New Advances in Deep Submergence Technology Using Remotely Operated Vehicles, High-Bandwidth Ship-to-Shore Satellite Technology, and Internet 2

Robert D. Ballard1 (ballard@nsf.gov)

Dwight F Coleman2 (dcoleman@nsf.gov)

1University of Rhode Island, Graduate School of Oceanography, Narragansett, RI 02882, United States

In August of 2003, the authors carried out a major oceanographic research cruise to the Black Sea and Central Mediterranean. Standard R/V Kastoria was used undersea vehicles linked in real time to scientists, engineers, and students aboard. Two vehicle systems, including an ROV and a towed vehicle, worked in tandem using multiple high-definition video cameras and sonar systems to investigate and sample a number of geological and archaeological sites. Scientists and engineers controlled the vehicles on a continuous basis in a shipboard command/control center. From a menu of more than twenty video feeds and computer generated displays within the control center, twelve video feeds from the vehicles below, including two high-definition camera feeds, and six audio channels were transmitted via a shipboard satellite-tracking antenna to a receiving site in the United States. From there the signals were sent to a processing center and then placed on Internet 2 and distributed to a number of participating universities across the country. Scientists and engineers at these universities were able to participate in real time in shore-based control centers similar to the one at sea. Two-way audio communications made it possible for participants down on the floor to access the data streams aboard ship and gave them the ability to ask the project scientists and engineers questions while they carried out their research.

ED51C-1200 0830h POSTER

The Hundred Year Hunt for the Red Sprite

Walter A. Lyons1 (970-568-7664; walyone@nmsu.edu)

Mickey Schmidt2 (719-337-2727; Mickey.Schmidt@asu.edu)

1FMA Research, Inc., 46005 Weld County Road 13, Fort Collins, CO 80525, United States

2USAF Academy, Planetary Center, for Educational Multimedia, USAF Academy, CO 80840, United States

This presentation reviews an NSF Informal Science Education project directed by the PI of an ongoing NSF-supported research program on red sprites. For over 100 years, anecdotally reported sprites have been seen, and the literature has persisted of strange luminous apporitions occurring high above undisturbed Earth's surface. Current research and resource needs include a calendar of events, newly created animations, sprite satellite data, sprite database, and video collections, and thematic education package.

URL: http://solarsystem.nasa.gov

ED51C-1202 0830h POSTER

NASA's DAAC Alliance Annual and Electronic Publishing: Current Uses of Earth-Observing Data to a Broad Audience

Laurie J Schmidt1 (303-735-1055; laschmidt@gss.nasa.gov)

Mischon Scott2 (303-492-1846; mischon@gss.nasa.gov)

1National Snow and Ice Data Center DAAC, University of Colorado Campus Box 449, Boulder, CO 80309-0449, United States

2NOAA Paleoclimatology, 325 Broadway, Boulder, CO 80305-0449, United States

The NASA Distributed Active Archive Centers (DAACs) are the data management and user services branches of NASA's Earth Observing System Data and Information System (RODIS). The DAACs process, archive, document, and distribute data from NASA's past and current Earth-observing satellites and field measurement programs. DAACs were established in the early 1990s, and each DAAC serves a specific science discipline. The DAAC Alliance Annual is a multimedia publication designed to highlight applications and research uses of satellite data archived at the NASA DAACs. Feature articles included in the publication describe research projects that use NASA satellite data. To facilitate understanding by a broad audience, which includes scientists, policymakers, and the general public, the articles are written at a lay audience level and include detailed explanations of scientific processes. Articles from the DAAC Alliance Annual are also published electronically on NASA's Earth Observatory and DAAC Alliance Web sites. The 9th edition of the NASA DAAC Alliance Annual publication, titled "Distributed Active Archive Centers Alliance: Supporting Earth Observing Science 2003," highlights the use of NASA satellite data in a variety of research disciplines, including oceanography, meteorology, climatology, land processes, cryospheric processes, and human influences on native habitats. For the first time, the 2003 edition also features color data images that enhance the reader's understanding of the 11 feature articles.

ED51C-1203 0830h POSTER

Partnering With Scientists To Increase the Visibility and Use of Published Global Climate Change Data

Mark S. McCaffrey1 (303-497-6939; mark.mccaffrey@noaa.gov)

C. Mark Eakin2 (Mark.Eakin@noaa.gov)

1NOAA Paleoclimatology, 325 Broadway, Boulder, CO 80305, United States

2NOAA Paleoclimatology, 325 Broadway, Boulder, CO 80305, United States

Climate journal articles are notoriously difficult for non-scientists to read and comprehend. Yet in society relevant fields such as climate change, it is critical that stakeholders also comprehend. Yet in society relevant fields such as climate change, it is critical that stakeholders also understand complex data. NOAA's World Climate Research Data for Paleoclimatology attempts to meet this need using the Internet to distribute raw data and information products. The Data Center creates "What's New" pages highlighting data from recent publications, along with descriptions and ancillary information such as photographs. The Data Center also hosts a "Climate Data Sets and Photo Gallery," and "Paleo Perspectives" web pages designed to describe the importance of paleo-climatic research, and how the data are used to improve our understanding of global climate change and climate change. With the goal to inform and engage, the Climate Data Center wants to make the climate data available in a form that can be integrated into the classroom. The approach benefits a diverse audience by demystifying climate science and benefits scientists by increasing the visibility and use of scientific research results. The approach, to it is useful for the science community, and may be reported in see in web site user statistics and comments, and more widely for the public may be reported in see in web site user statistics and comments, and more widely for the public.

It is important to create NASA educational resources that allow for deep understanding of space physics concepts, which link to main ideas outlined in the National Science Education Standards (NSES). One way of ensuring success in such a task is to use the backward design philosophy described in the book "How to Build a Better Brain" by Wiggie and McTighe. Using this design philosophy together with inquiry-based teaching methods, a new teachers' magnet guide with three main lessons. The goal of the this teacher's guide is to help middle school kids learn about motions and forces, magnetism, including electromagnetism, science as inquiry, and science as a human endeavor. The guide in part by using the story of the NASA STEREO Mission together with the data from the STEREO-IMPACT magnetic boom. We found that using a backward design guarantees that our activities teach the ideas we want the students to learn and also that the lessons include a variety of assessment and evaluation tools along the way. However, we also found that it is difficult to implement the backward design without a long lesson using several assessment tools. This could be a problem for teachers who may not be able to use such time-consuming NASA educational resources.

The current, stunningly successful exploratory phase of the Naval Research Laboratory and NASA's Solar Terrestrial Physics (NTPS) programs, has provided dynamic, visually intuitive grasp that will instill confidence, spark interest, and enthusiasm for space science among students. The NTPS Science in Service to Education (SIFE) project has been designed to develop effective science communication resources for educators and the general public. The Airborne Astronomy Ambassador Program (AAAP) represents a unique opportunity for educators. The AAAP program will enable students to interact with scientists and educators and to develop new educational tools. The AAAP program is expected to have a major impact on the use of space science in the nation's curriculum. The AAAP program will also enable students to interact with scientists and educators and to develop new educational tools. The AAAP program is expected to have a major impact on the use of space science in the nation's curriculum.

SOFIA Education and Public Outreach (EPO): Scientist/Educator Partnerships at 41,000 Feet

DA Dana Backman1 (650-604-2128; dbackman@mail.arc.nasa.gov)

Edna DeVore2 (650-960-4383; edevoe@eti.org)

Michael Bennett3 (415-317-1100; education@eti.org)

1USRA/SOFIA, MS 144-2, NASA-Ames, Moffett Field, CA 94035-1000, United States

2ETI Institute, 205 Landings Drive, Mountain View, CA 94043, United States

3Astronomical Society of the Pacific, 390 Ashton Avenue, San Francisco, CA 94112, United States

Nearly 100 astronomers and educators have joined in a pioneering collaboration to develop the SOFIA Airborne Astronomy Ambassador Program. Training for scientist-educators will be offered via the Astronomical Society of the Pacific's Slide Project (ASTRO) network. The program will enable students to interact with scientists and educators and to develop new educational tools. The AAAP program is expected to have a major impact on the use of space science in the nation's curriculum. The AAAP program will also enable students to interact with scientists and educators and to develop new educational tools. The AAAP program is expected to have a major impact on the use of space science in the nation's curriculum.
ED512-1212 0830h POSTER
NASA High Energy Space Science E/PO at SSU: Program Overview and Lessons Learned

Philip Platt1 (707-664-2190; phil@universe.sonoma.edu)
Lynn Cominsky1 (707-664-2655; lynn@charmarson.sonoma.edu)
1NASA E/PO at Sonoma State University, 1801 E. Cotati Ave., Rohnert Park, CA 94928, United States

The NASA Education and Public Outreach (E/PO) Group at Sonoma State University is the lead institution for the E/PO of three high-energy space science missions: Swift, GLAST, and XMM-Newton. We have developed award-winning standards-based formal and informal education activities (classroom exercises, instructor guides, web pages, posters, etc.) for these missions, with many more coming soon. Our primary goal is to bring the latest findings from the electromagnetic spectrum, and the astrophysical objects that emit this energy range, to the community. This poster will present an overview of our group and our work. This includes our collaborations with other groups, getting missions involved in the education projects, and the lessons learned in making effective E/PO products that actually get used by teachers. We will also include a brief overview of the NASA Educator Ambassador program, a support initiative that we have initiated to help train top-notch educators from across the country to help us develop, test, and disseminate our products.

URL: http://epo.sonoma.edu

ED512-1213 0830h POSTER
NASA Education and Public Outreach Initiatives at the MIT Center for Space Research

Jene L. Porto1 (617-258-7481; jporto@space.mit.edu)
MIT Center for Space Research, 77 Massachusett Avenue, Room 20-605, Cambridge, MA 02139, United States

Since its inception in 1999, the E/PO office of the MIT Center for Space Research (CSR) has focused directly on participation of local students in educational initiatives such as teachers workshops and public tours of the Charles E. Cox Control Center. The role played by the CSR EPO office has grown significantly, thanks in part to the number of EPO grants associated with the Chandra and HETE missions. In the past year, much of the CSR office was involved in the office’s E/PO initiatives: more than 1000 K-12 students, half from underrepresented groups, were included in formal education programs and informal education events attracted an estimated 1000 people per year. The mission of the CSR EPO office is focused on two areas: professional development for K-12 teachers and educational outreach to the public. E/PO supports field trips and workshops, and provides a number of resources that target the benefit and challenges and the higher level of the NSF program phase, and future prospects of the same.

URL: http://iota.jhuapl.edu/ed903.htm

ED512-1215 0830h POSTER
Synergy of Research and EPO Programs at NSO

K Balsalobre-Benitez1 (505-434-7134; balba@nso.edu); Stephen L Keil1,2 (505-430-7393; keil@nso.edu); Matthew J Pena1 (520-318-8510); David Donaldson1; Brian Biddle2; Priscilla Piano2 (520-318-8824; ppiano@nso.edu); Jackie Diehl1 (505-434-7065; diehl@nso.edu); Rex Hunter1 (505-343-7075; rexh@nso.edu)

1National Solar Observatory, Sacramento Peak, Sunspot, NM 88349, United States
2Funded Analytical Photonics and Optoelectronics Laboratory, University of California, Berkeley

The National Solar Observatory with its facilities at Sunspot, NM and Towards excellence in education and public outreach effort. Much of these efforts are coupled research and education efforts are aimed at attracting a spectrum of space through school teachers, school students, undergraduate researchers and graduate researchers, and the public. E/PO supports field trips and workshops, and provides a number of resources that target the benefit and challenges and the higher level of the NSF program phase, and future prospects of the same.

URL: http://nso.nso.edu

ED512-1216 0830h POSTER
Supporting Research at NASA’s Goddard Space Flight Center Through Focused Education and Outreach Programs

Frank Detrick1 (301-867-2034; fcdetrick@nasa.gov)
Jim Close1 (301-67-2119; jim.close@nasa.gov)

1Science Systems and Applications, Inc., 10210 Greenbelt Road Suite 500, Lanham, MD 20706, United States
2NASA’s Goddard Space Flight Center, 8800 Greenbelt Road, Greenbelt, MD 20771, United States

NASA research scientists work closely with Science Systems and Applications (SSAI) personnel at Goddard Space Flight Center (GSFC) on a large variety of education and public outreach (E/PO) initiatives. This includes providing assistance in developing E/PO plans, then carrying through the development of material, its implementation, and production. For instance, outreach efforts on topics such as developing and maintaining E/PO MOS initiatives, as well as planetary and visualization programs, is coordinated with NASA employees. E/PO support includes convening and taking part in sessions at professional meetings and workshops. Additionally, coordination of exhibits at professional meetings such as the AGU, AAS, AMS and educational societies such as the Science Teachers Association. Other E/PO efforts include the development of educational resources for educators to use both in the classroom and outreach materials for external to NASA such as the Smithsonian museum.

The Young Engineers and Scientists (YES) Program is a community partnership between Southwest Research Institute (SwRI), local high schools in San Antonio, Texas (USA). It provides talented high school juniors and seniors a bridge between classroom science and engineering. YES consists of two parts: 1) an intensive three-week summer workshop held at SwRI where students experience the research environment first-hand, develop skills and acquire tools for solving scientific problems, attend mini-courses and seminars on electronics, computers and the Internet, careers, science ethics, and other topics, and select individual research projects to be completed during the academic year; and 2) a mentorship program where students complete individual research projects under the guidance of their mentor—typically a postdoctoral fellow or a senior research scientist. At the end of the year, students publicly present and display their work, acknowledging their accomplishments in front of the partnering school in order to showcase their work to other students and teachers. YES has been highly successful during the past 10 years. All YES graduates have entered college, several have worked for SwRI, and three YES graduates have received the prestigious SwRI R&D Outstanding Achievement Award. These results illustrate the effectiveness of YES on their academic career. In particular, YES participants have gratefully acknowledged partial funding for the YES Program from a NASA RPO grant.

ED51C-1212 0830h POSTER
Exploring Earth’s Ionosphere with CINDI: Launching an Upper Atmosphere Mission into Pre-College Classrooms

Mary L. Urrabah1,2,3,4 (972-883-2499; urrabah@utdallas.edu)
Marc R. Hairston1,2 (hairston@utdallas.edu)
James M. Richardson3 (martinj@utdallas.edu)

1Department of Physics, University of Texas at Dallas, Mail Station F023 P.O. Box 730688, Richardson, TX 75083-0688
2Department of Mathematics/Engineering, University of Texas at Dallas, Mail Station F023 P.O. Box 730688, Richardson, TX 75083-0688
3Department of Physics, University of Texas at Dallas, Mail Station F023 P.O. Box 730688, Richardson, TX 75083-0688
4McKinney Independent School District, Scott Johnson Middle School 3400 Community Drive, McKinney, TX 75071

We will present the Education and Public Outreach work in progress for the joint Air Force/NASA project CINDI (Coupled Ion Neutral Dynamic Investigation). CINDI is a small component of the AFMST (Air Force/Military Science Team) C/NOFES (Communications/Navigations Overt/Exposed Satellite) project. Collaboration with the other instruments on C/NOFES, will study how radiowave characteristics are affected by variability with this layer of the atmosphere. The Educational outreach for CINDI is focused on helping students understand the link between the ionosphere and our technological communication. The ionosphere is typically neglected in pre-college science classes despite its impact on modern society and the substantial resources invested by funding agencies on furthering our understanding of this atmospheric layer. Our approach is to increase student understanding of the terrestrial ionosphere and Sun-Earth connections through strong classroom and curriculum partnerships. We will present our experience in developing a student-scientist research partnership program called the Athena Student Interns Program. The Athena Student Interns Program ASP began in early 1999 as the LAPES program, a pilot hands-on educational effort associated with the FIDO rover mission. Each group has spent one week at JPL using a prototype rover in a simulated Mars environment. In ASP, small groups of students and teachers selected through a competitive application process are paired with mentors from the mission’s Athena Science Education Team to carry out an aspect of the mission. To prepare for actual operations during the landed rover mission, the students and teachers participate in one of the Science Team’s Operational Readiness Tests ORTs at JPL using a prototype rover in a simulated Mars environment. Crisp, etal., inpress. See also http://mars.jpl.nasa.gov/mer/fido/.

ED51C-1213 0830h POSTER
Impact of Water Under Fire: A Seven Part Video Series on Canada’s Water

Richard Mrazek1 (403 329 2452; mrazek@uleth.ca)
James Byrne1 (403 329 2002; byrne@uleth.ca)
Nico Babi1 (403 394 3906; nico.babi@alberta.ca)
George Gallant2 (403 380 4439; george@gallantproductions.com)

1University of Lethbridge, 4401 University Drive West, Lethbridge, AB T1K 3M4, Canada
2Gallant Productions, 750 8th Street ‘C’ North, Lethbridge, AB T1H 2MT, Canada


ED51C-1214 0830h POSTER
Water Under Fire: A Seven Part Video Series on Canada’s Water

Richard Mrazek1 (403 329 2452; mrazek@uleth.ca)
James Byrne1 (403 329 2002; byrne@uleth.ca)
Nico Babi1 (403 394 3906; nico.babi@alberta.ca)
George Gallant2 (403 380 4439; george@gallantproductions.com)

1University of Lethbridge, 4401 University Drive West, Lethbridge, AB T1K 3M4, Canada
2Gallant Productions, 750 8th Street ‘C’ North, Lethbridge, AB T1H 2MT, Canada

Canada's water is under escalating pressure from a host of threats. Increasingly, our water is being tainted, misused, and over allocated. Experts have identified misused and over allocated. Experts have identified a multitude of threats to water quantity and quality. Among these threats are the roots to a serious shortage of high quality water sources. In the 1990s, waterborne diseases have re-emerged as one of the primary concerns. The first six programs in the series explore regional concerns: Rocky Mountains, Great Plains, Rocky Prairies, Northern Waters, Great Lakes Basin, St. Lawrence, and Western Canada. The final program covers the national and international perspectives.

ED51C-1255 0830h POSTER
Cosmic Origins: A Traveling Science Exhibit and Education Program
Paul D. Buntenberg1 (720-974-5822; pabuntenberg@colorado.edu)
Cherylynn A. Morrow1 (720-974-5828; cmorrow@colorado.edu)
James Harold1 (720-974-5858; harold@colorado.edu)
1Space Science Institute, 4750 Walnut Street, Suite 205, Boulder,CO 80303, United States
The Space Science Institute of Boulder, Colorado is developing a 3,000 square-foot traveling exhibition, called Cosmic Origins, which will bring origin-related research and discoveries to students and the American public. Cosmic Origins will have three interrelated exhibit areas: Star Formation, Planet Quest, and Search for Life. Exhibit visitors will explore the awareness of the stars and the hunt for planets outside our solar system. Activities that may engage in "habitable zones" and other stars; and finally they will be able to learn about the wide range of conditions for life on Earth and how scientists are looking for signs of life beyond Earth. Visitors will also learn about the tools scientists use, such as space-based and ground-based telescopes, to improve our understanding of the cosmos. Exhibit areas will address age-old questions that form the basis of NASA's Origins and Astrophysics programs: Where did we come from? Are we alone? In addition to the exhibit, our project will include workshops for educators and docents at host sites, as well as a public Web site that will use a virtual rendering of exhibit content. The exhibit's size will permit it to visit medium sized museums in underserved regions of the country. It will begin its 3-year tour to 9 host museums and science centers in early 2005. A second 3-year tour is also planned for 2008. The Association of Science-Technology Centers (ASTC) will manage the exhibit's national tour. Partners in the Cosmic Origins project include ASTC, the Denver Museum of Nature and Science, Lawrence Hall of Science, NASA Astrobiology Institute, NASA missions (e.g. PlanetQuest, and the Space Telescope Science Institute, and the Space Telescope Science Institute. Mobile classrooms expected by grants from NSF and NASA. This report will focus on the Planet Quest part of the exhibition.

ED51C-1266 0830h POSTER
Involving Students, Educators and Amateur Astronomers in the Search for Extrasolar Planets
Edna DeVore1
Ron Buehinger2 (925.462.0355; rbissinger@aol.com)
1Space Sciences
2University of Arizona, Steward Observatory 933 N. Cherry Ave., Tucson, AZ 85719, United States
Due to advances in telescope and digital imaging technology, the search for extrasolar planets can now be performed by dedicated students, educators, and amateur astronomers. The applicability of off-the-shelf telescopes is enhanced with the development of a search algorithm that requires the detection of extrasolar planets using the transit method is described. This algorithm has been used to search for the detection of extrasolar planets using the transit method is described. This algorithm has been used to search for planets using the search for planets transit algorithm. The results of this algorithm can theoretically reveal the presence of an extrasolar planet slightly larger than Earth's, or Jupiter-like Jupiter-like planets. Finally, educational outreach efforts conducted by an amateur astronomer involved in the search for extrasolar planets.