ED41E-04 1105h

Scientists and Educators in Sync: Exploring the Strengths of Each through a Collaborative Educational "Umbrella" on Space Weather

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Scientists and educators have much to offer formal and informal science education forums (and each other) when brought together in balanced collaboration. New educational opportunities from NASA and NSF have made it easier to develop these collaborations, effectively allowing for the establishment of educational "umbrellas" whereby several separately funded programs focused on a single theme are overseen by a single working group. Here, we explore one such collaboration on space weather developed by CU's Laboratory for Atmospheric and Space Physics, in collaboration with NOAA's Space Environment Center, the Fiske Planetarium, the Space Science Institute and teachers from local school districts. The goal of the collaboration is to develop a new planetarium show, associated curricula and teacher workshops and guidebooks, as well as distance learning programming through the NASA Center for Distance Learning. One hallmark of this collaboration is the recognition that both scientists and educators bring important research-based perspectives to the table - Scientists are primarily responsible for the scientific integrity of the programming; Educators offer effective (tested) educational models for implementing student and teacher experiences. Both bring creativity, ingenuity and innovation to this dynamic environment. Sustainability is enhanced by integrating components and activities into a cogent whole, and efforts are perceived as even more worthwhile since most aspects of this program will be available for national distribution over the next several years.

ED41E-05 1120h

Education/Public Outreach, and IDEAS grant in support of the NASA HEX sounding rocket mission launched March 2003 in Alaska

Neal B. Brown (9074792773; nbrown@eagle.ptialaska.net)

Neal B. Brown, Alaska Space Grant Program University of Alaska Fairbanks, Fairbanks, AK 99775-5919, United States

Education/Public Outreach materials were developed in conjuncation with K-12 classroom teachers for the NASA sounding rocket Horizontal E-Region Experiment launched in March 2003 from Poker Flat Research Range in Alaska. The science coordinator for the Yukon-Koyukuk school district and HEX principal investigator Mark Conde of the Geophysical Institute of the University of Alaska Fairbanks also carried out a NASA funded IDEAS grant in which middle school students made observations and measurements of the chemical releases which were the backbone of the HEX measurement program. Live From the Aurora, a national program sponsored by several agencies including NASA and NSF, involving live television interactions between rocket scientists and students overnighting at four museums also took place in the same launch window. I will discuss the problems encountering in developing and getting information about cutting-edge science, out in time-frames so they were useable by teachers and students, and some of the fun things that happened while working with national television media programs.

ED41E-06 1135h INVITED

NASA's Office of Space Science Small Grants Programs for Education and Public Outreach

Larry Cooper (202-358-1531; Larry.P.Cooper@nasa.gov)

NASA Headquarters, 300 E Street SW, Washington, DC 20546

Over the past six years, NASA's Office of Space Science has implemented what may well be the largest single program in astronomy and space science education ever undertaken. An important part of the overall program have been the small grants programs for education and public outreach (E/PO). These offer a way for many scientists not directly involved in major OSS missions to contribute to education and public outreach efforts. This paper provides an overview of the small E/PO grants programs associated with the Guest Observer programs for the Chandra X-Ray Observatory and Hubble Space Telescope, the Initiative to Develop Education through Astronomy and Space Science (IDEAS) program and the Research Opportunities in Space Science (ROSS) program. Characteristics of successful proposals are discussed along with representative examples of scientists participation in current projects in the areas of formal education, museum exhibits, planetarium show, and public outreach programs.

ED41E-07 1150h

Bridging the Gap Between Ocean Science and Education: Creating Effective Partnerships With Informal Science Education Centers

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Many scientists would describe an effective E&O partnership as one that did not take up too much of their time. The California Center for Ocean Sciences Education Excellence (CA COSEE), educators at the Ocean Institute (OI), Dana Point, and researchers at the Scripps Institution of Oceanography (SIO) have collaborated to develop a highly efficient, productive and rewarding approach to crafting scientist/educator partnerships. These efforts represent a new model for facilitated collaboration between informal science education and research partners. Each partner brings unique elements to this collaboration. The Ocean Institute's recently funded Sea Floor Science Exhibition represents an innovative approach to exhibits and programming for K-12 students and the public. The exhibits and programs are firmly grounded in the needs of the formal science education community (i.e. standards based), designed to be constructed/created on extremely short time frames (months), convertible for both public display and programming needs and easily updated. Scripps researchers, as well as those from other institutions, provide briefings on their ongoing research work, loan or donate equipment and instrumentation both for use and display, and in some cases provide research experiences for OI staff and students. CA-COSEE acts as the catalyst, identifying and engaging researchers from disciplines that are consistent with OI exhibit and program goals, serve as a liaison between newly introduced scientists and educators and facilitate the incorporation of E&O components in scientists research proposals, including funding for future exhibits. Using the example of the newest Sea Floor Science exhibit, "Slopes, Slides and Tsunamis!", we will describe the role each partner has played in creating this research based exhibit and program, the chronology of the process, and how this approach will provide the basis for a long-term, sustained partnership between the researchers and science educators.

ED41E-08 1205h

SPECTRA Teachers' Workshops: A Collaboration Between a NASA Laboratory and a Small University

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During the summer of 2003 we offered the first week-long SPECTRA (SPace telescope Educational Collaboration introducing Teachers to Research in Astronomy) Teachers' Workshop. This workshop was the result of a collaboration between physics faculty at the University of La Verne and scientists at Jet Propulsion Laboratory (JPL). It was funded by a Space Telescope Science Institute (STSI) Education and Public Outreach grant associated with four Hubble Space Telescope (HST) observing projects involving three JPL astronomers. The main focus of the workshop was to introduce local high school teachers to current research topics in astronomy and teach them how to incorporate the HST into their curricula. In addition to the workshop itself, a SPECTRA web site was created as a resource for secondary physical science teachers. We will describe the philosophy, format and contents of the workshop and elaborate on our experiences during its planning and execution. The feedback we received from the teachers who participated in 2003 will also be discussed. It is our intention to incorporate what we have learned during this first experience into the workshops that will be offered during the summer of 2004.

URL: http://www.ulv.edu/~natsci/physics/workshops/index.shtml

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ED42A MCC: Level 2 Thursday 1330h

The Next Generation: Research Projects of High School-Aged Geoscientists Posters

Presiding: **J Karsten,** AGU**; C Katsu,** Fairfield Area School District**; K Grove,** San Francisco State University

ED42A-1196 1330h POSTER

Sex, Status, and Sand: California Academy of Sciences' Teen Interns Examine Trends of the Pacific Mole Crab (*Emerita analoga*) at Ocean Beach, San Francisco

Jennifer B. Chu[1] (415-750-7456; jchu@calacademy.org); Ashley Conrad-Saydah[1] (415-750-7366; aconrad-saydah@calacademy.org); Sam Cohen[1]; Rachael Tom[1]; Melody Robins-Moloney[1]; Dylan Masters[1]; Kris Mason[1]; Francisco Alfaro[1]

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Student interns from the California Academy of Sciences' Careers in Sciences program monitored the Pacific mole crab (*Emerita analoga*), or sand crabs, in collaboration with the Farallones Marine Sanctuary Association. These small crustaceans live in the swash zone of the sandy beach habitat. Sand crabs are important in the food web, and therefore their status can help indicate the health of the larger environment. The interns helped the Gulf of the Farallones National Marine Sanctuary by monitoring the abundance and distribution of sand crabs at Ocean Beach in San Francisco, California. Students set up transects perpendicular to the shoreline, collected 10 samples along the transect, measured the carapace length, determined the sex of each crab, and checked for the presence of eggs. Students monitored June through September, 2003. Trends examined included differences in the gender ratio, size frequency, and distribution along the beach. Students also compared their data to other student data taken from other sites in San Francisco and Marin counties during 2001-2003 from the online database at http://www.sandcrabs.org. Using comparisons, interns were able to better understand the processes and significance of studying marine species. Implementation of the project was invaluable in aiding the interns in their understanding of the natural sciences and the role of monitoring habitats in environmental health.

URL: http://www.sandcrabs.org

ED42A-1197 1330h POSTER

Sustainable Seas Student Intertidal Monitoring Project at Duxbury Reef in Bolinas, CA

Kathy Soave[1] (415-454-3612; soave@microweb.com); Jennifer Saltzman[2] (415-561-6625; jsaltzman@farallones.org); Hannah Begley[1]; Hannah Bassett[1]; Molly Hester[1]; Lexsea Mann[1]; Jordan Scott[1]; Tori Ulrich[1]

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The Sustainable Seas Student Monitoring Project at the Branson School in Ross, CA has monitored Duxbury Reef in Bolinas, CA since 1999. In cooperation with the Farallones Marine Sanctuary Association, goals include: 1) To monitor the rocky intertidal habitat and develop a baseline database of density and

abundance; 2) To contribute to the conservation of the rocky intertidal habitat through education of students and visitors about intertidal species and requirements for maintaining a healthy, diverse intertidal ecosystem; and 3) To increase stewardship in the Gulf of the Farallones National Marine Sanctuary. Student volunteers complete an intensive 22 hour training course on the natural history of intertidal invertebrates and algae, identification of key species, rocky intertidal ecology, interpretation and monitoring techniques, and history of the sanctuary. Students conduct four baseline monitoring surveys three times per year (fall, winter, and late spring) to identify and count key invertebrate and algae species. During 2000-2002, the density of black turban snails, Tegula funebralis, is lowest in the high intertidal zones in winter yet has little seasonal variability in the mid intertidal zones. Most algae species had consistently higher percent cover in the northern transects than the more accessible southern transects. To test the reliability of the student counts, replicate counts of all species were performed. Replicate counts for invertebrate species within the same quadrat along the permanent transects revealed a very small amount of variability, giving us confidence that our monitoring program can provide reliable data. Student volunteers helped to design and install a rocky intertidal information kiosk to greet visitors at the entrance of Duxbury Reef. The kiosk includes pictures and natural history information on key intertidal species as well as tidepooling etiquette. Students lead an annual celebration at Duxbury Reef and lead intertidal walks for the public.

ED42A-1198 1330h POSTER

Correlation Between Radon Outgassing and Seismic Activity Along the Hayward Fault Near Berkeley, California

Daniel Holtmann-Rice[1] (510.642.7448; flyingtabmow@comcast.net)

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Results from previous studies indicate that radon concentration values are significantly higher over selected sections of the Hayward fault than adjacent areas. This phenomenon is believed to be attributed to the presence of abundant fractures in rock associated with the fault, which act as pathways for radon as it migrates from depth towards the earth?s surface. In an attempt to determine whether or not a relationship exists between seismicity along the fault, the production of microfractures, and emanation of radon, a radon outgassing monitoring study was conducted along an active section of the Hayward fault in Berkeley, California. The study was carried out by using an alphaMETER 611, which is a device capable of accurately measuring radon concentrations every 15 minutes. The alphaMETER was placed at the bottom of a sealed one meter deep well, in close proximity to a section of the Hayward fault located along the northwestern face of the Berkeley Hills. Once per week for several months data collected by the alphaMETER was downloaded into a laptop computer. Data from the alphaMETER was then compared with seismic data recorded by local seismometers to see if any correlation existed. A general correlation between variation in radon concentration and the occurrence of small earthquakes was found. Significant peaks in radon concentration were observed within an approximately one week period before the occurrence of small earthquakes. Concentration values then decreased dramatically just prior to and during periods when the earthquakes occurred. Such correlation is very similar to that recently observed in association with a magnitude five earthquake along the Anatolian Fault, reported by geoscientists working in Turkey using similar instrumentation (Inan, 2003, personal communication). The most plausible explanation for the observed correlation is as follows: 1) prior to a given earthquake, stress build up within a particular fault region leads to the formation of microfractures, which results in an increase in radon emisions; 2) during and immediately following an earthquake, stress release occurs, which then results in the closing of microfissures; 3) closure of microfractures leads to a subsequent decrease in radon emission. While data collected along the Hayward and Anatolian faults convincingly supports the notion that a relationship between radon outgassing and seismic activity does indeed exist, further research is necessary to better constrain the nature of this relationship.

ED42A-1199 1330h POSTER

The Trend of Radon Emission Values in Relation to the San Andreas Fault at Point Reyes, California

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The main goal of the current study was to determine the trend of radon emission values in relation to an important geologic fault. The study was conducted on the Earthquake Trail and Olema Valley regions of Point Reyes, California. Both sites are located in areas that contain clear evidence of faulting associated with the San Andreas Fault. Forty-nine radon soil-gas detector cups were buried in predetermined grids, with each cup spaced approximately ten meters apart. After collection the detectors were analyzed at Lawrence Hall of Science using an instrument specially made for radon detector analysis. The location of each detector and its radon emission value were mapped, with locations being determined by using a Global Positioning System (GPS) receiver or by its position within the grid, depending on the survey. The maps were then analyzed, and compared with geologic maps of each area. In the Olema Valley study, a northwest-southeast trend of radon outgassing was found, similar to the trend of the San Andreas Fault. In the Earthquake Trail study area, high radon concentration values also followed the fault?s trend. These results indicate the presence of unsealed fractures that provide channels for the transport of radon generated at depth. In the Earthquake Trail area several elongated zones of high outgassing were detected, which indicates the presence of numerous sets of fractures associated with the fault. Overall, the study showed that high radon readings (i.e., those that are greater than three times above background values) occur in fracture zones that have a trend very similar to that of known local features associated with the San Andreas Fault. In addition, results from this study suggest that valuable information regarding fault structure may be obtained through mapping radon outgassing patterns.

ED42A-1200 1330h POSTER

Radon Outgassing in the Casa Diablo Region, Long Valley Caldera, California

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A radon outgassing survey has been conducted in the Casa Diablo region of the Long Valley Caldera. The Long Valley Caldera (LVC) is an active volcanic system situated along the eastern front of the Sierra Nevada mountain range in east-central California. The survey was centered in an area .4 km northwest of the Casa Diablo geothermal power plant, located along the southwestern-most rim of the caldera?s resurgent dome. Results from previous radon emission studies in LVC indicate that high degrees of outgassing occur in association with relatively narrow networks of unsealed fractures (Cuff, et al., 2000 and Hoyos, et al., 2001). These fracture networks act as pathways for radon and other gases generated at depth as they migrate toward the surface. The purpose of the present study was to determine whether or not a relationship exists between radon emissions in the current survey area and that in a previously surveyed area approximately .8 km west of the geothermal plant. To accomplish this, we measured radon concentration in soil-gas at 35 separate sites. These sites were located within a 140 by 100 meter grid, with 20 meter spacing between each sample site. A radon outgassing map was then created using measured concentration values along with longitude and latitude values for each sample location. Geologic maps of the area were also analyzed and compared with radon outgassing maps. Analysis of these maps indicates that radon outgassing occurs through a set of crisscrossing fractures, trending southwest-northeast and northwest-southeast respectively. The northwest trending fractures are related to mapped normal faults in the area, while those with a southwest-northeast orientation are associated with an unmapped zone of faulting that is roughly perpendicular to the other faults. The latter set of fractures has a trend similar to that discovered in the previously surveyed area to the west. In both areas the highest readings were in excess of three times background radon concentration values measured in the field, and were obtained at locations believed to be where two sets of fractures intersect.

ED42A-1201 1330h POSTER

Radon Outgassing Along the Northern Calaveras Fault, California

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The Calaveras fault is an active fault located near or within several major urban areas. A total of 26 earthquakes greater than magnitude M5.0 have occurred on the Calaveras fault since the mid-1800's. In an attempt to provide information that can be used to better understand the structure of the Northern Calaveras fault, we set out to conduct a radon outgassing survey of a small portion of the fault in San Ramon Valley. We measured soil-gas radon concentrations at 77 separate sites within a 70 by 110 meter grid, using detectors that were placed 10 meters apart. The long axis of the grid was east-west aligned, while the shorter axis had a north-south trend. Survey transects with this north-south trend spanned a depressed area believed to have formed as the result of faulting in the area. In addition, a fence exists at the southern-most edge of the grid, which has clearly been offset due to faulting. Based on the relatively young age of this fence, faulting in the survey area has occurred within the past 20 years. Following analysis of detectors used in this survey, a radon outgassing map was produced by plotting measured radon concentration values versus geographic coordinates. Analysis of this map indicated two significant features: parallel sets of northwest-southeast trending high values; and perpendicular sets of northeast-southwest trending high values. Each of these features contained individual values that were greater than four times background radon concentration levels measured in the field. The observed zones of anomalously high values are believed to be an indication of crisscrossing fractures underlying our survey area. The northwest-southeast fractures correspond nicely to the northwest-southeast alignment of previously mapped sections of the Calaveras fault, while the northeast-southwest fractures, known faults in the area, are associated with an unmapped, transform feature that is roughly perpendicular to the main fault trend. This is not surprising considering seismic data that shows numerous earthquake clusters occurring in northeast-southwest trend patterns along various sections of the Calaveras fault. At points within the survey area located above intersections of a northwest-southeast and northeast-southwest trending fractures, the highest radon outgassing values were observed. In some cases measured values were observed to be as much as three standard deviations from the mean of our entire data set.

ED42A-1202 1330h POSTER

Does Geothermal Energy Production Cause Earthquakes in the Geysers Region of Northern California?

Karen Grove[1] (415-338-2617; kgrove@sfsu.edu)

Claire Bailey[2]

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Manning Yu[2]

Matthew Cohen[1]

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The Geysers region is located in Sonoma County, several hours north of San Francisco. At this location, hot magma beneath the surface heats ground water and creates steam that is used to make electricity. Since 1997, 8 billion gallons of treated wastewater have been injected into the ground, where the water becomes hot and increases the amount of thermal energy that can be produced. Frequent micro-earthquakes (up to magnitude 4.5) occur in the region and seem to be related to the geothermal energy production. The region is mostly uninhabited, except for several small towns such as Anderson Springs, where people have been extremely concerned about potential damage to their property. The energy companies are planning to double the amount of wastewater injected into the ground and to increase their energy production. Geothermal energy is important because it is better for the environment than burning coal, oil, or gas. Air and water pollution, which have negative impacts on living things, are reduced compared to power plants that generate electricity by

burning fossil fuels. We have studied the frequency and magnitude of earthquakes that have occurred in the region since the early 1970s and that are occurring today. We used software to analyze the earthquakes and to look for patterns related to water injection and energy production. We are interested in exploring ways that energy production can be continued without having negative impacts on the people in the region.

URL: http://sf-rocks.sfsu.edu/

ED42A-1203 1330h POSTER

Sediment Distribution in Central San Francisco Bay in the Vicinity of Raccoon Strait.

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We collected sediment grab samples from twenty-one sites distributed within a 2-km2 area in Central San Francisco Bay, including Raccoon Strait, which is located between the Tiburon Peninsula and Angel Island. We gathered these samples in May and August of 2003, dried and disaggregated them using a Gilson Sieve Tester, and analyzed the sediments by weight percent. Our purpose in monitoring sediment distributions over time in Central San Francisco Bay is to gain understanding of the oceanographic dynamics of the bay-delta estuarine system. Our initial results indicate that grain sizes range from $>$ 2 millimeters to $<$ 125 microns with coarser samples located at the entrance to Raccoon Strait. We anticipate collecting samples from these twenty-one sites in November of 2003, and eventually relating the sediment distribution patterns to seasonal variations in transport. This study is part of a larger-scale project involving bedform migration and current transport in Central San Francisco Bay.

ED42A-1204 1330h POSTER

Water Quality Analysis of Yosemite Creek Watershed, San Francisco, California

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Surface water quality in urban settings can become contaminated by anthropogenic inputs. Yosemite Creek watershed is situated on the east side of San Francisco near Bayview Hunters Point and provides an ideal location for water quality investigations in urban environments. Accordingly, students from Philip and Sala Burton High School monitored water quality at three locations for their physicochemical and biological characteristics. Water was tested for pH, dissolved oxygen, conductivity, total dissolved solids, salinity, and oxidation reduction potential. In addition, a Hach DR 850 digital colorimeter was utilized to measure chlorine, fluorine, nitrogen, phosphorous, and sulfate. The biological component was assessed via monitoring benthic macro invertebrates. Specifically, the presence of caddisfly (Trichoptera) were used to indicate low levels of contaminants and good water quality. Our results indicate that water quality and macro invertebrate populations varied spatially within the watershed. Further investigation is needed to pinpoint the precise location of contaminant inputs.

ED42A-1205 1330h POSTER

Comparison of Five Weather Forecast Methods at Four California Locations

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In this project we compare five methods of forecasting maximum and minimum temperature and probability of precipitation at four California locations: California Academy of Sciences in San Francisco, Oakland Museum, Sacramento Executive Airport, and Truckee Airport. The five methods are applied to make 24-hour forecasts twice weekly during the period from August 18 to December 2, 2003. The five forecast methods include: (1) Persistence. A persistence forecast assumes that tomorrow's weather will be the same as today's. (2) Climatology. Our climatology-based forecasts use weather conditions for the day at or very near each of the four locations, averaged over the 30-year period from 1971 to 2000. (3) Official National Weather Service (NWS) forecasts. We use the official NWS forecasts for Oakland Museum, Sacramento Executive Airport, and Truckee Airport. For The California Academy of Sciences (CAS) we use the NWS's new Prototype Digital Forecast for the CAS's latitude and longitude. (4) Individual student forecasts, made by four 10th grade students from San Francisco's Burton High School. They consulted the most recent meteograms, satellite images, soundings, synoptic analyses, and computer model forecasts, as well as climatology, persistence, and NWS forecasts. (5) A consensus of student forecasts, comprising the average of the four student forecasts. We calculate forecast error by squaring the difference between a forecast and the verifying observation, and compare the forecast methods based on these errors.

URL: http://funnel.sfsu.edu/sfrocks/wrg

ED42B MCC: 3012 Thursday 1340h

Interactions With Native America and Tribal Colleges and Universities I

(joint with P, C, PA)

Presiding: **J M Nall,** NASA Goddard Space Flight Center**; W David,** NASA Goddard Space Flight Center

ED42B-01 1340h

NASA's Tribal College Program

Mary Anne Stoutsenberger (202/358-0963; mary.a.stoutsenberger@nasa.gov)

NASA has been interacting with the Tribal College and University (TCU) Community for over ten years. During this time, we have worked with TCU faculty, students, and administrators to build relationships and develop mutually beneficial programs in science, technology, engineering and mathematics. We have found learning about native perspectives and approaches to education and science to be enriching and of great value to our science community. NASA scientists, engineers, and educators have been very receptive to Tribal culture's traditional wisdom in its approach to the study of the earth and the cosmos. In this session we will share some of the lessons we have learned over the last decade and discuss past and present partnership programs with Tribal Colleges and Native serving institutions.

ED42B-02 1355h

The Circle of Prosperity: Tribal Colleges, Tradition, and Technology – Building Synergistic Cross-Community Collaborations

Carrie L. Billy (703-838-0400; cbilly@aihec.org)

American Indian Higher Education Consortium, 121 Oronoco Street, Alexandria, VA 22314, United States

For more than three decades, American Indian Tribal Colleges and Universities have been working to sustain what is ours: our land, our language, our communities, and our culture. Tribal Colleges have achieved success by helping our communities, located in some of the poorest and most geographically remote areas of the country, develop systems for higher education, research, and economic development that are accessible, culturally responsive, and place-based. American Indian higher education is holistic, focused on the mind, body, spirit, and family. Research is respectful of culture, mindful of community values, and essential to community well-being. Economic development strategies are based on national and international trends, but focused on relationships between local people and their land. In this environment, applied research flourishes and new knowledge, integrating traditional ways of knowing with western science, is created and used. In the 1990s, the American Indian Higher Education Consortium, which is composed of 35 Tribal Colleges and Universities in the U.S. and Canada, launched a major initiative to expand and enhance this capacity through new collaborations and state-of-the-art information and communications technologies. Through a multi-phase effort, the Tribal Colleges developed and are currently implementing a dynamic and broad-based strategic plan. The goal: to reach a "Circle of Prosperity," a place where tribal traditions and new technologies are woven together to build stronger and more sustainable communities through enhanced STEM education and research programs. Our plan, the "Tribal College Framework for Community Technology," is a framework of strategic partnerships, resources, and tools that is helping us create locally based economic and social opportunities through information and communications technology and use of the Internet. During this presentation, we will: (a) discuss the innovative collaborative process we are using to build and implement the Framework; (b) provide examples of our growing ability to collaborate across time and distance; and (c) through coordinating presentations from a panel of Tribal College presidents, discuss strategies for establishing mutually beneficial education and research projects that integrate traditional knowledge and western science and involve Tribal Colleges, federal agencies, foundations, and mainstream research institutions.

URL: http://www.aihec.org

ED42B-03 1410h

An Indigenous Framework for Science, Technology, Engineering and Mathematics

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The American Indian Higher Education Consortium, composed of 35 American Indian tribally-controlled Colleges and Universities in the U.S. and Canada, is leading a comprehensive effort to improve American Indian student achievement in STEM. A key component of this effort is the synthesis of indigenous ways of knowing and western education systems. This presentation will provide an overview of culturally responsive, place-based teaching, learning, and research and will discuss potential opportunities and strategies for helping to ensure that education systems and research programs reflect our diversity and respect our cultures. One example to be discussed is the NSF-funded "Tribal College Rural Systemic Initiative." Founded on the belief that all students can learn and should be given the opportunity to reach their full potential, Tribal Colleges are leading this effort to achieve successful and sustainable improvement of science, math, and technology education at the K-14 level in rural, economically disadvantaged, geographically challenged areas. Working with parents, tribal governments, schools and the private sector, the colleges are helping to implement math and science standards-based curriculum for students and standards-based assessment for schools; provide math and science standards-based professional development for teachers, administrators, and community leaders; and integrate local Native culture into math and science standards-based curriculum. The close working relationship between the Tribal Colleges and K-12 is paying off. According to the National Science Foundation, successful systemic reform has resulted in enhanced student achievement and participation in science and math; reductions in the achievement disparities among students that can be attributed to socioeconomic status, race, ethnicity, gender, or learning styles; implementation of a comprehensive, standards-based curriculum aligned with instructions and assessment; development of a coherent, consistent set of policies that supports high quality math and science education for each student; convergence of science and math resource; and broad-based support from parents and the community.

URL: http://www.tm.edu/tmrsi.htm