to GLOBE. Participants report sightings of any RTHUs that are banded and color-marked with dye or that have unusual plumage (albinistic, leucistic, etc.). Participants in the eastern U.S. and Canada also report the occurrence of "winter vagrant" hummingbirds, i.e., species from the western U. S. and Mexico that from August through March seem to be wandering more frequently into the region. These unusual movements by western hummingbird species, as well as migration timing and winter occurrences of RTHUs, are correlated against GLOBE data to determine possible effects of atmosphere, climate, and land use, including the impact of global warming. As a new GLOBE protocol, Operation RubyThroat is just beginning to generate data for analysis. Operation RubyThroat's collaboration with GLOBE is funded by a grant from the National Science Foundation. Support for other aspects of the project comes from, among others, Agilent Technologies, ConocoPhillips (through National Fish and Wildlife Foundation), The Christensen Fund, and individual donors. Operation RubyThroat is an education, research, and conservation initiative of Hilton Pond Center for Piedmont Natural History (www.hiltonpond.org) in York, South Carolina USA.

URL: http://www.rubythroat.org

ED22C-1248 1330h POSTER

Idaho GLOBE- Implementing the Science Standards Through Preservice Teacher Education

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Integrating GLOBE into preservice teacher education is one strategy for improving science literacy, scientific inquiry skills, and teacher understandingof the nature of science. Elementary teachers typically receive minimal science as part of their preparation. This preparation often includes 2-3 introductory science courses. Introductory courses are often taught in large lecture formats with separate labs. GLOBE can be a mechanism for designing a field-based science course that prepares students to conduct long-term scientific inquiry projects and provide the appropriate experiences that can be repliicated or transferred to the k-12 classroom. This also provides universities a mechanism to teach science that is aligned with the k-12 teaching, content, and assessment standards

ED22C-1249 1330h POSTER

Integrating GLOBE Into NASA Earth Science Satellite Missions Through Education and Public Outreach

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Both the Landsat 7 and EOS Aura missions have supported and utilized GLOBE science protocols as a major component of their Education and Public Outreach (EPO) programs. The Landsat 7 program adopted MultiSpec and the GLOBE MultiSpec tutorials as a basis for several web-based education products as well as for teacher professional development workshops. We have also introduced GLOBE Land Cover protocols as well as change detection activities in the Grow Smart website (growsmart.gsfc.nasa.gov) and in workshops. The education effort for EOS Aura includes partnerships with the GLOBE Surface Ozone and Aerosols Investigations. The EPO program has also funded the development of a UV meter and the implementation of a GLOBE special measurement for UVA. In addition, Aura has hosted an Atmospheric Monitoring workshop for teachers and has introduced GLOBE Atmosphere Investigations to new audiences through partnerships with the American Chemistry Society and the Smithonsian Institutions National Museum of Natural History. We will provide a brief overview of these EPO efforts and focus on the GLOBE program in NASA EPO, and the evolution of our programs as a result of lessons learned through the implementation of both the Landsat 7 and the EOS Aura EPO programs.

ED22C-1250 1330h POSTER

Implementing GLOBE in Wisconsin

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GLOBE has had a mixed record in Wisconsin since the inception of the program. University of Wisconsin-Madison became a GLOBE partner in 1999, after over one hundred teachers had already been trained in GLOBE. Since then approximately additional one hundred or more teachers have been trained in one or more GLOBE protocols by us through a dozen workshops at various sites in Wisconsin. In order to improve the reporting of data by the GLOBE schools, we have undertaken directed efforts to help schools. The experience and success has been mixed perhaps due to changing school/teacher priorities and budgetary pressures. For GLOBE to become a true scientist-educator partnership and achieve its global potential much work lies ahead.

URL: http://tellus.ssec.wisc.edu/outreach

ED22D MCC: Level 2 Tuesday 1330h

Fixing the Holes in the Leaky Pipeline Posters *(joint with OS, C)*

Presiding: **R E Bell,** Lamont-Doherty Earth Observatory**; C O'Riordan,** AGU

ED22D-1251 1330h POSTER

Meeting the Challenges for Gender Diversity in the Geosciences

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Women are now routinely chief scientists on major cruises, lead field parties to all continents, and have risen to leadership positions in professional organizations, academic departments and government agencies including major funding agencies. They teach at all levels, advise research students, make research discoveries and receive honors in recognition of their achievements. Despite these advances, women continue to be under-represented in the earth, ocean, and atmospheric sciences. As of 1997 women received only 29% of the doctorates in the earth, atmospheric, and oceanographic sciences and accounted for only 13% of employed Ph.D.s in these fields. Women's salaries also lag: the median annual salary for all Ph.D. geoscientists was $60,000; for women the figure is $47,000. Solving the problem of gender imbalance in the geosciences requires understanding of the particular obstacles women face in our field. The problem of underrepresentation of women requires that earth science departments, universities and research centers, funding agencies, and professional organizations like AGU take constructive action to recognize the root causes of the evident imbalance, and enact corrective policies. We have identified opportunities and challenges for each of these groups. A systematic study of the flux of women at Columbia University enabled a targeted strategy towards improving gender diversity based on the observed trends. The challenge for academic institutions is to document the flux of scientists and develop an appropriate strategy to balance the geoscience demographics. Based on the MIT study, an additional challenge faces universities and research centers. To enhance gender diversity these institutions need to develop transparency in promotion processes and open distribution of institutional resources. The challenge for granting agencies is to implement policies that ease the burden of extensive fieldwork on parents. Many fields of science require long work hours but the geosciences are unique in their requirement of extended fieldwork in remote locations, which raises issues for parents, and may be one reason geosciences lags behind other science disciplines in gender diversity. AGU and AGI have both conducted comprehensive and important studies on the status of women in science at all levels. Conducting flux studies and identifying the decision points in the advancement of scientists will provide fundamental data for designing successful programs to enhance diversity in the geosciences. Professional organizations such as AGU and the Geological Society of America should develop projects to monitor the career patterns of scientists, both men and women, beyond graduate school and the first job.

ED22D-1252 1330h INVITED POSTER

The ADVANCE Program: Targeting the Increase in the Participation and Advancement of Women in Academic Science and Engineering Careers

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The goal of NSF's ADVANCE Program is to help increase the participation of women in the scientific and engineering workforce through the increased representation and advancement of women in academic science and engineering careers. The Program tries to address this under representation by focusing on support for men and women with three approaches: institutional (Institutional Transformation), grass-root (Leadership), and individual (Fellows) support. The ADVANCE Program alternates with a round of Institutional and Leadership awards in one year and a Fellows competition the next. Since its inception in 2001, NSF has had two competitive rounds for each of the three award types and will have spent approximately 75 M$ by the end of the next fiscal year (2004). The first and second ADVANCE Institutional Transformation competitions (FY 2001 and 2003) received over 70 proposals each. These awards are for multi-year support in the amount of 3-4M$ each. Details and access to the websites for the ADVANCE programs of each institution can be found in NSF's ADVANCE webpage at http://nsf.gov/home/crssprgm/advance/itwebsites.htm. The number of proposals submitted for the Leadership awards competition dropped from 35 in 2001 to 26 in 2003, despite an increase in the allowed award size for the second round. In terms of projected goals, this part of ADVANCE is perhaps the most eclectic. Some Leadership awards were made to professional societies to work specifically with their respective scientific communities in identifying needs that might be peculiar to a field of science. In the first round of the Leadership awards, PI Mary-Anne Holmes of the University of Nebraska-Lincoln and collaborators received a grant to work with the Association of Women Geoscientists to determine the current status of women geoscientists in the US. These grantees hope to disseminate the information gathered under this award broadly in order to educate women students and faculty on strategies to overcome barriers, and to encourage women to pursue academic geoscience careers as well as teach administrators how to recruit and retain qualified women in geoscience. The ADVANCE Fellows competition includes eligibility for women in three broad categories: early-career; career interruption; and trailing spouse. The first Fellows competition took place in 2002 and received over 150 applications throughout the Foundation. The Directorate of Geosciences (GEO) received 26 proposals, approximately 18% of the total number, and second only to the Directorate of Biological Sciences (BIO). Of the 26 proposals, 5 were in Atmospheric Sciences (ATM), 9 in Earth Sciences (EAR), and 12 in Ocean Sciences (OCE). Proposal pressure in the Fellows competition was roughly correlated with the number of women in the respective fields. In GEO, the number of proposals reflected broadly the representation of women as PIs in the various Divisions, where OCE has the largest number of female PIs, followed by EAR and ATM, respectively. Of the pool of applicants in 2002 and 2004, approximately 50% were PIs that applied in the early-career (post-doctoral) category, with the other 50% composed of about half for each of the two other categories (spouse relocation and career interruption). Over the next two years, NSF hopes to have a significant portfolio of awards to start deriving some information on successful models for promoting the increase in the representation of women at higher levels of the academic career. Feedback to the members of the ADVANCE Implementation Committee is strongly encouraged as we continue to try to improve this program to better answer the needs of women in academia.

ED22D-1253 1330h INVITED POSTER

Mentoring, Women in Engineering and Related Sciences, and MentorNet

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Mentoring is a frequently employed strategy for retention of women in engineering and science. The power of mentoring is sometimes poorly understood,

and mentoring is not always effectively practiced, however. At its strongest, mentoring is understood as a powerful learning process, which assures the intergenerational transfer of knowledge and "know-how" on an ongoing basis throughout one's life. Mentoring helps make explicit the tacit knowledge of a discipline and its professional culture, which is especially important for underrepresented groups. MentorNet (www.MentorNet.net), the E-Mentoring Network for Women in Engineering and Science, is a nonprofit organization focused on furthering women's progress in scientific and technical fields through the use of a dynamic, technology-supported mentoring program. Since 1998, nearly 10,000 undergraduate and graduate women studying engineering and related sciences at more than 100 colleges and universities across the U.S., and in several other nations, have been matched in structured, one-on-one, email-based mentoring relationships with male and female scientific and technical professionals working in industry and government. This poster will describe the MentorNet program, and provide findings of annual program evaluations related to outcomes for participants with particular focus on women in the planetary and earth sciences. We also address the development of the partnership of approximately 100 organizations currently involved in MentorNet and the value each gains from its affiliation. MentorNet is an ongoing effort which supports the interests of all organizations and individuals working to advance women in engineering and related sciences.

URL: http://www.mentornet.net

ED22D-1254 1330h POSTER

Plugging the Leaks One at a Time

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In common with most other research institutions in the Geosciences, Lamont Doherty Earth Observatory of Columbia University (LDEO) strives constantly to build and maintain strength on its staff through the recruitment and retention at a number of different levels of the highest quality researchers and educators. An essential characteristic of these activities is a special emphasis upon achieving gender balance in the scientific staff of the Observatory. Our goal is the establishment and maintenance of a number of women researchers appropriate to their representation in the graduate student body of the Earth and Environmental Sciences. Though we fail at achieving the 50 per cent representation that should be our goal, significant progress has been made as, over the last year, the Observatory's Senior Scientific staff has doubled the number of its female members through both recruitment and retention efforts. We present analyses of the recent history of recruitment and retention of women researchers at Lamont. Lamont has instituted a number of institutional policies and practices targeted at improving the institutional climate such as the development of onsite daycare, support of a maternity leave for research faculty, the instigation of a stop-the-clock policy for promotion procedures and the definition of clear, written well-communicated procedures for career advancement. In addition to the establishment of formal policies emphasis is placed on attacking issues at the level of the individual. A case is made that the complex variability of background and circumstance requires responses tailored to specific situations and individuals, and that a primary approach to stopping the loss of women researchers from professional careers in the Geosciences is a flexible approach enabling proactive responses to be designed on a case-by-case basis.

ED22D-1255 1330h INVITED POSTER

Focus Groups Reveal Differences in Career Experiences Between Male and Female Geoscientists

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We conducted twelve telephone focus groups of geoscientists to discover what motivates geoscientists to enter our field and stay in our field. There were separate male and female groups from six different professional categories: administrators, full and associate professors, non-tenure track personnel, assistant professors, post-docs and PhD candidates, Bachelor's and Master's candidates. A total of 96 geoscientists participated. Specifically, respondents were asked what initially brought them into the geosciences. Three dominant themes emerged: the subject matter itself, undergraduate experiences, and relationships. A total of 51 responses to this question related to the subject matter itself. Approximately 61 percent (31) of those responses were given by male focus group participants. Across all focus groups, participants brought up issues such as a general appreciation of the outdoors, weather, rocks, and dinosaurs. Following closely behind the general subject matter is undergraduate events. Fifty-one responses mentioned something about undergraduate experiences such as an introductory class, a laboratory experience, or field experiences. While both female and male participants discussed the role of interpersonal relationships in their decision to become a geoscientist, females were slightly more likely to bring up relevant relationships (26 times for females compared to 21 for males). These relationships varied in both groups from a parent or grandparents influence to camping trips with professors. When respondents were asked whether they had ever considered leaving the geosciences and under what circumstances, there was a striking difference between males and females: males were far less likely to have ever considered leaving. Younger males were more likely to consider leaving than older geoscientists. They feel challenged by the financial constraints of graduate school and the time constraints of academic vs. family life. Many females considered leaving at some point in their careers, from graduate school through the tenure process, and even post-tenure. The challenges they cited included difficult advisors, vague or inadequate advising/mentoring, the lack of support for family by their institutions and by their colleagues, and, like younger males, the balance of work and family life. Our results suggest that some strategies that can increase the numbers of women on our faculty include improving the climate for all under-represented groups and institutional support for families. Climate is a broad area that includes paying attention to: 1) our language, such as what personal comments we make to students and colleagues, 2) assuring that female students are encouraged to speak in class and are permitted to finish sentences without interruption, 3) allowing students to see themselves reflected in the curriculum by acknowledging a broad range of contributions to the field and by seeing more than senior men as professors, 5) adequate, clear-cut mentoring, and 6) open up new faculty searches to capture "less obvious" candidates, such as those that are less self-promoting. Support for families must come from institutions and includes: 1) child care, 2) adult care, 3) flexible schedules including part-time appointments and shared appointments, and 4) dual-career contracts.

URL: http://www.awg.org/gendereq.html

ED22D-1256 1330h POSTER

Improving the Climate for Female Scientists at the National Center for Atmospheric Research

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In the summer of 2000, at the invitation of the former Director of the National Center for Atmospheric Research (NCAR), a committee of senior female scientists affiliated with the American Physical Society's Committee on the Status of Women in Physics visited NCAR and NCAR's parent organization, the University Corporation for Atmospheric Research (UCAR). The purpose of the site visit was to develop recommendations designed to improve the climate for women scientists at NCAR. This site visit and the subsequent written report and response from NCAR/UCAR management were instrumental in the establishment of a series of new programs and recruitment/mentoring activities that have had a significant impact at NCAR. The APS Committee's report included recommendations in the areas of: staff recruitment and demographic balance; communication and consistent implementation of policies; mentoring and career development programs; and "family friendliness". The constructive and helpful report of the visiting APS committee was openly shared with staff and led to a series of discussions, debates, actions, and programs at NCAR that continue to this day. This poster will describe the APS Committee's recommendations, the institutional process that occurred in response to this study, and the resulting actions and their impact at the national center. Specific progress since the site visit has included a doubling of the percentage participation by females in the ladder (tenure-equivalent) scientist track at NCAR to a level that now significantly exceeds the national average for tenured or tenure-track female faculty at Ph.D.-granting institutions in the geosciences.

ED22D-1257 1330h POSTER

Advancement of Women Through the Academic Ranks of the Columbia University School of Arts and Sciences: Where are the Leaks in the Pipeline?

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Columbia Commission on the Status of Women[1]

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The Columbia University Commission on the Status of Women has examined the progress of women through the academic ranks of the university from PhD student through tenured faculty. The methodology of this study can serve as a model, and the results can provide context, for studies more explicitly focused on the geoscience career pipeline. We approached this problem as a system of reservoirs (e.g. graduate student body, junior faculty) with fluxes (e.g. attrition, hiring) into, out of and between the reservoirs, and then examined the femaleness of each of the reservoirs and fluxes. Among Ph.D. students, we see a higher rate of attrition among women than men in all divisions of Arts & Sciences. Female-rich attrition occurs both early and late in the graduate student career, among both funded and unfunded students. Attrition rate varies from division to division, with Natural Sciences having lower attrition than either Humanities or Social Sciences. Although Natural Sciences has a reputation as an inhospitable arena for women, in fact, a women beginning a PhD program in Natural Sciences has a better chance of graduating than her classmate studying Humanities or Social Sciences, because of the difference in attrition rate between divisions. For the tenure-eligible faculty ranks, we see a leak in the pipeline at the entrance to the applicant pool. Compared to national availability data, or to Columbia's own Ph.D. production, Columbia's applicant pool for junior faculty positions is female-poor. Once within the applicant pool, however, women are hired at an equitable rate, a rate comparable to their representation in the applicant pool. For entry into the tenured ranks, we find that external hires into tenured positions in Social Sciences and Natural Sciences are only half as likely to be female as are candidates promoted from within the University. The imbalance is particularly bad for "targets of opportunity" (applicant pool of one) within the Natural Sciences; eleven male and zero female scientists were hired through this mechanism over the decade studied.

URL: http://www.columbia.edu/cu/senate/

ED22D-1258 1330h POSTER

Changing Gender Demographics in Geosciences Since the 1970's

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We will use data collected over the last 15 years to illustrate how the representation of women in the geosciences compares to other fields at both the bachelor's and PhD levels. An increasing proportion of those who earn academic degrees in almost all scientific fields including the geosciences are women. The percentages of women earning bachelor's degrees in specific fields within the geosciences and the number of women earning PhDs in the geosciences since the 1970s are both increasing. We will highlight the representation and trends of minority women among those earning degrees in the geosciences. Finally, we will propose some initiatives for policies that can help to increase the number women that study science and remain in scientific careers.