

DEVELOPING A FRAMEWORK FOR CLIMATE & WEATHER EDUCATION: *BUILDING FROM AAAS PROJECT 2061'S ATLAS OF CLIMATE & WEATHER SCIENCE LITERACY*

NOAA Climate Literacy Working Group FY06 Mini Grant Application

Project Team:

Principal Investigator: Sidney Thurston, U.S. OCO Associate Program Manager

Project Director: Frank Niepold, *Climate Program Office Education/Literacy Coordinator*, Washington D.C.

Project Co-Director: Ted Wilard, AAAS Project 2061, Washington D.C.

Introduction

The *Developing A Framework For Climate & Weather Education* Grant proposal will fund the development of a workshop and framework aimed at building climate and weather continuum literacy capacity and catalyzing coordination and expansion of limited resources within federal agencies and other organizations to support the cross-cutting priority of environmental literacy focused on climate literacy and weather literacy.

- **Deliverables:** *Framework For Climate & Weather Education Council* (FCWEC) will provide an education program structure that allows:
 - Formal, Informal and Outreach Educators to explore and collaborate with to the nation's leading science literacy institution, AAAS Project 2061. This will be accomplished in a **series of collaborative planning actions** and a **workshop** that:
 - Brings together an established group of federal science agencies, curricular developers and science organizations to understand the current AAAS Project 2061 research relative to the Climate & Weather strand maps,
 - To collaborate with the AAAS team on the scope of the climate & weather strand maps,
 - Participants will develop an appreciation of the AAAS Project 2061 research and climate and weather literacy benchmark revisions and the new (circa Jan 2007) strand map on weather and climate.
 - And to develop a framework that provides a map of how educational programs/developers can create climate and weather lessons using the AAAS Project 2061 research and products.

- **Statement of need:**

To date there is no *comprehensive* weather and climate science literacy product available. Additionally, numerous inventories and collection building efforts in the weather/climate continuum of science education have shown the curricular materials to be insufficient to

the NOAA strategic needs. In the NOAA's strategic plan clearly states that "*support educational efforts to create a more climate-literate public by developing climate educational materials, involving teachers in the research process, and generating tools to allow climate information to be used in decision making* " It is to this purpose that the workshop is needed.

Additionally, the NOAA's education plans goals 1 and 2 would "promote environmental literacy by increasing understanding" and "build NOAA's capability to engage audiences and enable informed decision making" through enhanced educational materials that benefit from AAAS's research.

- **Project Design:**

The scope of this FY 06 NOAA Education Mini Grant is to help the Climate goal answer two essential questions. The first is a broad one that AAAS Project 2061 has primarily answered through the development of a draft "Weather & Climate" strand map, "What Climate Science Should Be Taught in an Earth System Science Curriculum?" The AAAS Project 2061 team is currently clarifying the research on what and when should certain science literacy benchmarks relating to weather and climate be taught. The second question is the larger of the two, how will we develop the resources, phenomenon and representations to teach the climate and weather benchmarks identified by AAAS?

This proposal sets forth the idea that key education agencies and organizations who have weather and climate as part of their missions/focus should assemble in a workshop setting and fully explore the AAAS Project 2061 work, inform the development process and develop a unifying framework of how to develop lesson based on the new strand map. The AAAS Project 2061 staff is committed to the development of the clarification of the benchmark ideas, research summaries and assessment items for the Earth science content area on weather and climate for grade levels 6-8 and 9-12 by 2007.

However, they will not have the funds to develop the phenomenon and representations for these benchmark ideas. As educators and educational products, we could develop a comprehensive collection of lessons that utilize the AAAS research that apply best practices and instructional strategies improving the quality of materials now available to teachers in this ever growing critical area to our nations resiliency.

In doing so, we could share our limited resources and mutually serve our missions needs and those of the classroom teachers. Project 2061 has agreed to the workshop given that it takes place in the January to April 2007 timeframe. After the workshop, participants will be encourage to work collaboratively in a inter-agency/inter-organization working group that will coordinate the development of the best practice phenomenon and representations for all the weather and climate benchmarks. The terms of reference for the working group will be inclusive while participation will remain voluntary.

Series of collaborative planning actions – Over a 6 month time frame, all the partners will participate in a series of joint sessions building the complete interactivity that will take place between Climate and Weather Literacy Working Group and their organization regardless of participation at the AAAS Atlas workshop.

Action #1 – Partnership development Sessions (2 weeks)

Action #2 – Develop support and investment by potential partners Sessions (ongoing)

Action #3 – Conduct AAAS Project 2061 “Using *Atlas of Weather and Climate Science*

Literacy (3 Days)

Action #4 – Develop Master Plan of Action for the Implementation of Climate and Weather Literacy – On-site implementation; regional implementation; national implementation (1 day with virtual preparation)

Action #5 – Submission of a preliminary and full performance report

- **Project accountability:** Sidney Thurston, U.S. OCO Associate Program Manager, will be responsible of the portion of the Education and Outreach budget dedicated to the *Developing A Framework For Climate & Weather Education* Grant. Additionally, due to the short timeline of the proposal we have set aside 5,000 of the CPO education and outreach budget to cover any discrepancies.
- **Sustainability:** The proposal will cover both the development and implementation of the AAAS workshop but also assist in the development of the *Framework For Climate & Weather Education Council* (FCWEC) that will coordinate the use of the AAAS Project 2061 research related to weather and climate literacy in the development of educational materials. After the initial costs covered by the proposal, all new costs will be covered by the council and its partners future budgets.

- **Budget justification:**

The primary focus of the workshop and framework is focused on climate literacy. Due to the current limits on education and outreach funding that exist in the climate goal and the infancy of its education and outreach program, we are requesting that most of the funds for this workshop be provided in the grant. Climate education has very little traction in NOAA and other organizations. Due to the work completed by the Climate Change Collect , <http://serc.carleton.edu/climatechange/>, efforts, the status of climate literacy materials is very limited, while the societal need is growing in importance every day. This situation demand that all the key members of the climate education/literacy community come together and coordinate their curricular development resources within a mutually agree upon framework. This unique opportunity is very timely for two reasons. First the need for climate literacy is now. Informed decision making is critical to our nations and the world future and numerous polls and studies reveal that the “public” interest in climate is high, while their true literacy rates are low. This is where we come in. The second issue is that the AAAS work relative to weather and climate is being complete right now and the second strand map book will be produced in the near term.

- **Plan for sustainability:**

project outlines potential mechanisms for long-term sustainability or successful replication/expansion outside EdMG funding (10 points).

Other EdMG program Requirements

- **Proposed NOAA Education Plan strategies**

- Strategy 5
 - Leverage partnerships to enhance formal and informal environmental science education.
- Strategy 6
 - Build capability within NOAA for educational excellence.
- **Project goals, objectives, and performance measures**

The Climate Program Offices performance measure “Improved ability of society to plan and respond to climate variability and climate change using NOAA climate products and information” will be achieved by two related milestones located in the CPO 2006 annual operating plan:

| Program | Point of Contact | Milestones | Performance Measure |
|------------------------|------------------|---|---|
| Education and Outreach | Frank Niepold | Milestone: Develop climate literacy key concepts prototype based ocean literacy key concepts | Improved ability of society to plan and respond to climate variability and climate change using NOAA climate products and information |
| | | Milestone: Develop K-12 climate education products | |

- **Partnerships:** Each of the following potential partnership organizations has worked with and familiarized themselves with Climate program development, evaluation or implementation. This will be the pool of people that the grant will pull from to join the Climate and Weather Literacy Working Group (CaWLWG) and to attend the AAAS Project 2061 “*Using Atlas of Climate Science Literacy*” workshop. An example of the workshop can be found at the AAAS web site: <http://www.project2061.org/events/workshops/dcOctober.htm>
 - NOAA: CPO, NWS, OEd, ESRL, NCDC, GFDL, AMOL
 - US Geological Survey
 - EPA
 - MIT: Laboratory For Energy and the Environment
 - Byrd Polar Research Center
 - University Corporation for Atmospheric Research: UCAR
 - DLESE
 - National Science Foundation: Directorate for Geosciences
 - American Museum of Natural History, New York
 - American Meteorological Society
 - NASA Terra and Aqua Mission: Education
 - NASA GISS
 - EdGCM Project
 - TERC
 - Lamont-Doherty Earth Observatory
 - Connecticut Climate Change Education Committee

Broader Impacts

- **Audience:** The grant targets direct materials and instructional design support for Educators to enhance the delivery of their expertise to their K-16 audiences.
- **Impact Evaluation:** Success will be determined through a comprehensive formal evaluation of the grant action sessions. The outline of the evaluation is included in the Budget Appendix

Appendix 1: Timeline for implementation:

- COB March 15, 2006: Submission of NOAA EdMG Proposals to the appropriate Education Council member and Jon Lilley in the Office of Education
- COB March 22, 2006: Education Council members forward proposals to OEd
- April 5, 2006: Award Announcement
- May 5, 2006: *Framework For Climate & Weather Education Council* (FCWEC) Advisory Committee forms to develop invitation pool and work with AAAS to set the workshop date (the council will meet monthly to
- May 19, 2006: Financial report due
- June 1, 2006: AAAS Procurement Action begun, work order submitted to obligate FY06 money for Jan-March 2007
- June 16, 2006: Financial report due
- July 1, 2006: Money is sent to CIRES for evaluation
- July 14, 2006: Financial report due
- July 30, 2006: Invitational Travel money is Education and Outreach bu
 - CIRES Outreach Program
 - NOAA Climate Education
 - The GLOBE Program
 - California State University
 - CoCoRaHS program
 - Science Museum of Minnesota
 - The JASON Project
 - American Geophysical Union
 - American Geological Institute
 - National Geographic
 - Keystone Foundation
 - COSSE
 - AGI EarthComm
 - Thomson Delmar Learning
- August 18, 2006: All funds obligated
- September 30, 2006: Workshop date set and Invit
- October 16, 2006: First performance report sub
- March, 2007: AAAS Project 2061 Worksh
- March, 2007: Post Workshop the *Framework For Climate & Weather Education Council* works on AAAS Project 2061
- March, 2007: Post Workshop evaluation (
- April 16, 2007: Final performance report with Framework For Climate & Weather Education Council

*The timing of the workshop is tightly constrained on two sides. AAAS can not prepare and conduct the workshop any sooner than March of 2007 and the Final performance report is due on April 16th, 2007. This does not allow very much time to conduct the post workshop evaluation and to generate the evaluation report. Additionally, there will need to be time to produce the Final performance report.

CIRES Evaluation:

Telecons meetings and Conference calls will assist in the development of questionnaires via email with team at the start of the workshop planning and the formation of the council. Travel to/from workshop are covered under the proposed grant. Additionally, the analysis of the data generated from the transcription of raw quantitative data collected from the questionnaires will be the primary evaluation tool. The time of the grant did not allow for more in-depth interviews. In the end an evaluative summary report will be produced and submitted along with the final performance report submitted along with the Framework For Climate & Weather Education report

Appendix3: AAAS Project 2061 Draft *Building From The Atlas Of Climate & Weather Science Literacy* Agenda In Brief

| <i>Day One</i> | <i>Goals for Learning</i> |
|------------------|---|
| 8:30 - 9:00 | Getting Started |
| 9:00 - 9:30 | The Need for Change |
| 9:30 - 10:15 | Overviews of Project 2061 & This Workshop |
| 10:15 - 10:30 | BREAK |
| 10:30 - 12:30 | Writing a Goal for Student Understanding |
| 12:30 - 1:30 | LUNCH |
| 1:30 - 2:00 | Building a Map |
| 2:00 - 3:30 | Connections |
| 3:30 - 4:00 | Assignments and Reflections |
| <i>Day Two</i> | <i>Teaching for Understanding</i> |
| 9:00 - 9:15 | Reflections & Issues |
| 9:15 - 9:45 | Features of Atlas |
| 9:45 - 10:30 | Connections and Instruction |
| 10:30 - 10:45 | BREAK |
| 10:45 - 11:45 | Benchmark Study Discussion |
| 11:45 - 12:30 | Evaluating Instruction |
| 12:30 - 1:30 | LUNCH |
| 1:30 - 3:30 | Modeling Standards-Based Instruction |
| 3:30 - 4:00 | Assignments And Reflections |
| <i>Day Three</i> | <i>Putting it into Practice</i> |
| 9:00 - 9:15 | Reflections & Issues |
| 9:15 - 10:15 | Unburdening the Curriculum |
| 10:15 - 11:15 | Analyzing Assessment Tasks |
| 11:15 - 11:30 | Team Study Project Assignment |
| 11:30 - 12:30 | Project Work Time |
| 12:30 - 1:30 | LUNCH |
| 1:30 - 2:30 | Project Work Time |
| 2:30 - 3:30 | Presentation And Discussion |
| 3:30 - 4:00 | Final Reflection/Feedback |

AAAS Project 2061 Draft *Building From The Atlas Of Climate & Weather Science*
Literacy Agenda in detail

Day One Goals for Learning

8:30 – 9:00 *Getting Started*

Participants and presenters introduce themselves. Procedural and technical details of the workshop are discussed.

9:00 - 9:30 *The Need for Change*

Exploration of the current state of students' understanding of important ideas in science, mathematics, and technology. Discussion of the need for reform efforts.

9:30 - 10:15 *Overview of Project 2061 & This Workshop*

A brief history of Project 2061 and the "tools" for reform developed at Project 2061. Discussion of the major principles that will influence our continued efforts at reform. Discussion of the challenges ahead as we try to move reform forward and make use of standards and other resources to change classroom practice.

10:15 - 10:30 *BREAK*

10:30 - 12:30 *Writing a Goal For Student Understanding*

Participants will study an adult science literacy goal on the topic of Climate. They will then consider the appropriate steps along the way to literacy for students at different grade levels. Participants will be asked to write learning goals for several grade ranges, consider the nature and usefulness of learning goals, and question how they develop in sophistication through the grades.

12:30 - 1:30 *LUNCH*

1:30 – 2:00 *Building a Map*

Participants will look at the Project 2061 learning goals on the topic of climate and then "walk through" the development of a strand map for that topic, discussing the usefulness and qualities of the learning goals.

2:00 – 3:30 *Connections*

Participants will focus on the connections between benchmarks that are represented in the strand maps. Discussion of how learning goals relate to one another and the different kinds of "connections", including those that appear on the strand maps and those that do

not. Participants will also consider how connections might influence understanding of the ideas and development of learning experiences.

3:30 – 4:00 *Assignments and Reflections*

Participants will discuss a specific learning goal that they will then study for homework, and reflect on the day in writing.

Day Two **Teaching for Understanding**

9:00 – 9:15 *Reflections & Issues*

Group will briefly discuss any questions on the reflections or left over from the previous day.

9:15 – 9:45 *Features of Atlas*

An overview of the major features of the strand maps and the Atlas of Science Literacy. Participants will practice navigating and using the book and the maps

9:45 - 10:30 *Connections and Instruction*

Participants will consider how connections might influence understanding of the ideas and development of learning experiences.

10:30 - 10:45 *BREAK*

10:45 - 11:45 *Benchmark Study Discussion*

Participants will discuss the benchmark they studied for homework and reflect on the process they used to examine it.

11:45 - 12:30 *Evaluating Instruction*

Participants will discuss how we can evaluate learning experiences according to specific learning goals.

12:30 - 1:30 *LUNCH*

1:30- 3:30 *Modeling Standards-Based Instruction*

Participants will be taken through a lesson This will need to change to reflect the climate & weather focus of the special workshop that targets the learning goal they have studied and discussed.

3:30 – 4:00 *Assignments And Reflections*

Participants will receive a reading assignment for the next day and reflect on the day in writing.

Day Three Putting it into Practice

9:00 – 9:15 *Reflections & Issues*

Group will briefly discuss any questions on the reflections or left over from the previous day.

9:15 – 10:15 *Unburdening the Curriculum*

Participants will review a procedure for removing parts of the curriculum that do not contribute to science literacy.

10:15 -11:15 *Analyzing Assessment Tasks*

Participants will examine two assessment tasks using the Project 2061 process for analyzing an assessment.

11:15 -11:30 *Team Study Project Introduction*

The Team Study Project will focus on a specific learning goal that the participants choose themselves. Participants will be asked to prepare a report on that learning goal, bringing together all the information needed to teach or design a lesson around that learning goal, including some rough sketches of questions, activities, and assessments.

11:30 -12:30 *Project Work Time*

12:30 - 1:30 *LUNCH*

1:30 - 2:30 *Project Work Time*

2:30 - 3:30 *Presentation And Discussion*

Each team will present their Team Study Project and participants will discuss them.

3:30 – 4:00 *Final Reflection/Feedback*

Participants will reflect one last time on the workshop in writing.



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
OFFICE OF OCEANIC AND ATMOSPHERIC RESEARCH
Office of Global Programs
1100 Wayne Ave. Suite 1210
Silver Spring, MD 20910-6603

John Lilley
NOAA Office of Education
14th and Constitution Avenue, NW
HCHB, Room 6869
Washington, DC 20230

Re: Letter of Support – NOAA Education Mini-Grant Proposal from the Climate Program Office titled *Developing A Framework For Climate & Weather Education*

Dear Ms. Koch,

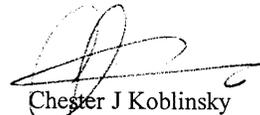
On behalf of the Climate goal, I am pleased to submit this Letter of Support for the proposal, titled *Developing A Framework For Climate & Weather Education* from NOAA's Climate Program Office, which is being submitted in response to the 2006 NOAA Education Mini-Grants request for proposals. The principal investigator on the proposal is Sidney Thurston, U.S. OCO Associate Program Manager and the co-principal investigator is Frank Niepold, CPO Education and Literacy specialist.

We strongly support this project to help NOAA, and all partners involved in the development of a workshop and framework aimed at building climate and weather literacy capacity. Additionally the proposal catalyzes coordination and expansion of limited resources within federal agencies and other organizations to support the cross-cutting priority of environmental literacy focused on climate literacy and weather literacy. By bringing together an established group of federal science agencies, curricular developers and science organizations to understand the current AAAS Project 2061 research relative to the Climate & Weather strand maps, we hope to expand the portfolio of climate literacy focused curricular materials in the nations schools and educational settings.

Through collaboration with the AAAS climate & weather team the to be formed *Framework For Climate & Weather Education Council* (FCWEC) intends to expand the AAAS scope of work by developing a framework that provides a map of how we can create climate and weather lessons using the AAAS Project 2061 research and products.

The Climate Program Office is committed to support the *Developing A Framework For Climate & Weather Education* project proposed by the offices Education and Outreach team as described in the project proposal. If you have any questions, please feel free to contact me directly at Chester J Koblinsky <Chester.J.Koblinsky@noaa.gov> or (301) 427-2334.

Sincerely,



Chester J Koblinsky

Director, Climate Program Office



Printed on recycled paper





March 9, 2006

Mr. Frank Niepold
Frank Niepold
Climate Education Fellow, NOAA CPO
Climate Program Office- K-14 Education
1100 Wayne Ave., Suite 1215 D
Silver Spring MD 20910

Dear Frank:

CIRES Outreach is excited to learn of your proposal for the NOAA Education Mini Grant program that will leverage the work of the AAAS Project 2061 benchmarks relating to Weather and Climate and help NOAA and its partners wrestle with the tough questions of how climate science should best be taught in the Earth System Science Curriculum.

As you know, CIRES works closely with the NOAA climate researchers. Our well-regarded Inquiry Workshops for scientists help researchers understand what concepts relating to their science is taught at what grade level, how the science education standards help determine the scope and sequence of science education, and how to use inquiry approaches in conveying their research to students and other non-technical audiences. The Climate Change Collection developed through a NSF grant includes some existing NOAA resources, and our Climate Literacy Project, if funded, will be greatly enhanced should your mini-grant be funded as well.

We are strongly supportive of your efforts in whatever ways we can be, and share your enthusiasm and dedication to promoting a climate savvy, environmentally literacy society.

Sincerely,

Mark S. McCaffrey
Science Communication Specialist
CIRES Outreach
University of Colorado at Boulder
UCB 449
Boulder, CO 80309