

(UCAR-EO) help to translate NCAR's scientific programs, methodologies, and technologies, and their societal benefits to over 80,000 visitors to the NCAR Mesa Laboratory each year. This is accomplished through the implementation of exhibits, guided tours, an audiotour, programs for school groups, and a teachers' guide to exhibits which is currently in development. The Climate Discovery Exhibit unveiled in July 2003 offers visitors a visually engaging and informative overview of information, graphics, artifacts, and interactives describing the Earth system's dynamic processes that contribute to and mediate climate change, the history of our planet's changing climate, and perspectives on geographic locations and societies around the world that have potential to be impacted by a changing climate. Climate Futures, an addition to this exhibit to open in the summer of 2004, will help visitors to understand why scientists seek to model the global climate system and how information about past and current climate are used to validate models and build scenarios for Earth's future climate, while clarifying the effects of natural and human-induced contributions to these predictions. UCAR-EO further strives to enhance public understanding and to dispel misconceptions about climate change by bringing scientists' explanations to visitors who learn about atmospheric sciences while on staff-guided tours and/or while using an audiotour developed in 2003 with a grant from the National Science Foundation. With advanced reservations, a limited number of visitors may experience demonstrations of climate models in the NCAR Visualization Laboratory. An instructional module for approximately 5,000 visiting school children and a teachers guide for the Climate Discovery Exhibit is in the development and field testing phase with a goal to promote interest in and understanding of how climate change studies align with K-12 science standards. Over the next year, much of the content will become available to national audiences via the new NCAR EO web site (www.ncar.ucar.edu/eo), UCAR-EO's summer teachers workshops, and sessions at the National Science Teacher Association meetings.

ED33A-03 1400h

Climate Change and K-12 Professional Development Opportunities at UCAR/NCAR

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Recognizing the paucity of information in K-12 textbooks related to climate change, UCAR's Office of Education and Outreach has developed two summer workshops designed to enhance earth science teacher's knowledge of climate and global change. The two workshops, Climate and Global Change for Geoscience Educators and Modeling in the Geosciences, comprise a significant component of UCAR/NCAR's teacher professional development efforts. The overall goals of the workshops are to provide standards-relevant science content, instruction on easy to implement inquiry-based classroom activities, and a broad overview of the geosciences to educator-leaders who are teaching sciences at the middle and high school levels. In its third year, the Climate and Global Change for Geoscience Educator workshop (sponsored by NCAR) focuses on the scientific foundation of climate change with an Earth system science focus and highlighting societal impacts, mitigation opportunities, and policy perspectives. Summer of 2004 will be the second year the Modeling in the Geosciences (sponsored by NASA) has been offered. This workshop explores modeling as a tool for better understanding Earth as a system including in-depth investigation of how scientists use climate models to better understand change. Both workshops include presentations by leaders in scientific research, instruction in appropriate technologies, standards based activities, field trips, project work, and discussions about pedagogy, educational standards, and classroom implementation. Both workshops use distance-learning resources to extend the experience past the summer residency, thus providing ongoing support and community mentoring opportunities. Applications for the workshops have far outweighed available space suggesting a need for such workshops. The selection process takes into account the need for a diverse group of participants, balanced between middle and high school educators, with a commitment to sharing the information

and resources that they receive through the workshops with colleagues in their home school districts via additional workshops, seminars, and presentations. This presentation will share the results of ongoing evaluation efforts of both workshops and a follow-up discussion of effective classroom implementation strategies.

ED33A-04 1415h

Global Climate Change: using field studies to prepare the next generation of scientists

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Global Climate Change is a new and invigorating concept in the pre-college classroom. To some it portends the altering of the Earth's climate by introducing anthropogenic influences and for others the natural progression of the Earth's systems. Regardless, climate change involves a plethora of environmental interactions and comprehension is a challenge for both teachers and students. This paper addresses a field studies program that prepares students to complete research projects associated with climate models affecting montane environments. It emphasizes a partnership between researchers from universities, government agencies, and public schools and their support of pre-college students in inquiry learning and research activities.

Beginning in 1994 students from a Pennsylvania high school and schools in Scotland have engaged in biannual holistic studies of montane and glacial environments with the objective of completing investigations concerning the energy budgets of these environments. This paper will focus on 2000 and 2002, and the support and partnership of Dr. Jeff Hare and CIRES in designing, supporting, and providing professional interpretations, while assisting teachers and students toward the completion of recognized papers regarding climate studies. Introducing students to the employment and operation of complex field equipment will be discussed. URL: <http://www.wyoming2002.org>

ED33A-05 1430h

What's Happening in my Backyard? A New England Focus on Global Climate Change

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Global climate change remains a difficult concept for the general public to understand. Melting ice sheets and ozone holes have little to do with their everyday lives. Despite this, there is strong evidence of widespread concern of global warming and climate change due to human activities. In order to educate New Englanders concerning climate change, the Atmospheric Investigation, Regional Modeling, Analysis and Prediction (AIRMAP) project has chosen to focus on developing and disseminating data and information on change within New England. Our approach is based on the notion that individuals can connect and understand climate change in their own backyards, whether it is warmer winters, an increase in precipitation, a longer growing season, more ozone exceedance days, or earlier lilac blooms. This data is also made available in easy to view formats on the AIRMAP web page, along with real-time air quality data, so that the general public can investigate change in their backyards on their own. Our experience suggests that students, teachers, and the general public become more interested in the global climate change when they connect it to their local environment.

URL: <http://airmap.unh.edu>

ED33A-06 1445h

Is This Global Warming? Communicating the Intangibles of Climate Change

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Unlike weather, which is immediate, tangible, and relevant on a daily basis, climate change is long-term,

slow to evolve, and often difficult to relate to the public's daily concerns. By explaining global-change research to wide and diverse audiences through a variety of vehicles, including publications, exhibits, Web sites, and television B-roll, UCAR has gained experience and perspective on the challenges involved. This talk will explore some of the lessons learned and some of the key difficulties that face global-change communicators, including: -The lack of definitive findings on regional effects of global change - The long time frame in which global change plays out, versus the short attention span of media, the public, and policy makers -The use of weather events as news pegs (they pique interest, but they may not be good exemplars of global change and are difficult to relate directly to changes in greenhouse-gas emissions) -The perils of the traditional journalistic technique of point-counterpoint in discussing climate change -The presence of strong personal/political convictions among various interest groups and how these affect the message(s) conveyed

ED34A CC: 518 C Wednesday 1530h

Multinational Education and Outreach Programs in the Earth and Space Sciences

Presiding: H Gaonac'h, Universit du Qubec Montral; C Laj, Laboratoire des Sciences du Climat et de l'Environnement

ED34A-01 1530h

The Benefits and Challenges of Education and Public Outreach Efforts Associated With Scientific Research Programs

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Earth and space science research programs, institutions, and societies the world over are increasingly attentive to the importance and value of scientists' involvement in effective education and public outreach (EPO). At the Fall 2003 meeting of the American Geophysical Union (AGU), the authors of this paper convened a successful session where scientist-educator partnerships presented papers about their EPO programs and the benefits and challenges of having them closely associated with scientific research programs, institutions, and spaceflight projects. It was the largest education session out of the unprecedented 24 sessions that were approved. Our session's invitees and contributors represented multiple AGU space and Earth science disciplines, and included a mix of large, medium, and small EPO programs and projects. We surveyed all poster and oral presenters to ask them for the top three benefits and three challenges they faced in their work. This paper will summarize the results of this survey. We intend for our paper to be a valuable resource for the broader international community of those interested in optimizing the integration of exemplary EPO programs with scientific research programs, and in supporting effective EPO roles for research scientists.

ED34A-02 1545h

S'COOL: Providing Flexibility to Explore Science with NASA in 64 Countries

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Students' Cloud Observations On-Line, S'COOL is a hands-on project that involves schools of every grade in collaborative research on Earth's climate with NASA scientists to create learning opportunities and to educate inquisitive minds. Students make ground truth observations and record the type, amount, and features of clouds in the sky at the exact time the satellite passes over their location. The observations are used to validate the Cloud and the Earth's Radiant Energy System (CERES) instrument on-board the new generation satellites Terra, Aqua and TRMM. To observe and send the results to NASA, teachers and students go through the following three steps: 1) obtain the satellite overpass schedule, 2) observe the clouds and record the observation on the report form provided, 3) insert the observations in the NASA database. To facilitate communication with the various countries and to help the teachers to prepare introductory lessons on clouds and meteorology, NASA provides educational material and report forms in different languages. To perform step 1 and 3, schools can follow the on-line procedures or interact with the S'COOL team through e-mail, phone or fax. The many languages in which the educational material is translated and the different options that the schools have to interact with a group of NASA scientists provide the S'COOL project with a high flexibility. Thanks to this schools from many countries are now registered and active observers. This paper will focus on the different strategies adopted to involve the schools in countries where teaching techniques differ substantially from the ones adopted in the United States or where the Internet is a tool that just recently has reached the schools.

ED34A-03 1600h

Volcano outreach and education at GEOTOP

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Within research centers, there is a growing consensus about the importance of public outreach programs and the need for them to comprise a science education component. This requires the focused efforts of a wide spectrum of specialists, including scientists. At the GEOTOP center in Quebec we are seeking to bring our unique science perspective to educators and the public. GEOTOP is an interuniversity center whose research covers a many areas of geo-science and includes researchers from diverse specialties (www.geotop.uqam.ca). The main outreach effort is to publicize the center's research; a recent initiative focuses on the young public via the Vicki Volka (www.vickivolka.uqam.ca) web site. Volcanic activities on the Earth and in our solar system hold an extraordinary attraction for the general public. In recent years, volcanic news has frequently been disseminated through the media. But the understanding of these news items is beyond the nonspecialist so that the news itself is often reduced to the human impacts - such as the evacuation of thousands of inhabitants or the closure of an airport - to the detriment of a scientific understanding of the natural processes at work. Volcanoes provide a unique angle from which many different aspects of our world can be viewed including not only its geography, politics and culture, but also its internal dynamics as well as geodynamics elsewhere in the solar system. Through the outreach to Francophone internauts, GEOTOP has begun to improve its public relations. This includes visits to primary schools aimed at educating the young public about volcanic activities as well as bringing the results of research projects to the general public. This provides a dynamic approach to better integrating real-time volcanic news with existing educational standards as well as a scientific methodology and latest research efforts. While francophones regularly visit the web site, there is a growing demand to enlarge the site to include other languages so as to reach a broader audience around the world.

ED34A-04 1615h

Proposed School of Earth And Space Sciences, Hyderabad, India

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The hallmarks of the proposed school in the University of Hyderabad, Hyderabad, India, would be synergy, inclusivity and globalism. The School will use the synergy between the earth (including oceanic and atmospheric realms), space and information sciences to bridge the digital divide, and promote knowledge-driven and job-led economic development of the country. It will endeavour to (i) provide the basic science underpinnings for Space and Information Technologies, (ii) develop new methodologies for the utilization of natural resources (water, soils, sediments, minerals, biota, etc.) in ecologically-sustainable, employment-generating and economically-viable ways, (iii) mitigate the adverse consequences of natural hazards through preparedness systems, etc. The School will undertake research in the inter-disciplinary areas of earth and space sciences (e.g. climate predictability, satellite remote sensing of soil moisture) and linking integrative science with the needs of the decision makers. It will offer a two-year M.Tech. (four semesters, devoted to Theory, Tools, Applications and Dissertation, respectively) course in Earth and Space Sciences. The Applications will initially cover eight course clusters devoted to Water Resources Management, Agriculture, Ocean studies, Energy Resources, Urban studies, Environment, Natural Hazards and Mineral Resources Management. The School will also offer a number of highly focused short-term refresher courses / supplementary courses to enable cadres to update their knowledge and skills. The graduates of the School would be able to find employment in macro-projects, such as inter-basin water transfers, and Operational crop condition assessment over large areas, etc. as well as in micro-projects, such as rainwater harvesting, and marketing of remote sensing products to stake-holders (e.g. precision agricultural advice to the farmers, using the large bandwidth of thousands of kilometres of unlit optical fibres). As the School is highly interdisciplinary, it will seek to cooperate not only with national public institutions, such as NRSA, NGRI, AMD, IMD, NIO, and national industrial houses, such as Reliance, but also with international institutions such as WMO, Geneva, CIRES and NOAA in Boulder, Colorado, USA, and University of Paris, Paris, France, etc.

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