

high schools. Our project also involves the incorporation of the new California Science Standards, as well as NASA's Strategic Enterprises: the Earth Science Enterprise (ESE) and the Space Science Enterprise (SSE). We will also present various aspects of our experiences in online instruction.

**ED21A MC: Hall D Tuesday 0830h**

**Women in the Geosciences: Developments, Current Status, and Outstanding Challenges (joint with PA)**

**Presiding:** M K McNutt, Monterey Bay Aquarium Research Institute; J Giesler, AGU

**ED21A-0188 0830h POSTER**

**An Analysis of Gender Differences in Recent Earth and Space Science PhD Graduates**

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The American Geophysical Union (AGU) and the American Geological Institute (AGI) have been collecting data on recent PhDs in the geosciences for 5 years (1996-2000). The 1999-2000 PhD classes were combined for an increased sample size and analyzed for gender differences. Other than salary, place of employment, and job search methodology no differences were found. Females had salaries that were slightly lower than those of their male counterparts. This might be due to the fact that there are a greater number of female postdoctoral candidates 47% compared to males 40%. Place of employment tended to be similar with fewer women in industry and a higher number of recent female PhD graduates in the academic sector. Interestingly, men and women differed in the ways in which they found their first job. A higher percent of men reported they felt their advisor was helpful in their job search (52% for men and 50% for women). Women used electronic resources at a higher rate (17.3%) than men (12.1%) and 33.6% of the women felt their scientific society was helpful in their job search, compared to only 24.1% of the men.

**ED21A-0189 0830h POSTER**

**Retention of Women in Geoscience Undergraduate and Graduate Education at Caltech**

Claudia J. Alexander ((818)393-7773; calexand@pop.jpl.nasa.gov)  
Jet Propulsion Laboratory, 4800 Oak Grove Dr., Pasadena, CA 91740

Institutional barriers encountered by women in undergraduate and graduate schools may take many forms, but can also be as simple as a lack of community support. In the 1990s the California Institute of Technology (Caltech) made a commitment to the retention of women in their graduate and undergraduate schools. Their program included mentoring, focused tutoring, self-esteem support groups, and other retention efforts. Under this program, the attrition rate of women has dramatically slowed. In this paper, we will discuss recent data from the American Geological Institute chronicling the enrollment and successes of women in the geosciences, the program instituted by Caltech, possible causes of attrition among women in the geosciences, as well as potential programs to address these problems. We will also present, from the nationwide study, data on geoscience departments which have been relatively successful at retaining and graduating women in Earth and Space Sciences.

**ED21A-0190 0830h POSTER**

**Mixing a Career in the Geosciences with Real Family Life: One Woman's Perspective**

Roberta M Johnson (303 497 2591; rmjohnsn@ucar.edu)  
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A career in the geosciences can offer many exciting opportunities for discovery, challenges, and rewards. The question is, can a successful career in our field be mixed with a full family life including spouse, children, and other family responsibilities? As a mother of three young children, married to a geoscientist, I have

worked for over a decade to find a balance between a full time job and family responsibilities. This presentation will highlight some of the career management techniques that can be used to attempt to balance these competing priorities for dual career couples. Additionally, structural barriers that hamper opportunities for female geoscientists to progress will be discussed. Finally, the positive effects of the development of family friendly policies within professional societies and at places of employment will be highlighted.

**ED21A-0191 0830h POSTER**

**Numbers of women faculty in the geosciences increasing, but slowly**

Cecily J Wolfe (808-956-5228; cecily@soest.hawaii.edu)  
University of Hawaii at Manoa, Hawaii Institute of Geophysics and Planetology 1680 East West Road POST 819E, Honolulu, HI 96822, United States

Why are there so few women faculty in the geosciences, while there are large numbers of women undergraduate and graduate students? According to National Science Foundation (NSF) estimates for 1995 in the Earth, atmospheric, and oceanic sciences, women made up 34% of the bachelor's degrees awarded, 35% of the graduate students enrolled, and 22% of the doctorates granted. Yet progress has been slower in achieving adequate representation of women geoscientists in academia, where women represent only 12% of the overall faculty. This talk will present the results of a survey I conducted on the status of women faculty at the 20 top-ranked geology programs, which was originally published as a feature article in *Eos* [Wolfe, 1999]. Data from the 1997 AGI Directory of Geoscience Departments were used to compare the numbers of women faculty at different departments, as well as to consider the distribution of men and women faculty by year of Ph.D. Strong inequities were found to exist between the individual departments. The percentages of women in the departments ranged from 0 of the departments had either one woman faculty member or none. Histograms of the faculty sorted by year of Ph.D. showed that clear generational differences existed between the sets of men and women faculty. Thirty-nine percent of the men obtained their Ph.D. prior to 1970, whereas only 3% of the women obtained their Ph.D. before this date. The majority of women faculty members (64%) received their Ph.D. after 1980, but a minority of men (31%) received their degrees after 1980. In the 1960s and 1970s, the geosciences expanded and departments employed a high percentage of recent Ph.D.s, but hiring of young faculty decreased in the 1980s and 1990s. In contrast, the numbers of women graduate students only began to rise after 1970, and thus the quantity of women Ph.D.s increased as the number of young hires decreased. Two problems appeared evident from this study using 1997 data. Women faculty were unevenly distributed among top-ranked departments, and the limited employment situation was another factor impeding the advancement of women in academia.

**ED21B MC: Hall D Tuesday 0830h**

**Diversity and Geoscience Societies: Sharing Our Mutual Interests (joint with PA)**

**Presiding:** R Johnson, UCAR/NCAR; F Hall, University of New Orleans

**ED21B-0192 0830h INVITED POSTER**

**DIVERSITY IN THE GEOSCIENCES: ISSUES, INFORMATION, AND THE ROLE OF THE AMERICAN GEOPHYSICAL UNION**

Frank R Hall<sup>1</sup> (504-280-6325; frhall@uno.edu)

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As a field of study, the geosciences have lagged behind other fields of science and engineering in terms of improving diversity. The proportions of women and racial and ethnic minorities entering the field is also significantly lower than their proportions in the general population. For women, this is particularly true at the Masters and Doctoral levels whereas racial and ethnic minorities are disproportionately low from the entry or Bachelors degree level. In this presentation, we discuss the more than 25 years of data on diversity within geoscience and compare it with other sciences. In addition,

we will look at how these data compare with present and projected population trends in the United States. We will examine factors that may be responsible for the disproportionately low representation of women and minorities in the geosciences, and also discuss how these trends can affect geoscience industries and academic geoscience departments. Finally, we will examine the efforts of the American Geophysical Union to improve diversity in the geosciences, including the recent establishment of its first Subcommittee on Diversity of the Committee on Education and Human Resources.

**ED21B-0193 0830h INVITED POSTER**

**The American Geological Institute Minority Participation Program**

Michael J Smith<sup>1</sup> (207-230-0046; msmith@agiweb.org)  
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Since 1971, the American Geological Institute (AGI) Minority Participation Program (MPP) has supported scholarships for underrepresented minorities in the geosciences at the undergraduate and graduate levels. Some of our MPP scholars have gone on to hugely successful careers in the geosciences. MPP scholars include corporate leaders, university professors, a NASA scientist-astronaut and a National Science Foundation (NSF) CAREER awardee. Yet as ethnic minorities continue to be underrepresented in the geosciences, AGI plans to expand its efforts beyond its traditional undergraduate and graduate scholarships to include diversity programs for secondary school geoscience teacher internships, undergraduate research travel support, and doctoral research fellowships. Funding for the MPP has come from multiple sources, including industry, scientific societies, individuals, and during the last 10 years, the NSF. College-level students apply for the MPP awards or award renewals, and the MPP Advisory Committee selects scholarship recipients based upon student academic performance, financial need, and potential for success as a geoscience professional. Mentoring is a long-standing hallmark of the AGI MPP. Every AGI MPP scholar is assigned a professional geoscientist as a mentor. The mentor is responsible for regular personal contacts with MPP scholars. The MPP Advisory Committee aims to match the profession of the mentor with the scholar's academic interest. Throughout the year, mentors and scholars communicate about possible opportunities in the geosciences such as internships, participation in symposia, professional society meetings, and job openings. Mentors have also been active in helping younger students cope with the major changes involved in relocating to a new region of the country or a new college culture. We believe that AGI is well-positioned to advance diversity in the geosciences through its unique standing as the major professional organization in the geosciences. AGI maintains strong links to its 37 professional Member Societies, state and federal agencies, and funding programs, many with distinctive programs in the geoscience education. AGI Corporate Associates have consistently pledged to support diversity issues in geoscience education. Current plans include seeking funding for 48 undergraduate awards at \$2500 each and \$24,000 to support undergraduate travel to professional meetings. We also expect to increase the size of our graduate scholarship program to 30 students and raise an additional \$30,000 to support graduate travel to professional meetings.

URL: <http://www.agiweb.org/education/mpp.html>

**ED21B-0194 0830h INVITED POSTER**

**The ASLO Minorities Program: A Model for Scientific Societies Working to Increase Their Ethnic Diversity.**

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Shifting demographics of the population of the United States is resulting in an increasing proportion of ethnic minorities. Yet the representation of minority groups in the geosciences remains very low. The American Society of Limnology and Oceanography (ASLO) developed a successful program to address this issue. This NSF funded effort has run since 1990. Minority undergraduate and graduate students attend the annual ASLO meetings and a special pre-conference workshop. The highly structured program has many facets. These include field trips, keynote presentations from distinguished scientists, interactions with mentors and role-models, symposia for presentation of student research, workbooks to aid in navigating the meetings,

and special talks on topics related to student success. As of 2001, there have been 751 participants in the program.

URL: <http://ww2.hamptonu.edu/science/ASLO.htm>

#### ED21B-0195 0830h INVITED POSTER

##### NABGG Reflects on Its Impact on Developing African American Geoscientists

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NABGG was founded in 1981 in the Houston/Dallas area with a mission to inform individuals with an aptitude in math and science of career opportunities in the Geosciences. NABGG has awarded over \$210,000 to over 130 students for undergraduate and graduate study. Since 1990, NABGG has become significantly recognized as a national, professional society by becoming member societies of the American Geological Institute, the Geological Society of America and has member representation on the National Petroleum Council. The organization is active nationwide with members in oil and gas industry, academia, government and colleges and universities.

#### ED21B-0196 0830h INVITED POSTER

##### Association for Women Geoscientists: enhancing gender diversity in the geosciences.

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The Association for Women Geoscientists (AWG) has been working to increase the representation and advancement of women in geoscience careers since its founding in 1977. We promote the professional development of our members and encourage women to become geoscientists by gathering and providing data on the status of women in the field, providing publications to train women in professional skills, encouraging networking, publicizing mentoring opportunities, organizing and hosting workshops, funding programs to encourage women to enter the field of geosciences, and providing scholarships, particularly to non-traditional students.

We promote women geoscientists' visibility through our Phillips Petroleum Speaker's List, by recognizing an Outstanding Educator at our annual breakfast at the Geological Society of America meetings, and by putting qualified women's names forward for awards given by other geo-societies. Our paper and electronic newsletters inform our members of job and funding opportunities. These newsletters provide the geoscience community with a means of reaching a large pool of women (nearly 1000 members). Our outreach is funded by the AWG Foundation and carried out by individual members and association chapters. We provide a variety of programs, from half-day "Fossil Safaris" to two-week field excursions such as the Lincoln Chapter/Homestead Girl Scouts Council Wider Opportunity, "Nebraska Rocks!!". Our programs emphasize the field experience as the most effective "hook" for young people.

We have found that women continue to be under-represented in academia in the geosciences. Data from 1995 indicate we hold only 11 percent of academic positions and 9 percent of tenure-track positions, while our enrollment at the undergraduate level has risen from 25 to 34 percent over the last ten years. The proportion of women in Master's degree programs is nearly identical with our proportions in undergraduate programs, but falls off in doctoral programs. Between 1986 and 1996, women comprised 18 to 22 percent of doctoral candidates. AWG recently obtained funding from the National Science Foundation to address the under-representation of women in academia. The objectives of the project are to determine the current status of women in academia, identify barriers to women's progress in the field, and recommend strategies to overcome these barriers.

#### ED21B-0197 0830h POSTER

##### Strategies for Diversity: SOARS, a Case Study

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Achieving the goal of a diverse, internationally competitive, and globally engaged workforce of scientists, engineers, and well prepared citizens calls for renewed educational goals and strategies. In 1995 UCAR teamed up with NSF and established a program, SOARS, that extends science education and encourages university students from diverse backgrounds to nourish their interests, develop skills, and create paths that lead them to careers in the atmospheric and related sciences. SOARS integrates multi-summer research opportunities with a comprehensive mentoring component and other proven learning strategies to create a student (protg) centered learning community. SOARS is having a positive impact on the scientific community. Already more than 60 protgs have traveled this pathway; several are successfully employed as scientists. Nine have attained graduate degrees, three are Ph.D. candidates, and 34 have received undergraduate degrees. In fall 2001, 17 SOARS protgs are enrolled in graduate programs in the atmospheric and related sciences. Many have participated in scientific conferences and coauthored papers published in peer-reviewed journals. SOARS sponsorship has expanded and includes DOE, NASA, and NOAA. Strategies contributing to the success of SOARS include an accrediting disposition that: 1) recognizes protgs as capable, competent, responsible, successful adults and 2) deploys organized activities designed to encourage protgs to see themselves as eligible to become successful scientists while being in good standing in their "home" communities. Relationships with professional scientists and scientific societies that share this disposition have been critical to the success of SOARS.

URL: <http://www.ucar.edu/soars>

#### ED21B-0198 0830h POSTER

##### Enhancing the role of Community Colleges to improve science, math and technology literacy in under-served communities.

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A new initiative has recently been organized to bring together a diverse group of scientists, educators, industry leaders, and teachers to focus on the problems of providing under-served populations with a high-quality and effective education in science, mathematics and technology. This initiative, known as the Chicken Soup Conference has led to the formation of a non-profit organization - the Institute for Imagination and Innovation in Science Education (I3SE or "I see") - with strong ties to Chabot Community College in the diverse and under-represented community of Hayward, California. The California Community College system is the largest system of higher education in the world, currently serving 1.4 million students, roughly 10% of all students in the US. While many students attending a community college face significant barriers in maintaining a regular educational agenda, the wealth of latent talent deserves a robust and committed support. The Chicken Soup Conference is a unique collaboration of K-12 teachers, community colleges, scientists, parents, students and industry, designed to provide that support and to create a pathway to success for these young people.

URL: <http://www.vjurtex.com/newchicken/finaldoor.html>

#### ED21B-0199 0830h POSTER

##### Urban Town and Gown: Increasing Minority Participation in the Geosciences Through a College-High School Partnership in Hartford, CT

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Urban public schools are often poor and have a tremendous need for educational assistance. In many cities the population is dominated by ethnic minorities. Hartford, CT, is one of these cities. Only about 50% of the students entering high school graduate and approximately 50% of those go on to higher education. Of those students taking the SAT's the average verbal and math scores are below 400. Despite these statistics, many students do succeed and therein lies an opportunity for earth scientists. As individuals and as institutions we can partner with schools and students to involve them in and excite them about the earth sciences.

In 1995 Trinity College, located in Hartford, CT, undertook a \$175 m.d. neighborhood revitalization project with funds from the college, neighboring institutions, foundations, and city, state and federal governments. Central to the revitalization is the "Learning Corridor," an educational complex that includes a magnet Montessori School, a Math and Science Middle School, and a Math and Science Magnet High School (GHAMAS). GHAMAS has a three-fold mission: teaching math and science to high school students, professional development for all math and science teachers from participating school districts, and community outreach. The Learning Corridor is adjacent to the Trinity College campus and Trinity faculty work with GHAMAS faculty to fulfill all three missions. Trinity faculty teach several high school classes. During the summer 3 Trinity and 1 GHAMAS faculty participated as a group in a week long-long NSF-sponsored Environmental Science workshop. This fall over ten teacher workshops were co-taught by Trinity and GHAMAS faculty. Recent NSF funding will allow us to develop a collaborative education and research program focused on the Connecticut River.

#### ED21B-0200 0830h POSTER

##### Innovations in Science Education in Europe

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At many European Universities, the retention of skilled science graduates is hindered mainly by organizational structures. In particular, women students are often under-represented in sciences, and career progression is in general difficult. The linear system of knowhow transfer is inefficient from the pedagogical point of view and unsatisfactory for many students. Owing to fast changes in society and the working environment, a re-building of curricula in tertiary education (including University Education) has begun. Conceptual visions aim at influencing the investment in the largely untapped human capital and preparing the students for quick adaptation and enhanced flexibility. Traditional methods of classroom teaching and knowhow transfer are increasingly complemented by New Learning Technologies and Mentoring. The EU Project INDECS (Potentials of Interdisciplinary Degree Courses in Engineering, Information Technology, Natural and Socio-Economic Sciences in a Changing Society) examines such pedagogical aspects in European degree courses combining engineering, IT, physical sciences and socio-economic sciences. Inclusion of specific IT and social science topics in modular form is examined. How innovation in University Teaching will meet the attractiveness to both students and employers in Europe is major focus of the study.

#### ED21B-0201 0830h POSTER

##### Marine Language Exchange Program: A 21st Century International and Interdisciplinary Partnership

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The ability of scientists to communicate across cultural and linguistic barriers is crucial for the global economic sustainability and protection of the world's oceans. Yet students with majors in the sciences and engineering constitute less than 2% of those who study abroad each year. And even rarer are students who study in countries where English is not the first language.

The Marine Language Exchange program is a case study of an international and interdisciplinary collaboration between faculties in the languages and the sciences who address this gap. A consortium of U.S. and European institutions including Eckerd College (Florida), University of Washington (Washington), University of Hilo (Hawaii), Université de la Rochelle (France), Université de Liège (Belgium), and Universidad de Las Palmas (Spain) is developing a multilingual, marine sciences exchange program in an effort to internationalize their Marine Sciences departments.

The program includes a three-week, intensive "bridge" course designed to reinforce second language skills in the context of marine sciences, and prepare undergraduate students for the cultural and educational differences of their host country. Following this immersion experience students from each institution enroll in courses abroad including marine sciences specialization for full academic credit. This session will review the Marine Language Exchange program activities since 2000 and will discuss the ideological and practical aspects of the program. The program successes, difficulties and future directions will also be presented. Different disciplinary approaches -Second Language Acquisition, English as a Second Language and Marine Science- prepare science students to contribute to the study and the management of the world's oceans with an awareness of the cultural issues reflected by national marine policies. Based on this case study, other universities could initiate their own international and interdisciplinary collaboration to facilitate a better understanding of other planetary issues.

URL: <http://www.marine-language-exch.org/>

**ED22A MC: 308 Tuesday 1330h**

**Evolution in the Classroom: Resources, Strategies, and Issues (joint with PA)**

**Presiding:** E DeVore, SETI Institute; K O'Sullivan, San Francisco State University

**ED22A-01 1335h INVITED**

**Evolution: Its Treatment in K-12 State Science Curriculum Standards**

Lawrence S. Lerner (650-851-0137; lslerner@csulb.edu)

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State standards are the basis upon which states and local schools build curricula. Usually taking the form of lists of what students are expected to learn at specified grades or clusters of grades, they influence statewide examinations, textbooks, teacher education and credentialing, and other areas in which states typically exercise control over local curriculum development. State science standards vary very widely in overall quality. 1,2 This is especially true in their treatment of evolution, both in the life sciences and to a somewhat lesser extent in geology and astronomy. Not surprisingly, a detailed evaluation of the treatment of evolution in state science standards<sup>3</sup> has evoked considerably more public interest than the preceding studies of overall quality. We here consider the following questions: What constitutes a good treatment of evolution in science standards and how does one evaluate the standards? Which states have done well, and which less well? What non-scientific influences have been brought to bear on standards, for what reasons, and by whom? What strategies have been used to obscure or distort the role of evolution as the central organizing principle of the historical sciences? What are the effects of such distortions on students' overall understanding of science? What can the scientific community do to assure the publication of good science standards and to counteract attacks on good science teaching?

1. Lerner, L. S., *State Science Standards: An Appraisal of Science Standards in 36 States*, The Thomas B. Fordham Foundation, Washington, D.C., March 1998.

2. Lerner, L. S. et al., *The State of State Standards 2000*, *ibid.*, January 2000.

3. Lerner, L. S., *Good Science, Bad Science: Teaching Evolution in the States*, *ibid.*, September 2000.

URL: <http://www.edexcellence.net>

**ED22A-02 1350h INVITED**

**Stay Tuned for Evolution.berkeley.edu**

Judy Scotchmoor (510-642-4877; jscotch@uclink4.berkeley.edu)

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Evolution affects every aspect of our lives and is the central organizing principle that biologists use to understand the world, yet there are few comprehensive resource packages available for science teachers that address both content and pedagogy. There are even fewer resources developed specifically to increase the understanding of evolution by students and the general public. Evolution.berkeley.edu will house a new website designed to address the need for more effective education about evolution and the nature of science among three target audiences: those who teach about science (K-12 teachers), those who are learning about science in the classroom (their students), and those who are at an informal stage of their learning (the general public). With funding support from the National Science Foundation and the Howard Hughes Medical Institute, this website is being developed by the University of California Museum of Paleontology and the National Center for Science Education. Its goals are to: 1. Improve teacher understanding of the nature of science, the patterns and processes of evolution, and the history of evolutionary thought. 2. Increase teacher confidence level to teach these subjects effectively. 3. Increase student understanding of the nature of science and engage them in the process of science. 4. Improve the public's understanding of the nature of science and the patterns and processes of evolution. 5. Increase student and public awareness of the importance of understanding evolution and its relevance to their lives.

For teachers, the site provides content knowledge in the form of five self-study units on the nature of science, the history of evolutionary thought, the scales and levels of evolution, the relevance of evolution to society, and the challenges to evolution. The site also provide classroom resources including a selection of effective approaches and teaching strategies and a searchable database of curricula, teacher-tested activities, and lesson plans that are consistent with those modeled in the National Science Education Standards.

**ED22A-03 1405h INVITED**

**Resources for Teaching About Evolution from the U.S. Geological Survey**

Leslie C. Gordon (650-329-4006; lgordon@usgs.gov)

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As a scientific research agency, the U.S. Geological Survey (USGS) is in an ideal position to provide scientific information and resources to educators. The USGS is not a curriculum developer, nor an expert in pedagogy, yet the USGS does have a wealth of scientific information on subjects such as fossils, geologic time, biological resources and plate tectonics that naturally come in to play in the teaching of evolution.

Among USGS resources are the general interest pamphlets *Geologic Time*, *Dinosaurs: Facts And Fiction*, *Our Changing Continent*, and *Fossils Rocks, and Time*, and its accompanying poster, *Fossils Through Time*. In addition to printed versions, the pamphlets are available at no cost on the Internet at <http://pubs.usgs.gov/gip/>. The popular booklet, *This Dynamic Earth: The Story of Plate Tectonics*, available at <http://pubs.usgs.gov/publications/text/dynamic.html>, touches on evolution-related subjects such as Alfred Wegeners use of fossils to develop his theory of continental drift, "polar" dinosaur fossils found in Australia, marine fossils in the rocks of the Himalayas, and the use of fossil ages to determine rates of plate motions.

Paleontological research at the USGS is highlighted on the Internet at <http://geology.er.usgs.gov/paleo/>. The web site includes links to technical publications, profiles of scientists, a geologic time scale, a glossary, information on important fossil groups, and a list of non-USGS references on fossils: all very useful to educators.

A wealth of biological information and data can be found in the National Biological Information Infrastructure (NBII), a multi-agency collaborative program led by the USGS. In addition to data on the Nations biological resources, the NBII web site <http://www.nbii.gov/> includes a section on systematics and scientific names (helpful for illustrating the evolutionary relationships among living organisms), and links to non-USGS curriculum materials. A fact sheet, *Unveiling the NBII as a Teaching Resource*, is available at <http://www.nbii.gov/about/pubs/factsheet/pdf/education.pdf>.

Evolution is a key theme in the scope of many USGS research activities. From the evolution of living organisms, to the evolution of geological materials and landforms, the USGS is a rich source of current, accurate, and relevant scientific information for teachers in today's classroom.

**ED22A-04 1420h INVITED**

**Voyages Through Time: Everything Evolves**

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Evolutionary change is a powerful framework for studying our world and our place therein. It is a recurring theme in every realm of science: over time, the universe, the planet Earth, life, and human technologies all change, albeit on vastly different scales. Evolution offers scientific explanations for the age-old question, "Where did we come from?" In addition, historical perspectives of science show how our understanding has evolved over time. The complexities of all of these systems will never reveal a "finished" story. But it is a story of epic size, capable of inspiring awe and of expanding our sense of time and place, and eminently worthy of investigating. This story is the basis of Voyages Through Time.

Voyages Through Time (VTT), provides teachers with not only background science content and pedagogy, but also with materials and resources for the teaching of evolution. The six modules, Cosmic Evolution, Planetary Evolution, Origin of Life, Evolution of Life, Hominid Evolution, and Evolution of Technology, emphasize student inquiry, and promote the nature of science, as recommended in the NSES and BSL. The modules are unified by the overarching theme of evolution and the meta questions: "What is changing?" "What is the rate of change?" and "What is the mechanism of change?"

Determination of student outcomes for the project required effective collaboration of scientists, teachers, students and media specialists. The broadest curricula students outcomes are 1) an enjoyment of science, 2) an understanding of the nature of science, especially the understanding of evidence and re-evaluation, and 3) key science content. The curriculum is being developed by the SETI Institute, NASA Ames Research Center, California Academy of Sciences, and San Francisco State University, and is funded by the NSF (IMD 9730693), with support from Hewlett-Packard Company, The Foundation for Microbiology, Combined Federated Charities, NASA Astrobiology Institute, and NASA Fundamental Biology.

URL: <http://www.seti.org/education/vtt-bg.html>

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**Enhancing Evolution Education Through K-12 Curriculum Development and Public Outreach**

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The American Geological Institute (AGI) has been actively involved in K-12 Earth science education for more than 40 years. Recent efforts at AGI have focused upon producing secondary science curriculum programs that target the National Science Education Standards (NSES) and working with Member Societies to create documents that enhance the public's understanding of evolution. National standards, which have driven reform of science education in many states, call for including evolution within the secondary curriculum. AGI's recently published curriculum programs, Investigating Earth Systems (IES) for middle schools and Earth System Science in the Community (EarthComm) for high schools, provide much-needed tools that help teachers address learning goals related to evolution. IES is a modular program that emphasizes inquiry, the nature of science, and five big ideas of Earth science, including understanding that the geology of Earth is