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

Gerald Monette (701.477.7862; carty.monette@tm.edu)

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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

ED42B-04 1425h

Strategies for Expanding the Geosciences Workforce: Recruiting, Mentoring, and Partnering with American Indian Students and Faculty

Ron McNeil (701.854.3861; rsmcneil@aol.com)

Sitting Bull College, 1341 92nd Street, Fort Yates, ND 58538, United States

Tribal Colleges and Universities are a primary resource for reservation-based American Indian communities to create economic development opportunities, build a trained workforce, and promote and preserve traditional culture. They are also the higher education gateway for most American Indian students living on reservations. All Tribal Colleges and Universities offer environmental sciences programs and many provide training in GIS, with environmental science applications. Universities and research centers interested in bringing more diversity into their geosciences programs, and ultimately into the field, should work with Tribal Colleges to expand current environmental science programs and develop a research focus relevant to tribal communities. Partnering faculty and researchers could offer advanced geosciences courses online, support students interested in field research by addressing local water, soil, and climate questions, mentor Tribal College faculty, and collaborate on research projects. During this presentation, we will provide examples of successful and innovative collaborations and discuss strategies for encouraging AGU members to investigate TCU programs and find faculty with whom to collaborate.

URL: http://www.aihec.org

ED42B-05 1440h

Oglala Lakota College: A Model Institution for Excellence

Stacy Phelps[1] (6054556001; sphelps@olc.edu)

Michael Fredenberg[1] (6054556003; mfredenberg@olc.edu)

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Oglala Lakota College (OLC) was selected in 1996 by the National Science Foundation as one of six Model Institutions for Excellence (MIE). The MIE Program funded the physical infrastructure, staff, and faculty with the goal of increasing the opportunities for Native Americans to engage in Science, Technology, Engineering, and Math and to develop our capacity to engage in scientific research. As one of the few four-year Tribal Colleges, OLC offers degree programs in Interdisciplinary Environmental Science, pre-engineering, life-science and Information Technology. With the development of the Lakota Center for Science and Technology, which includes a full suite of analytical testing labs and Geographic Information System/Remote Sensing labs, OLC has much to offer the Earth science community. During this session we will discuss our interests and abilities that expand to include students beginning in the eighth grade through the baccalaureate level across South Dakota in Earth Systems Science, Biological Science, Engineering, Information Technology and distance education. We look forward to sharing our capability with this larger community.

ED42B-06 1455h

Partnering for Geospatial Innovations in Indian Country

. D Jhon Goes In Center (605-856-4262; jgic1@earthlink.net)

Sinte Gleska University, 221 East 2nd Street P.O. Box 557, Mission, SD 57555, United States

In the spirit of collaboration and reciprocity, Sinte Gleska University on the Rosebud Reservation of South Dakota will present recent developments, experiences, insights and a vision for education in Native America. As a thirty year young institution, Sinte Gleska University is founded by a strong vision of ancestral leadership and the values of the Lakota Way of Life. A recent relationship building endeavor that utilized a recent Executive Order to empower federal agencies to work hand in hand with tribal colleges has resulted in a formal Memorandum of Understanding with the United States Geologic Survey. This relationship has paved the way toward significant progress that is measured in the enhanced educational services and relevant research for Sinte Gleska University and the Lakota Nation. As an institution of higher learning for the region in the Great Plains, SGU's leadership is unparalleled. Sinte Gleska University proposes to share a vision of collaboration with not only sister institutions but with the greater national and global community. This vision is already in place with SGU's leadership in developing and participating in the World Indigenous Higher Education Consortium. As a recent recipient of the NASA REASoN CAN award and ongoing projects with the NSF and NOAA, SGU will exemplify the culmination of these endeavors to illustrate and promote innovative partnerships with Federal Agencies, Industry Partners, mainstream academic institutions and other tribal colleges.

URL: http://www.sinte.edu/nativeview

ED42B-07 1510h

Encouraging Involvement of Alaska Natives in Geoscience Careers

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Geologically, Alaska is a dynamic state, rich in mineral and energy resources. The impact of natural geologic hazards and mineral resource development can be especially critical in rural areas. While Alaska Natives comprise a large percentage of Alaska's rural population, few have the training to be leaders in the decision-making processes regarding natural hazard mitigation or mineral resource evaluation and exploitation. UAF, with funding from the National Science Foundation, has embarked on a three year integrated program aimed at encouraging young Alaska Natives to pursue geosciences as a career. The program combines the geologic expertise at UAF with established Alaska Native educational outreach programs. The Rural Alaska Honors Institute (RAHI) is a bridging program specifically designed to prepare rural high school students for college. To attract college-bound Alaska Native students into the geosciences, geoscience faculty have developed a college-level, field-intensive, introductory RAHI geoscience course that will fulfill geoscience degree requirements at UAF. In years two and three, this class will be supplemented by a one week field course that will focus on geologic issues encountered in most Alaskan rural communities, such as natural hazards, ground water, mineral and energy resources. In order to retain Alaska Native undergraduate students as geoscience majors, the program is providing scholarships and internship opportunities in cooperation with the Alaska Native Science and Engineering Program (ANSEP). Undergraduate geoscience majors participating in ANSEP can intern as teaching assistants for both the classroom and field courses. Besides being mentors for the RAHI students, the Alaska Native undergraduate geoscience majors have the opportunity to interact with faculty on an individual basis, examine the geologic issues facing Alaska Natives, and explore geology as a profession.

ED42B-08 1525h

Successful Tribal College Student Internship

Janie Nall (701-223-4100; phyllis@ndatc.org)

North Dakota Association of Tribal Colleges, 919 S. 7th Street, Bismarck, ND 58504, United States

The North Dakota Association of Tribal Colleges (NDATC) would like to host a student panel for the AGU community in order to convey the ingredients of a successful student internship program from the tribal student view. Tribal college students offer a unique perspective to the study and utilization of Earth systems science, and we would be prepared to help others in the community build successful interactions and recruitment strategies as they build their partnerships into Native America.

ED42C MCC: 3012 Thursday 1600h

Interactions With Native America and Tribal Colleges and Universities II *(joint with P, C, PA)*

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

ED42C-01 1600h

Native Peoples-Native Homelands Climate Change Workshop: Lessons Learned

Nancy G. Maynard ((301) 614-6572; nancy.g.maynard@nasa.gov)

NASA Goddard Space Flight Center, Mail Code 900, Greenbelt, MD 20771

The Native Peoples-Native Homelands Climate Change Workshop was held on October 28 through November 01, 1998, as part of a series of workshops being held around the U.S. to improve the understanding of the potential consequences of climate variability and change for the Nation. This workshop was specifically designed by Native Peoples to examine the impacts of climate change and extreme weather variability on Native Peoples and Native Homelands from an indigenous cultural and spiritual perspective and to develop recommendations as well as identify potential response actions. The workshop brought together interested Native Peoples, representatives of Tribal governments, traditional elders, Tribal leaders, natural resource managers, Tribal College faculty and students, and climate scientists from government agencies and universities. It is clear that Tribal colleges and universities play a unique and critical role in the success of these emerging partnerships for decision-making in addition to the important education function for both Native and non-Native communities such as serving as a culturally- appropriate vehicle for access, analysis, control, and protection of indigenous cultural and intellectual property. During the discussions between scientists and policy-makers from both Native and non-Native communities, a number of important lessons emerged which are key to building more effective partnerships between Native and non-Native communities for collaboration and decision-making for a more sustainable future. This talk summarizes the key issues, recommendations, and lessons learned during this workshop.

URL: http://www.usgcrp.gov/usgcrp/Library/nationalassessment/native.pdf

ED42C-02 1615h

A Consortium of Universities Partnering with Tribal Colleges

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Institutions participating in the Upper Midwest Aerospace Consortium (UMAC) are the Universities of North Dakota, Montana, Idaho, and Wyoming; North Dakota, South Dakota, and Montana State Universities; the South Dakota School of Mines and Technology; and Sinte Gleska University. UMAC?s purpose is to build learning communities integrating researchers with stakeholders, with the intent of leading a regional transition toward sustainability. No single culture has a monopoly on ideas for a sustainable future; in fact, the more diverse the input, the better the emergent ideas will be. The region spanned by the Consortium includes 20 Indian reservations and 18 tribal colleges/universities. The input from these institutions is an essential part of any integrated program to change lifestyles for the benefit of present and future generations. Success stories in education and in resource management, including management of cultural and sacred resources by tribal officials and educators, will be described.

URL: http://www.umac.org