Earth science programs whose focus is primarily an undergraduate education do not often have the funding to take students to very many conferences which could expose the student to new research as well as possible graduate programs and employment opportunities. Conferences also give the more enthusiastic and hardworking students a venue in which to present their research to the meteorological community. In addition, the California University services largely lower income counties, which make student attendance at conferences even more difficult even though the student in SW PA may be individually motivated. This issue is compounded by the fact that the Meteorology Concentration within the Earth Science department at Cal U is composed of only two full-time Professors, which limits the amount of research students can be exposed to within a classroom setting. New research ideas presented at conferences are thus an important mechanism for broadening what could be an isolated program. One way in which the meteorology program has circumvented the funding problem to a certain extent is through an active student club. With nearly 60 majors (3/4 of which are active in club activities, the meteorology club is able to execute a variety of fundraising activities. Money that is raised can then request from student services matching funds. Further money is given to clubs, which are very active not only in fundraising, but using that money for academic related activities. For the last 3 years the club budget has been in the neighborhood of $4500. The money has then been used to partially finance student registration and accommodation costs making conference attendance much more affordable. Normally 8-16 students attend conferences that they would otherwise not be able to attend without great expense. There are times when more than 16 students wish to attend, but travel arrangements prohibit more than 16. Moreover club money is also use to supplement student costs on a summer storm chasing intercept course.

ED12A-0128 1330h POSTER

The NOAA Center in Atmospheric Sciences (NCAS) at Howard University

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The National Oceanic and Atmospheric Administration (NOAA) of the Department of Commerce established the NOAA Center for Atmospheric Sciences (NCAS), a Cooperative Science Center, in fall 2001 to support the development of quality education to students at minority serving institutions while meeting the prescribed goals of NOAA and the nation. NCAS was established to research some of the critical environmental conditions occurring nationally and globally, and to provide opportunities and programs for students to pursue careers in atmospheric, environmental, and oceanic sciences and remote sensing. A primary goal is to increase the number of highly qualified, well trained graduates in the fields of NOAA related atmospheric sciences. NCAS is led by Howard University, in collaboration with three partners - Jackson State University, the University of Texas at El Paso, and the University of Puerto Rico at Mayaguez. This presentation will highlight the activities and accomplishments in research, education, and outreach of NCAS over its first two years of existence. The primary benefactor of NCAS has been the Howard University Program in Atmospheric Sciences (HUPAS), a comprehensive graduate program in atmospheric sciences with core focus areas of atmospheric chemistry, atmospheric physics, and geophysical fluid dynamics.

ED12A-0129 1330h POSTER

A Non-science Major Undergraduate Seminar on the NASA Earth Observing System (EOS): A Student Perspective

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Titled "Observing Climate Change From Space-what tools do we have?", this non-science major freshman seminar at UCLA is the culmination of a year-long interdisciplinary program sponsored by the Institute of the Environment and the College Honors programs at the University. Focusing on the anthropogenic and natural causes of climate change, students study climate forcings and learn about satellite and other technological means of monitoring climate and weather. NASA's Terra satellite is highlighted as one of the most recent and comprehensive monitoring systems put into space and the role of future NASA platforms in the "A-train"-constellation of satellites is discussed. Course material is typically presented in a Power-Point presentation by the instructor, with assigned supplementary reading to stimulate class discussion. In addition to preparing lectures for class presentation, students work on a final term paper and oral presentation which constitutes the majority of their grade. Field trips to the San Gabriel mountains to take atmospheric measurements with handheld sunphotometers and to JPL, Pasadena (CA) to listen to a NASA scientist discuss the MISR instrument aboard the Terra satellite help bring a real-world perspective to the science learned in the classroom. In this paper, we will describe the objectives and structure of this class and present measurement results taken during the field trip to the San Gabriel Mountains. In this context we will discuss the potential relevance of hands-on experience to meeting class objectives and give a student perspective of the overall class experience.

ED12A-0130 1330h POSTER

The Role of Geoscience Departments in Developing the Earth Science Teacher Workforce: A Workshop Report

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Undergraduate geoscience departments play a critical role in the preparation of future teachers. This workshop sponsored by AGU and NAGT with funding from NSF brought together geoscience faculty known for their work in teacher preparation, Earth Science teachers and representatives from schools of education. Discussion focused on critical contributions of geoscience departments in recruiting, mentoring and advising future teachers; designing research and teaching experiences for future teachers; developing links between education and geoscience departments; supporting alumni in the teaching profession; and the role of introductory courses in teacher preparation. Each participant contributed a short essay describing the strengths of their program for teachers. The essay collection provides a snapshot of the breadth and innovative nature of current practice in geoscience departments around the country (serc.carleton.edu/NAGTWorkshops/teacherprep03). A summary of the program, powerpoint presentations, and discussion highlights are also available on the website. Of special interest are 1) approaches to introductory courses including revision of teaching methods in the general introductory course to demonstrate a range of pedagogy; separate introductory course sections or laboratory sections for pre-service teachers; and an integrated science approach for pre-service elementary teachers; 2) results of brainstorming sessions on mechanisms for recruiting and supporting Earth Science teachers suggesting a range of activities taking place before, during, and after participation in the geoscience program; 3) a summary of why teaching and research experiences are important for pre-service teachers and recommendations for program elements that lead to successful experiences and 4) plenary presentations on lessons learned from the NSF programs (Prival) and effective program design (Ridkey).

URL: http://serc.carleton.edu/NAGTWorkshops/teacherprep03

ED12A-0131 1330h POSTER

Opportunity to Participate in ESSE 21: The 2003 Call for Participation

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Earth System Science Education for the 21st Century (ESSE 21), sponsored by NASA through the Universities Space Research Association (USRA), is a collaborative undergraduate/graduate education program offering small grants to colleges and universities to engage a diverse interdisciplinary community of faculty and scientists in the development of courses, curricula and degree programs and sharing of learning resources focused on the fundamental understanding and application of Earth system principles for the classroom and laboratory. Through an expanded focus including partnerships with minority institutions, ESSE 21 is further developing broadly based courses, educational resources, electronic learning materials and degree programs that extend Earth system science concepts in both undergraduate and graduate classrooms and laboratories. These resources emphasizing the fundamentals of Earth system science advance the nation's broader agenda for improving science, technology, engineering and mathematics competency. The thrust to establish Earth system and global change science within the classrooms of colleges and universities is critical to laying and extending the foundation for knowledge-based decision making in the 21st century by both scientists and society in an effort to achieve sustainability. ESSE 21 released a Call for Participation (CFP) in the Fall of 2002 soliciting proposals from undergraduate institutions to create and adopt undergraduate and graduate level Earth system science content in courses, curricula and degree programs. In February 2003, twelve college and university teams were competitively selected through the CFP as the Year 1 and Year 2 Program participants. Eight of the participating teams are from minority institutions. The goal for all is to effect systemic change through developing Earth system science learning materials, courses, curricula, degree tracks or programs, and departments that are self-sustaining in the coming decades. ESSE 21 offers an expanded infrastructure for an interactive community of educators and researchers including minority participants that develops interdisciplinary Earth system science content. Emphasis is on the utilization of NASA resources involving global change data, models, visualizations and electronic media and networks. The ultimate aim of ESSE 21 is to expand and accelerate the nation's realization of sound, scientific interdisciplinary educational resources for informed learning and decision-making by all from the perspective of sustainability of the Earth as a system. The next Call for Participation will be released in late 2003.

URL: http://esse21.usra.edu

ED12B MCC: Level 1 Monday 1330h

Building a Better Classroom: Improving Teacher Education Through the Earth System Science Education Alliance Posters

Presiding: **T G Schwerin,** Institute for Global Environmental Strategies**; R Myers,** Wheeling Jesuit University

ED12B-0132 1330h INVITED POSTER

Facilitation: An Essential Ingredient in Online Coursework

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Mid-continent Research for Education and Learning (McREL) partnered with the Colorado School of Mines (CSM) to offer the ESSEA Earth System Science Online Course for Middle School Teachers during the 2002-2003 school year. During the two semesters that the course was offered, we were able to retain 75% of our enrollees. We found that course facilitation was the key ingredient in retaining this large number of studentswho are not only scattered across the U.S., but around the worldin a rigorous online course. In this poster session, we will share what we have learned about online facilitation as part of this course, and how this knowledge might translate into other online coursework. Online facilitation begins as soon as a student enrolls in the course. When a student registers online or at CSM, McREL receives notification and then sends course materials and e-mail and written confirmation to the enrollee within 24 hours. This sets the tone for the type of communications that students can expect during the 16-week course. McREL facilitators know how time consuming monitoring participant progress can be, but feel strongly about its importance when facilitating learners who are working in small groups and are completing independent research. Timely monitoring of discussion spaces and e-mail messages is essential to maintaining a high student-retention rate. Kearsley (2000) confirms this when he states that, "the most

important role of the instructor in online classes is to ensure that there is a high degree of interactivity and participation." In the ESSEA courses, the isolation of students working independently on classroom applications and reflection is balanced with group construction of interactions and causal chains. Each step of the way facilitators use guided questioning in group discussion sessions and serve as a mentor when participants develop individualized classroom assignments, giving participants the opportunity to apply what they have learned in a supportive environment (Wilson & Berne, 1999).

ED12B-0133 1330h INVITED POSTER

Pitfalls and Problems from the Professor's Prospective: Earth System Science Education Alliance

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In response to the need to improve scientific literacy of teachers and K-12 students in Toledo and Ohio, the University of Toledo joined the Earth System Science Education Alliance to offer the 5-8^{th} grade Earth Science course in the fall of 2001. We have been teaching the course twice a year since that time. The use of the Internet for the delivery of higher education courses has dramatically increased especially at the University of Toledo where over 6,000 students a semester take distance-learning courses. However, our clientele of in-service teachers seem to have more than their share of technological problems, possibly due to the length of time since their graduation and lack of computer knowledge. Overcoming this technological hurdle has proven to be a major obstacle in the successful completion of the course, and, indeed, is the major cause of students' withdrawals from the course. Additional problems we have needed to address are the correct use of Internet materials, up to and including blatant plagiarism and computer etiquette. In our presentation we will discuss our findings from pre- and post-course surveys on teachers' comfort levels with the medium, as well as innovative ways we have dealt with other problems unique to distance learning.

ED12B-0134 1330h INVITED POSTER

USING AN ESSEA EARTH SYSTEMS SCIENCE COURSE IN A WEB-ENHANCED SETTING FOR PRE-SERVICE MIDDLE SCHOOL TEACHERS

William Slattery (william.slattery@wright.edu)

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The ESSEA Middle School course was originally designed as an asynchronous on-line tool for teacher professional development. The ESSEA course uses real world events such as deforestation, volcanic eruptions and hurricanes to develop content understandings of Earth systems processes and to model pedagogical best practices appropriate for middle school students. The course is structured as multiple three-week learning cycles. During week one of each cycle, participants are formed into Sphere groups to study the impact of the event under consideration on the atmosphere, biosphere, hydrosphere, or lithosphere. During week two, Event teams are formed to include members from each of the previous week's Sphere groups. Together they develop interactions between the different spheres and the event. During week three, teachers develop classroom applications and post them on-line for other participants to comment upon. On-going assessment suggests that in-service teacher participants of the on-line course are more likely to infuse inquiry-based science instruction into their classroom settings and to teach science as a subject integrating Physical science, Life science, and Earth/Space science in their own classrooms It is imperative to develop such characteristics in pre-service teachers as well. Wright State University's undergraduate Middle School teacher preparation program requires that undergraduates seeking Middle Childhood Licensure by the State of Ohio take a course in Earth Systems science that is aligned with the national and state science education standards. Towards this end the ESSEA course has been adapted for use in a web-enhanced setting. Weeks one and two (Sphere and Event study) of the ESSEA Middle School course are used as an integral component of this Earth Systems science course. In this way content knowledge and pedagogical strategies are modeled just as they are in the fully on-line course. Questions raised on-line are the topic of research or experimentation during the face-to-face component of the course. Follow-up interviews and classroom visits to student teaching sites confirm that pre-service teachers are using Earth systems science concepts and cooperative teaching techniques to teach science as an integrated whole.

ED12B-0135 1330h INVITED POSTER

School-Based Multidisciplinary Teacher Team-Building Combining On-Line Professional Development (ESSEA) and Field-Based Environmental Monitoring (GLOBE)

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The multidisciplinary nature of Earth system science provides a strong foundation for integrated science teaching at the K-12 level. In a Minneapolis-St. Paul based project, urban middle school teaching teams composed of language arts and math specialists as well as physical, Earth, and biological science teachers participate in the NASA Earth system science course (ESSEA) and in the international GLOBE environmental monitoring project. For students, the goal is to integrate science throughout the curriculum as well as involve classes from different subjects in a high-interest school science project. For teachers, the project provides greatly-needed classroom support and teacher team building, as well as professional development. The on-line course provides continuity and communication between the different team members. Face-to-face meetings with the instructors on site are conducted every 4 weeks. The problem-based learning approach to environmental issues developed in the ESSEA course lends itself to application to local environmental issues. New ESSEA modules developed for the project highlight environmental problems associated with flooding, introduced species, and eutrofication of lakes and rivers located near the participating schools. In addition, ESSEA participants are certified as GLOBE teachers, and assist their students in monitoring water quality. The synergistic partnership of ESSEA and GLOBE provides an attractive package upon which long-term school-based environmental monitoring projects can be based.

ED12B-0136 1330h POSTER

RITES: Online (Reaching In-service Teachers with Earth Sciences Online)

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The RITES: Online project team (Drs. H. Prentice Baptiste, Susan Brown, Jennifer Villa) believed that the power of technology could not be effectively utilized unless it was grounded in new models of teaching and learning based on a student centered and project based curriculum, that increased opportunities for active, hands-on learning and respect for multiculturalism. We subscribe to an inquiry approach to learning. Specifically, science teaching should actively engage the learners in activities that draw on multiple abilities and learning styles. Recent brain-based research has shown that human beings construct knowledge through actions and interactions within their environment. Learning occurs in communities, and new ideas are linked to previous knowledge and constructed by the learner. Knowledge is acquired by making connections. We believed the aforementioned ideas and points to be equally true for the teacher candidates and inservice teachers participating in the RITES: Online project as well as for their students. The ESSEA science courses were delivered by distance learning via the university WebCt distance education system to teacher candidates (preservice teachers) and inservice teachers. Teacher candidates and inservice teachers were encouraged to use technology when involving their students in science inquiry activities and to record their students' involvement in science activities with digital cameras. Teacher candidates and inservice teachers involve in the ESSEA courses are engaged in earth science inquiry activities relevant to the four spheres (atmosphere, lithosphere, biosphere, hydrosphere) with the students in their classes. This presentation will highlight teacher candidates and inservice teachers in the roles of designer, researcher, and collaborator. Examples of student works will also be a part of the Power point presentation. As a result of our courses our teachers have attained the following positive outcomes: 1) Teacher candidates and inservice teachers are experiencing the inquiry approach to learning about the spheres of our earth. 2) Teacher candidates and inservice teachers are becoming confident in using technology. 3) Teacher candidates and inservice teachers are learning to work cooperatively in-groups and understand what their own students must feel. 4) Teacher candidates and inservice teachers are finding ways to obtain dynamic professional development and not leave their classrooms or homes. 5) Teacher candidates and inservice teachers are developing relationships with other teachers that have an interest in teaching science and a learning community is evolving.

ED12B-0137 1330h POSTER

The Kentucky Earth System Science Education Project

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The Kentucky Earth Systems Education Project is a partnership between Western Kentucky University and Morehead State University to deliver the Earth Systems Science Alliance (ESSEA) courses via the Kentucky Virtual University to classroom teachers in Kentucky and beyond. One goal of the project has been to integrate the courses into the teacher preparation programs at both institutions, as well as providing professional development to practicing K-12 teachers. This presentation will highlight how team teaching courses with professors from different institutions at opposite ends of the state, as well as teaching in a different way, has brought new challenges and its own rewards. The instructors will present their own experiences and lessons learned that resulted in more effective ways of communicating and engaging students in the study of Earth Systems. They will also discuss how teaching strategies used in the course has changed their own teaching and student reactions to their online experience learning earth systems science.

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ED12B-0138 1330h POSTER

Modifications to ESSEA Curriculum at San José State University: Adapting to Teachers' Needs

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San José State University's Geology Department and Program in Science Education piloted their ESSEA program in spring 2003. The initial offering, the High School Course, drew teachers from California and New York. Formative feedback and summative evaluations from participants suggested that the curriculum could be modified to serve its target audience more effectively. Dialog with other ESSEA P.I.s confirmed that many of these suggestions were aligned to the needs of teachers in other states. In summer 2003 SJSU's ESSEA team revised the High School Course in response to these discussions. The revised course contains three 4-week cycles (instead of four 3-week cycles), a slight decrease in group activities and increase in individual assignments, and required readings on "Netiquette." This revised curriculum was shared with four other ESSEA institutions before the start of classes in fall 2003. Future plans include the substitution of one of the existing 4-week cycles with another that focuses on the cosmosphere, and how the Earth spheres may affect and/or respond to more distant influences. Doing so would further benefit teachers by allowing the ESSEA course to satisfy subject matter competency in the geosciences, a requirement of the California Commission on Teacher Credentialing and counterpart authorities in other states.

ED12B-0139 1330h POSTER

Re-Examining the Way We Teach: The Earth System Science Education Alliance Online Courses

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Science education reform has skyrocketed over the last decade thanks in large part to the technology of the Internet, opening up dynamic new online communities of learners. It has allowed educators worldwide to share thoughts about Earth system science and reexamine the way science is taught. The Earth System Science Education Alliance (ESSEA) is one positive offshoot of this

reform effort. This developing partnership among universities, colleges, and science education organizations is led by the Institute for Global Environmental Strategies and the Center for Educational Technologies^{TM} at Wheeling Jesuit University. ESSEA's mission is to improve Earth system science education. ESSEA has developed three Earth system science courses for K-12 teachers. These online courses guide teachers into collaborative, student-centered science education experiences. Not only do these courses support teachers' professional development, they also help teachers implement Earth systems science content and age-appropriate pedagogical methods into their classrooms. The ESSEA semester-long courses are open to elementary, middle school, and high school educators. After three weeks of introductory content, teachers develop content and pedagogical and technological knowledge in four three-week learning cycles. The elementary school course focuses on basic Earth system interactions between land, life, air, and water. The middle school course stresses the effects of real-world events-volcanic eruptions, hurricanes, rainforest destruction-on Earth's lithosphere, atmosphere, biosphere, and hydrosphere, using "jigsaw" to study the interactions between events, spheres, and positive and negative feedback loops. The high school course uses problem-based learning to examine critical areas of global change, such as coral reef degradation, ozone depletion, and climate change. This ESSEA presentation provides examples of learning environments from each of the three courses.

ED12B-0140 1330h POSTER

Earth System Science Online: An Innovative Course for Non-traditional Students, Offered by Hampton University

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Hampton University (HU), a historically black university, is currently offering an innovative online course, Earth System Science Online, for teachers, future teachers, non-science undergraduate majors, and mature non-traditional students continuing their education. Supported by NASA and offered by the Interdisciplinary Science Center at HU, this course targets students interested in an asynchronous web-based learning environment. Often these students are working adults, such as those in the HU religious studies program, or undergraduate athletes who need the flexibility of taking their courses online in the evenings. Participants of this course earn three hours of science credit either graduate or undergraduate through their online explorations of the geosphere, hydrosphere, and atmosphere. The incorporation of specific problem-based case studies, allows students to investigate weather phenomena, deforestation, and the various instruments and satellite data systems that are used to collect and analyze this data. This web-based course utilizes the unique capabilities of the web allowing students to work at a self-regulated pace and at times most convenient to their schedules. The course delivers all lectures, text readings, and course assignments online. Assignments are given on a weekly basis, and participants are expected to conduct independent research that will enrich their online experience. The nature of the web allows the students to easily integrate text and graphics into their assignments and have access to their classmate's work. Participants meet online weekly and interact as a team.

ED12B-0141 1330h POSTER

ESSEA On-Line Earth System Science Course at California State University Northridge

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The ESSEA on-line Earth System Science course at California State University Northridge has been coordinated with the Los Angeles Unified School District since 2000. We have offered the three educational modules (K-4, 5-6, 9-12), one module per semester. The teachers have utilized these courses for both credential and service credits. The impacts on the teacher's classroom were: teachers were educated in Earth System Science (ESS) Analysis and problem-based learning, some teachers implemented the concepts and associated lesson plans, and the student's awareness of ESS improved. Our challenges have included the strategies for teacher recruitment, participation, and retention. The high school module has been incorporated into a course for the geology option in secondary teaching. The geology students have developed an ESS module for the 1994 Northridge earthquake. The course has related connections to our California Science Project and Eisenhower/ Improving Teacher Quality program for in-service teachers, and the new California science standards.

ED12C MCC: 3012 Monday 1340h

Polar Attraction: Linking Polar Science With Education and Outreach I *(joint with C)*

Presiding: **S L Pfirman,** Barnard College, Columbia University**; R E Bell,** Lamont-Doherty Earth Observatory

ED12C-01 1345h INVITED

Writing About Polar Regions for the General Public

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The Earth's polar regions hold an extraordinary attraction for members of the general public. In recent years, tales of polar exploration and derring-do have come to the public's attention through films, documentaries, novels and biographies of the early explorers. But the modern scientific exploration of Antarctica and the Arctic remains much less accessible to the lay public, and is often relegated by newspapers and magazines to disaster storiesfor instance the discovery of a hole in the ozone layer over Antarctica, the disintegration of polar ice shelves because of global warming or even tragic accidents involving scientists themselves. As Features Editor of New Scientist, I visited Antarctica twice under the NSF science media program and made several research trips to the Arctic, each time writing magazine pieces about my experiences for the public. I have also recently published a popular book "Snowball Earth" about ancient ice, aimed at the intelligent lay person. I will discuss several different writing approaches for integrating descriptions of scientific research with the romance of Antarctica and the Arctic, in order to stimulate the imagination of lay people who are afraid of science, but ready to be captivated by ice.

ED12C-02 1405h INVITED

A Journalist's View From the Bottom of the Earth

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Each year, a few journalists travel to Antarctica under the aegis of the National Science Foundation, to report about research at the ends of the earth. National Public Radio science correspondent Richard Harris took that trip in November, 2000. Listeners, readers and viewers are fascinated by exotic locales, so a trip to the ice provides an ideal backdrop to report on topics such as limnology and glaciology, which are otherwise unlikely to make the news. Journalists have to be flexible and creative - just as the researchers do - to overcome constraints imposed by weather and logistics. In this case, a trip to the West Antarctic Ice Sheet was canceled at the last minute and replaced with a trip to study the chemistry of an icebound lake in the McMurdo Dry Valleys. But the essential ingredient for a compelling story remained the same: Scientists, willing to endure hardship to pursue their passion.

ED12C-03 1425h INVITED

The Marketability of Mass Media: Why Newspaper Readers in Texas Want to Hear About Polar Research

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Stories about exploration and adventure play well in any market, even if they are about science, a topic traditionally loathed by journalists. In April 2003 I traveled with the National Science Foundation to cover research activities at the North Pole Environmental Observatory. Surprisingly, audiences in the Southwest couldn't get enough of hearing about researchers from the Northwest drilling holes in the ice at the ends of the earth. I discuss the challenges of gathering stories in a polar environment, the reaction from the general public, and ways to increase the visibility of earth sciences in the mass media.

ED12C-04 1445h INVITED

The Role of Science Museums in Polar Outreach and Education

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Research sponsored by NSF and other funding agencies in the Antarctic and Arctic are the equivalent of NASA's space program. The public is fascinated by the exotic landscape, the hardship and adventure facing scientists who work in extreme environments, and the remote, inaccessible locations. To take maximum advantage of the potential for public outreach, scientists and funders must increase access and the flow of information to media and schools as well as institutions involved in public science education, such as science museums. The Exploratorium, an interactive science museum in San Francisco, received support from the Artists & Writers program of the Office of Polar Programs, NSF, for a 6-week webcast expedition to Antarctica in 2001/2002. Science Producer Mary Miller will describe the project Live from Antarctica: Scientific Journeys from McMurdo to the South Pole. The project involved daily live Internet broadcasts to the museum floor and out on the World Wide Web and an extensive website and museum activity center.

URL: http://www.exploratorium.edu/origins/antarctica

ED12C-05 1505h

Integrating Research and Education in NSF's Office of Polar Programs

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The National Science Foundation invests in activities that integrate research and education, and that develop reward systems to support teaching, mentoring and outreach. Effective integration of research and education at all levels can infuse learning with the excitement of discovery. It can also ensure that the findings and methods of research are quickly and effectively communicated in a broader context and to a larger audience. This strategy is vital to the accomplishment of NSF's strategic goals of ensuring a world-class science and engineering workforce, new knowledge across the frontiers of science and engineering, and the tools to get the job done efficiently and effectively. The NSF's Office of Polar Programs sponsors educational projects at all levels of learning, making full use of the variety of disciplinary and interdisciplinary studies in the polar regions to attract and invigorate students. An array of efforts from the Arctic and Antarctic scientific communities link research activities with education. There has been an advance from the beneficial but isolated impacts of individual researcher visits to K-12 classrooms to large-scale developments, such as field research experiences for teachers and undergraduate students, online sharing of polar field experiences with rural classrooms, the institution of interdisciplinary graduate research programs through NSF initiatives, and opportunities for minority and underrepresented groups in polar sciences. The NSF's criterion for evaluating proposals based upon the broader impacts of the research activity has strengthened efforts to link research and education, resulting in partnerships and innovations that infuse research into education from kindergarten through postdoctoral studies and reaching out to the general public. In addition, the Office of Polar Programs partners with other directorates at NSF to broaden OPP's efforts and benefit from resources and experience in the Education and Human Resources Directorate, the Geosciences Education program, the Environmental Research and Education program and others. This presentation will provide an overview of the direction of science education in the Office of Polar Programs and highlight some important and long-lasting ventures. It is intended to encourage the Arctic and Antarctic scientific communities to look for additional avenues to bridge their research with education.