both

- Products and activities tend to combine the educational substance of formal education with the excitement and relevance of successful public outreach

- Can require a person to travel to unique settings that are outside both the classroom and the home (e.g. nature centers, museums, aquariums, zoos, national or state parks, club meetings, career fairs, eclipse locales)

- Often ideal environments for family-based learning

- Opportunities are active and voluntary and are intended to provide motivation for further formal learning and life-long interest
Outreach

• Opportunities designed to build awareness, develop relationships, and inspire action (e.g., pursuit of further learning opportunities, behavioral change). Involves information exchange between provider and target audience. Frequently designed to reach diverse audiences, but can be personal and interactive, designed to identify and appeal to an individual’s personal interest or motivation for information.

• Typically outside the classroom and designed to reach a wider audience

• A person need not move from their everyday path in order to experience; the provider has reached out to where people normally are (e.g. home, car)

• Often designed to entertain; educational value is offered but there is not expectation or demonstration of an education result