THE NATIONAL ACADEMIES
BOARD ON SCIENCE EDUCATION
COMMITTEE ON HUMAN DIMENSIONS OF GLOBAL CHANGE
DIVISION OF EARTH AND LIFE STUDIES

WORKSHOP ON CLIMATE CHANGE EDUCATION IN FORMAL SETTINGS, K-14

August 31 – September 1, 2011
20 F St. Conference Center
Washington, DC

The workshop will discuss climate change and climate science education in formal settings from Kindergarten through the first two years of college with the goal of building towards innovate practices based on a solid understanding of current trends. The workshop will begin with an investigation on student understanding of climate change and global warming and the state and quality of curricular materials for climate change and climate science in K-12. The broader context for climate change and climate science education will be explored through new generation national and state science standards and the current state of teacher understanding of, and preparation for climate change and climate science education. The workshop will end by featuring and discussing innovative approaches to climate change and climate science education that span into early college.

WEDNESDAY, AUGUST 31, 2011

8:15 – 8:45 Individual Discussions with panelist and commissioned authors (*Breakfast available*)

8:45 – 9:00 **Welcome**
Martin Storksdieck (Director, Board on Science Education)
Jim Mahoney (Climate Change Education Roundtable Chair)

9:00-10:15	**Session 1: Introduction and Keynote Remarks**

9:00 – 9:15 **Introduction: Goals for the Workshop**
Andy Anderson (Workshop Committee Chair)

9:15 – 9:45 **Challenges and Opportunities in Climate Change Education**
Danny Edelson (National Geographic Society)

Formal education has an important role in preparing citizens to respond appropriately to the challenges posed by climate change. The keynote speaker will address this role and provide an overview of the need for climate change education in schools, the goals for climate education in K-14, and challenges and opportunities inherent to teaching and learning climate change education in schools.

9:45 – 10:15 **Questions and answers**

10:15 – 10:30 BREAK

10:30 – 12:00 Session 2: Student Understanding of Climate Change

Moderator: *Andy Anderson (Workshop Committee Chair)*

Climate change education is being taught in formal settings in various ways, both within formal courses and other activities within schools (e.g. after school programs). This session will explore how students currently understand and learn about climate science and climate change, how climate change education is represented in current curricula materials, and appropriate pedagogies that address various goals for climate change education in K-12.

Guiding questions:

- What does mental model research and select items from the National Assessment of Environmental Literacy suggest about student climate literacy and understanding?
- What is the nature and quality a current materials for teaching climate change and climate science in K-12?
- What are effective teaching strategies for various climate literacy goals?

10:30 – 11:30 Presentations and Panel Discussions

Eddie Boyes (University of Liverpool): Student Mental Models of Global Warming and Climate Change

Frank Niepold (NOAA): Nature and Quality of Teaching Materials for Climate Change Education

Tom Marcinkowski (Florida Institute of Technology): Climate Literacy and Climate Pedagogy

11:30 – 12:00 Audience Q&A

12:00 – 1:00 Continued Audience Discussions

Lunch being served

1:00 – 4:45 Session 3: Standards and Teachers

This session will explore two critical aspects that influence the nature and quality of climate change education throughout the K-12 system: how standards may influence what is taught in classrooms, how teachers currently address climate change and climate science, and how teachers can be supported in effective ways.

1:00 – 2:15 Session 3A: Role of Science Education Standards

Moderator: *Jim Geringer (Workshop Committee Member)*

This section will discuss the role of new science education standards and other frameworks, such as state environmental literacy plans and state standards in providing opportunities for addressing climate change and climate science in the K-12 curriculum.

1:00 – 2:00 **Presentations and Panel Discussions**

Brian Reiser (Northwestern University) & Stephen Pruitt (Achieve): Addressing climate change in the NRC Framework and the next generation science education standards

Gilda Wheeler (Office of Superintendant of Public Instruction, State of Washington): A perspective from the State of Washington

Stephen Pruitt (Achieve): Challenges with controversial science issues

2:00 – 2:15 **Clarifying Questions to prepare for the Break-Out Discussions**

2:15 – 3:15 **Session 3B: Teacher understanding and preparation**

Moderator: *Tamara Ledley (Workshop Committee Member)*

Teacher preparation and understanding of climate science and climate change issues are key components for providing effective climate change education in K-12. This session will explore current teacher practices in K-12 climate change and climate science education, and strategies to support climate science and climate change teaching in the classroom.

2:15 – 3:15 **Presentations and Panel Discussions**

Susan Buhr (University of Colorado, Boulder): Navigating Climate Science in the Classroom: Teacher preparation, practices, perceptions and professional development

Roberta Johnson (National Earth Science Teachers Association): Addressing teacher practices and barriers and challenges inherent with teaching climate change education

Francis Eberle (National Science Teachers Association): Discussant

3:15 – 3:30 BREAK

3:30 – 4:30 **Break-out sessions: small group discussions**

Workshop participants will continue the discussion initiated in the two previous panel discussions (Standards and Teacher preparation) during small group discussions. Workshop participants can choose to focus on either the role of standards in climate science and climate change education, or on how teachers are prepared and supported in teaching climate science and climate change.

Guiding Questions:

<u>Role of Science Education Standards</u>

1. What is the role of new Science Education Standards and other frameworks (State Environmental Literacy Plans and State Standards) in providing opportunities or barriers for K-12 CCE? How is the framework similar to or different from current practices?
2. In addition to the areas identified in the Conceptual Framework for

New Science Education Standards, where should climate change education be covered in the curriculum?
3. In the translation from the Framework to the Standards, what are the opportunities to embed climate change literacy more broadly across disciplines?
4. What are the leverage points for incorporating climate change education into each level of education (elementary, middle, high school)?

Teacher Understanding and Preparation

1. What types of pedagogical knowledge is needed to teach climate change or climate science? How can we help teachers to obtain the knowledge they need to teach climate change comprehensively?
2. How can teachers and principles overcome skepticism about climate change and climate change education, e.g. from parents or administrators?
3. What are strategies for finding appropriate curricular materials?
4. How can schools/districts organize themselves so that teachers are motivated to teach climate change?

4:30 -5:00 **Report out from break-out session: Synthesis and lessons learned**

5:00 **Wrap up of day**

Thursday, September 1

8:30 – 9:00 Individual Discussion of Day 1 (*Breakfast available*)

9:00 – 9:15 Welcome and overview of Day 2
Andy Anderson (Workshop Committee Chair)

9:15 – 10:45	**Session 4**: **Innovations in providing opportunities to engage in climate change education in high school and colleges**

Moderator: *Louisa Koch (Workshop Committee Member)*

This session will explore innovations in teaching climate change education, including links between high school and the first two years of college. Discussion will focus on issues such of student engagement and motivation, addressing the interdisciplinary nature of climate change and climate science, and strategies for education towards stewardship and citizenship.

Guiding Questions:

- What is the role of AP courses, particularly AP environmental science, in teaching students about climate change and climate science?
- What examples of effective and innovative and potentially inter- and transdisciplinary practices in climate change and climate science education can we find in high school and colleges?
- What can we learn from alternative approaches to climate change education in schools that make use of out-of-school models for teaching and learning?

9:15 – 10:45 **Presentations and Panel Discussions**

Karen Lionberger (College Board – AP Program): AP Courses and climate science and climate change education

LuAnne Thompson (University of Washington): Partnerships between high schools and universities

Nicky Phear (University of Montana): Developing and implementing an interdisciplinary climate change minor

Matt Lappe (Alliance for Climate Education): Bringing climate change to schools and back home

Mike Town (Steering Committee Member): Discussant

10:45-11:00 BREAK

11:00-12:00 **Break-out sessions**

Workshop participants will continue the discussion initiated in the previous panel in small groups, inspired by topics like innovation in high schools, linkages between high school and college, inter- and transdisciplinary approaches, and using out-of-school resources for school-based instruction. The break-out discussions allow participants to innovate and share, but all are asked to address how new ideas can be evaluated and brought to scale.

Guiding Questions: Use questions for overall session (listed above)

12:00 – 1:00 **Continued Audience Discussions**

Lunch being served

1:00-2:00 **Bringing it all together: a plenary discussion**

Moderator: *Andy Anderson (Workshop Committee Chair)*

2:00-2:30 **Workshop implications and next steps**

Andy Anderson (Workshop Committee Chair)
Martin Storksdieck (Director, Board on Science Education)
Jim Mahoney (Climate Change Education Roundtable Chair)

2:30 **Meeting Adjourn**