PROPOSAL TO ESTABLISH AN ACADEMIC PROGRAM

Date: February 27, 2009 Type of Degree: Graduate

Title of proposed program: Graduate program in Geoscience

Degree and Abbreviations: Doctor of Philosophy (Ph.D.)

Please designate a responsible department and individual for this proposal:

David E. Grandstaff
Professor and Chair, Department of Earth and Environmental Science
322B Beury Hall
215-204-8228, grand@temple.edu

1. A. DESCRIPTION OF THE PROPOSED PROGRAM

Rationale for a New Ph.D. Program in Geoscience

The Department of Earth and Environmental Science (formerly the Department of Geology) proposes to establish a Doctor of Philosophy (Ph.D.) program in Geoscience, beginning in Fall 2009, which will ultimately be comprised of 10 to 14 doctoral students. Our graduate program will focus on basic understanding of the geological processes and cycles which affect human well-being and how the increasing human population and technology alter those processes and their effects. As the human population has grown and become more technologically advanced, anthropogenic activities have produced progressively greater effects on the environment. At the same time, increased concentration of the population in urban areas near coasts and in floodplains and geologically hazardous areas has rendered humans more susceptible to floods, tsunami, earthquakes, volcanic eruptions, tropical cyclones, and sea-level rise. For example, more than 55% of the US population lives within 50 miles of the ocean, where it is most susceptible to sea-level rise and hurricanes. More than 500 million (nearly 10%) of the world’s people live in coastal zones, at elevations less than 10 meters above sea-level, in environments highly vulnerable to flooding. Such circumstances require scientists with essential training and skills to conduct scientific research to understand the basis for these processes, educate the public, and inform policy decisions. In addition, the demand for scientists with these essential skills will also grow as the current staffs of many government, research, and educational institutions retire. The Ph.D. program will increase our ability to do cutting-edge, externally-funded research in the geosciences at Temple University and provide trained, professional geoscientists for employment in research, teaching, policy-making/government, and non-governmental organizations (NGOs).

A long-term goal of the new Ph.D. program is to offer Ph.D. students the option of an international research experience related to environmental impacts, sustainability, and the developing world. The value of study abroad in undergraduate education has long been accepted, and international studies are a key component of Temple’s 2008 Strategic Plan.
prescriptive nature of the coursework required of science majors, however, means that they are far less likely than students majoring in the humanities or social sciences to spend a semester abroad as an undergraduate, and international study as a formal component of Ph.D. graduate science studies in the United States is virtually without precedent. However, with increased globalization, international understanding is vital in science as well as in business. Although contacts with international scientists or scientists at other North American institutions are gradually established during a person's career as a result of international conferences and co-operative research, we believe that a program which encourages such contacts early during a student's studies would have significant benefits:

(1) Young geoscientists who study abroad would develop a greater appreciation for the spatial variability of the Earth, a variability that reflects different geologic regimes, and captures different stages of the tectonic processes fundamental to geologic understanding.

(2) Study abroad would also expose students to the variety of academic traditions and research practices, and in some cases provide access to equipment and expertise not available at Temple. The experience would unquestionably improve student understanding of cultural, political and economic differences, and their influence on the globalization of scientific research, as well as the role the geosciences play addressing problems of economic development and global sustainability.

(3) Students would develop a network of contacts and collaborators that could prove invaluable in launching their careers.

(4) Even if the Temple Earth and Environmental Science faculty doubles in size, our Ph.D. program would be relatively small compared with peer institutions, but by developing collaborative arrangements with international partners EES could offer a research experience as rich as that offered by any of our competitors.

(5) The program is likely to boost graduate student recruitment. The chance to study overseas will attract domestic students, and the research partnerships developed with foreign universities will bring foreign student to Temple. Offering an international research experience would "brand" the Temple geoscience Ph.D., providing high-quality graduate students with an incentive to choose Temple.

(6) International graduate research experiences have the potential to boost faculty productivity as well, with students cross-pollinating ideas between programs and facilitating research collaboration that will open new opportunities for research funding.

(7) Finally, the idea of an international research experience, particularly one directed toward global development and sustainability, is in harmony with Temple's basic mission of fostering diversity and encouraging service in higher education.

By placing new emphasis on globalization, environmental protection, and sustainability in graduate research, we offer opportunities that few graduate programs emphasize. An aggressive plan of targeted hires provides an opportunity to build on our established strengths while
expanding the program in new directions. This expansion will produce greater research depth in selected areas and allow focused collaborative, interdisciplinary research in the environmental and geological sciences. The Ph.D. program will enhance opportunities for research with external funding to understand the basis of geological processes, their effects throughout earth history, and their implications for and applications to human well-being, particularly in urban and coastal environments. We anticipate that once fully developed, this program will generate more than $1,000,000/year external funding to support research projects, graduate students, and departmental resources. This program will prepare students for careers in industrial and academic research, college education, policy development, and implementation of humanitarian mitigation of environmental problems and hazards.

Outcomes

After graduation, Ph.D. geoscientists obtain jobs in a variety of areas (Figure 1). The Ph.D. program we seek to develop will prepare students for a variety of careers in industrial and academic research, college education, policy formulation in governmental and non-governmental organizations (NGOs), humanitarian service based on evaluation and mitigation of human impacts on the environment, and an understanding of the occurrence and locations of potentially hazardous geological processes. International research experience will prepare students for policy and government work and international aid programs. These programs in the Earth and Environmental Science Department will also set Temple University apart from other institutions and attract highly competitive and motivated students to the program. These alternate educational objectives are described in more detail below.

1. Research Careers

Universities, national laboratories, petroleum or mining companies, and other industries all hire research geoscientists. Students will be more competitive in this traditional track as the program builds to a critical mass. We anticipate that the additional educational programs described below will both distinguish our department and help develop the graduate student population to a critical mass.
2. Education Careers

In addition to training research scientists, one of the most important tasks of any Ph.D. program is the training of new generations of university and college faculty. Many of the current faculty hired during the 1960s and 1970s, the peak period of hiring by universities, are now retiring or near retirement. Given the general importance of a college education for maintenance of the economic middle class and the position of the United States in the global economy and the specific importance of an understanding of and research in geological and environmental issues, these faculty must be replaced. In addition to training of educators, students entering careers in government or non-government agencies must be trained to present the methods and conclusions of geological and environmental science to policy makers and the general public. An understanding of science is necessary for both of these groups so that proper policies can be proposed and implemented and so that these policies will be supported by the public.

3. International Research Experience

We propose to add a humanitarian component to the Ph.D. program as an option for students who wish to conduct research or assist with research that uses science to solve societal problems. We plan to develop a research profile that includes sites that have been targeted by both global and national aid programs. The projects will have a research component, but will also examine the strengths and limitations to scientific solutions to global problems such as the shortage of drinkable water. We plan to establish projects involving long-term monitoring of environmentally sensitive sites. Such extensive, long-term monitoring is only rarely attempted by research programs. The lack of long-term, publicly available data limits our ability to understand results of environmental interventions. Instead of a theoretical head nod to the practical uses of science, students will have the opportunity for field-based research where these problems occur. This experience will (1) attract students who can’t find socially relevant research in other Ph.D. programs, and (2) provide practical experiences that bolster the students’ vitae when they are seeking jobs in academia, industry, NGO or government agencies.

We believe that adding an international research experience is consistent with Temple University’s mission. Such a program would significantly raise the profile of the Department and Temple University and would be very much in the “Acres of Diamonds” spirit of the University. It would blend the talents of the Department’s faculty, promote collaborative graduate and undergraduate research, open new funding opportunities, and prepare students to pursue careers in government policy or aid work where sound scientific understanding of earth and environmental issues is sorely needed. It would also create a distinctive niche for the nascent Ph.D. program what would attract exceptional students and faculty to Temple. We believe that once established this on-going program would require a minimum of resources to maintain. In addition, the ultimate placement of students in governmental positions will likely result in increased resources for the department. All of these elements will contribute to the department’s successful transition into a Ph.D.-granting program.

We have found three programs which provide models for development of this aspect of our proposed Ph.D. program.
The first program is the Masters International Program offered by the Peace Corp (http://www.peacecorps.gov/index.cfm?shell=learn.whyvol.eduben.mastersinternational) in partnership with over 50 institutions of higher education, which allows students to earn a masters degree that includes a 27-month service in the Peace Corps. Most programs are in fields such as agriculture, forestry, or public health, but Michigan Tech’s Department of Geology, Geologic Engineering, and Geophysics, has a long and successful record offering this opportunity to geoscience students.

A second model program is the Masters of Humanitarian Engineering which was recently developed at the Colorado School of Mines (http://humanitarian.mines.edu/) with funding from a multi-million dollar grant from the William and Flora Hewlett Foundation. This program goes beyond the short-term projects exemplified by organizations such as Engineers Without Borders by crafting a graduate curriculum that prepares students for experience either internationally or in areas of North America, such as Native American Indian or Inuit Reservations. However, while both of these programs are excellent synergies of graduate-level science education and humanitarian outreach, neither provides the research preparation that will allow a newly-minted Ph.D. to compete in the publish-or-perish world of academia.

A third model program, which appears to be both unique and extremely successful, provides both international experience and research. In 2003, UNESCO-IHE Institute for Water Education in conjunction with Delft Technical University in the Netherlands created a new Ph.D. program (http://www.unesco-ihe.org/Education/PhD-programme). Quoting from the IHE website:

Ph.D. research is sometimes carried out using the ‘sandwich’ model. Participants prepare their research and finalise their theses – the first and last portions of the programme – in Delft, but conduct the actual research in their home country, under the co-supervision of a local institution. Researchers maintain regular contacts with their promoters through visits and electronic media, enabling them to employ solutions directly related to problems in their home region.

The Delft Ph.D. model is appealing because it focuses on an international research experience, while preserving the goal of engaging students in issues of global sustainability. The Department of Earth and Environmental Science is already actively working with the director of Geoscientists Without Borders (http://www.seg.org/gwb) to convene a conference at Temple to address humanitarian issues in the geosciences.

To incorporate the Delft model into a new EES Ph.D. will require fostering long-term partnerships with international institutions of higher education. To accomplish this EES faculty would actively seek funding from NSF, which offers grants though the Office of International Science Education (OISE) for “International Research and Education: Planning Visits and Workshops” (50 awards total $1.5M/yr), "Small Grants for Exploratory Participation" ($200,000 for 2 yrs), and "Partnerships for International Research and Education" ($40,000,000 available in 2010-14 to fund 5-20 projects).

We will seek funding from a variety of sources in addition to the NSF. The Colorado School of Mines has had considerable success obtaining foundation grants, including a multi-million dollar grant from The William and Flora Hewlett Foundation. In September, 2007, Schlumberger made a million dollar donation to Society of Exploration Geophysicists (SEG) Foundation to create
Geoscientists Without Borders (www.seg.org/gwb) expressly to “provide funding to projects that will bring benefits to communities in need where conditions and hazards can be mitigated or removed using geoscience technology.” This foundation has just announced its first three awards and is growing rapidly with new donations from industry.

In addition to funding, it will take time to develop this aspect of the Ph.D. program -- we estimate it will take 3-5 years to form co-operative research and educational programs with appropriate foreign universities and institutes. At least eight international universities, including the National Taiwan University of Science and University of Science and Technology of China are already partners with Temple in the Dual Bachelors/Masters program. Temple also has reciprocal student exchange agreements with the Universities of Hamburg, Tübingen, East Anglia, and Puerto Rico, maintains campuses in Japan and Rome, and has summer programs in more than 14 countries. Faculty at these and other institutions will be contacted to form initial agreements.

Additional programs with which Temple University could affiliate are Engineers Without Borders and the National Ground Water Association’ (NGWA) Developing Countries Interest Group. Engineers Without Borders (EWB) has been involved in water supply projects (such as digging wells and water routing), water quality, and renewable energy. The NGWA links members to service organizations that work in developing countries to provide sustainable water supplies. The interest group allows members to share experiences and suggest projects, such as the Global Water Challenge of the United Nations. We will also seek to enter into formal agreements or affiliations with United Nations (UN), U.S. and local governments, and NGOs to create research experience opportunities for students during and immediately following graduation from the Ph.D. program at Temple University. This strategy addresses two critical issues: 1) the need of these organizations for highly skilled workers in areas of environmental hazards, hydrology, water management, shallow Earth geophysics, natural hazards, alternative energy (geothermal), landscape monitoring, and other human-environmental interactions; 2) the central strategy of the department to address the growing need for scientifically informed policy in government and planning. Establishing a relationship with the NGOs would provide a unique university resource to facilitate future research, and benefit both the recipient of the aid, the NGO, and the student Fellow.

**Degree Requirements for the Ph.D.**

Students in the Ph.D. program will be required to take seven classes beyond the Masters degree. The number of credits depends on the combination of lecture oriented (3 cr) versus laboratory oriented (4 cr) classes taken, but will be a minimum of 21 credits. One class, Geoscience Research Methods, will be required; the other six are elective courses which will be chosen by the student with the advice of the thesis adviser or committee, subject to additional constraints described below. In addition to classes, students will register for 1-2 research credits in the semesters that they are not enrolled in courses, seminars, or research with a minimum of 6 credits. An outline of the full curriculum and comparison with some aspirant Ph.D. programs at other institutions can be found in Appendix A.

Students will ordinarily be expected to have a masters degree prior to admission. Students
without a prior Master’s degree will be considered only on an exceptional basis and with additional degree requirements. Selection will be based on credentials, they must have prior research experience, and they must meet the approval of both the admissions committee and the designated advisor. These students must fulfill the requirements for the Ph.D. plus some additional number of credits. The number of additional credits for their program will be determined by the admissions committee and the designated advisor at the time of admission. The flexibility in credit requirements is needed because of the varying backgrounds of students likely to be admitted to this interdisciplinary program. Students will have specific coursework to provide the necessary background for their research and as such the course requirements are not likely to be uniform. Furthermore, the program is likely to attract students from different disciplines, so the preparation will be varied.

Because of the interdisciplinary nature of our program, we will encourage both breadth and depth in selection of the six elective courses. However, the following limitations will apply. Students may need course work in other departments, such as chemistry, biology, mathematics, computer science, engineering, or public health. However, students may take no more than two of their courses outside the department. Students must also take at least two courses outside their field of specialty, but within the department.

In addition to classes and research credits, Ph.D. students are required to pass a qualifying exam by the end of their first year of residence, a written and oral defense of a research proposal by the end of their second year, and submit a dissertation, including oral defense, at the end of their research.

In summary, the Degree Requirements include:

- MS degree or course plan in lieu of a MS degree prior to admission
- Research Methods (3 cr)
- Six Electives (18-24 cr)
- Qualifying exam preparation (9994)(1 cr)
- Pre-Dissertation research in preparation for proposal exam (9998)(minimum 1 cr)
- Dissertation Research (9999)(minimum 6 cr)
- Dissertation Defense

These requirements are similar to those of many Ph.D. programs at other model institutions (Appendix A). Knowledge of a foreign language may be necessary for some students, particularly if they are working or studying abroad in non-English-speaking institutions or areas, but a foreign language will not be required. Unfortunately, a detailed plan of courses or course sequences in electives cannot be presented at this time due to the number of new courses that will be proposed as new faculty are hired.

**Common Required Course**

One course will be required of all students: Geoscience Research Methods.
This course will emphasize laboratory skills and quantitative tools used in research. Students will learn about broadly used techniques for data collection, data analysis and interpretation, developing data sets for proposal preparation and research, statistical analysis of data, and software tools for analysis and presentation.

The Research Methods course may emphasize different techniques depending on the instructor. As such, it can be taken more than once if a different theme is selected, but no more than twice by any one graduate student.

Research Experience

In addition to course requirements, students will conduct research. Some students in the proposed program, particularly those conducting long-term research projects in foreign countries or remote locations or who require specialized facilities not available at Temple, also will be encouraged to participate as visiting scholars at partner institutions. We will be developing both international and national partners for the global/sustainability research. These partnerships are a necessary component of research on global problems, but they also offer opportunities for our students to expand their experience - a preliminary post-doc. While other Ph.D. programs may have one or two faculty members who have research sites in developing countries or who encourage sustainability research, our proposed program differs because we will encourage all students to develop their skills in these areas.

Advising

The Geoscience Ph.D. program will have a clear set of advising procedures and methods of tracking and documenting student process. All of the procedures and policies related to the Ph.D. program will be presented to the students and faculty through a variety of venues, including an annual orientation, a Ph.D. BlackBoard website, printed materials, and one-on-one advising. Initial one-on-one advising will be done by the advisor with assistance from the Ph.D. program director. Students are expected to designate an area of interest and advisor during application.

Administrative Structure

The Ph.D. program will be administered by the Chair of EES and a Ph.D. Program Director selected by the graduate faculty of EES. Governance of the program will rest with the graduate faculty who are members of the Earth and Environmental Science Department who will participate in recruitment, admissions, and curriculum development. The administrative structure of the program will consist of a Ph.D. program director; a steering committee consisting of all graduate EES faculty members; and standing committees, including admissions, curriculum, environmental health and safety and radiation safety. We also plan to have a Director of International Research Programs, a position in part funded by grants.

Tuition and Fees

There are no special tuition or fee requirements. Students will be charged the standard tuition rates for the College of Science and Technology.
Implementation and Hiring

The EES Department currently consists of seven tenure-track and five non-tenure track faculty (Appendix B) and adjunct faculty that teach individual courses or laboratories. These faculty members currently conduct research and provide education in environmental geology, structural geology, stratigraphy-sedimentation, paleontology and earth history, planetary geology, and geochemistry-materials (Table 1 and Faculty CVs in Appendix C).

**TABLE 1: Current research specialties in the Department of Earth and Environmental Science**

<table>
<thead>
<tr>
<th>Research area</th>
<th>Faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geothermal energy</td>
<td>N. Davatzes</td>
</tr>
<tr>
<td>Environmental geophysics</td>
<td>Nyquist</td>
</tr>
<tr>
<td>Hydrogeology &amp; urban hydrology</td>
<td>Toran</td>
</tr>
<tr>
<td>Low temperature geochemistry</td>
<td>Grandstaff, Toran</td>
</tr>
<tr>
<td>Mineralogy-materials</td>
<td>Myer, Grandstaff</td>
</tr>
<tr>
<td>Paleontology-fossil provenance, paleoclimates</td>
<td>Tumarkin-Deratzian, Terry, Grandstaff</td>
</tr>
<tr>
<td>Planetary geology</td>
<td>A. Davatzes</td>
</tr>
<tr>
<td>Sedimentation-stratigraphy</td>
<td>A. Davatzes, Terry</td>
</tr>
<tr>
<td>Structural geology</td>
<td>N. Davatzes</td>
</tr>
</tbody>
</table>

However, seven full-time faculty are not sufficient to provide adequate research or pedagogic strength or breadth, or allow the synergistic collaborations for a fully developed Ph.D. program. Therefore, to implement the new Ph.D. program, we propose to expand the department by hiring five to seven new faculty over the next five years to bring the total number of tenure-track faculty to at least 12 individuals. A consideration of the number of faculty in similar and aspirant programs (see Appendix A) suggests that this is the minimum number necessary to establish a
sustainable program. We plan to use the new hires to further strengthen these areas and develop new strengths in emerging areas of research, such as urban geoscience, ancient and modern climates, geohazards, and research on globalization/sustainability (Table 2). For example, several faculty (Table 1) currently conduct research in ancient environments and climates. Hiring of new individuals in isotope geochemistry and climate modeling would provide additional strength in this currently important and well-funded research area and would allow development of research in new areas of modern global climate change which, informed by knowledge of the effects of past climatic change, will enable faculty and students to provide guidance for socially important policy decisions. Similarly, several faculty conduct research in sedimentary processes and stratigraphy (Table 1). Addition of new faculty with specialties in marine or coastal processes would build on our current strengths and allow development of a focus in modern coastal processes and environments with implications for environmentally important aspects such as global sea-level rise, tsunami, and hurricanes and typhoons (Table 2). Finally, hiring of faculty with expertise in geological hazards, prediction of volcanic eruptions or earthquakes or their environmental effects, will build on strengths in structural geology and environmental geophysics. These new areas will emphasize the connection between humans, other organisms, and the environment, which will enhance both our research profile and the employment opportunities for students.

**TABLE 2**

<table>
<thead>
<tr>
<th>Enhanced research area</th>
<th>Specialties we already have</th>
<th>Potential new hires</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban geoscience</td>
<td>Hydrogeology, urban hydrology, soils, geophysics, structure</td>
<td>Geohazards, GIS, materials, medical geology</td>
</tr>
<tr>
<td>Climate change</td>
<td>Hydrology, paleosols, sedimentology</td>
<td>Isotope geochemist, climate modeler</td>
</tr>
<tr>
<td>Coastal process and/or geohazards</td>
<td>Hydrology, geophysics, sedimentology, soils, structure</td>
<td>Geohazards, GIS, geomorphologist, remote sensing</td>
</tr>
</tbody>
</table>

In 2008 the EES Department added two faculty in structural geology/geothermal energy (N. Davatzes) and sedimentary petrology/planetary geology (A. Davatzes). This year (2008-2009), we are conducting searches for two more faculty, an isotope geochemist and a specialist in geohazards. Assuming that these searches are successful, and with the permission of the dean of CST and University administration, we anticipate that next year we will conduct searches for research specialists in remote sensing/Geographic Information Systems and
geomorphology/coastal processes. Building on the expertise of these newly hired and current faculty, specialists in climate modeling and materials/medical geology will ultimately be hired. Additional faculty searches may also be required to replace faculty who retire or leave for other positions.

The proposed emphasis in emerging areas of research at the intersection between humans and the environment provides a dimension not ordinarily found in traditional Ph.D. programs in geology. For example, urban geoscience provides scientific input to planning urban land use, rectifying problems of decay and poor prior procedures, avoiding or ameliorating effects of concentrated urban pollution sources, managing surface- and groundwater resources. Our urban setting will provide students with challenging research questions related to sustainability which may be pursued either in the Philadelphia area or in other locations. Similarly, the problems of climate change, geohazards, and coastal processes are multiplied in population centers. The application of earth system approaches to problems related to sustainability is likely to attract students to our new Ph.D. program.

This program may attract students from a variety of scientific disciplines. We have designed the curriculum to encourage and allow students to take a combination of courses inside and outside the department to prepare them for interdisciplinary research. For example, students may take a course in public health or engineering to better understand how their research interfaces with disciplines outside the department. The students are brought together in two research courses that are based on readings in selected topics.

While other Ph.D. programs may have one or two faculty members who have research sites in developing countries or who encourage interdisciplinary research, our proposed program differs because we encourage all students to develop their skills in these areas. A student whose research is not linked to a field site with a social problem will have the opportunity and be encouraged to provide field assistance to students working on these sites. The interdisciplinary curriculum that we propose will better prepare students to adapt to emerging areas of science as they go forward in their careers. Temple has recently articulated a commitment to enhance the undergraduate experience in sustainability and globalization. This proposed Ph.D. program does the same at the graduate level.

1. B. RELATIONSHIP OF THE PROPOSED PH.D. TO THE MISSION OF TEMPLE UNIVERSITY AND THE COLLEGE OF SCIENCE AND TECHNOLOGY

At present the Department of Earth and Environmental Science is the only department in CST which does not offer a Ph.D. program. Instituting a Ph.D. program and adding additional faculty will enable cutting edge, externally-funded research in the geosciences at Temple University and provide trained, professional geoscientists for employment in research, teaching, and policy-making and governmental organizations. Addition of the Ph.D. program will support Temple University as a research intensive university. Providing student with an international research experience will give them contact with scientists and students in other institutions; furthermore, these opportunities will focus on geological processes which most directly affect urban areas and human well-being. These emphases are fully consistent with the "Acres of Diamonds" philosophy of Russell Conwell and with the recent initiatives by President Hart and Dean Dai to
establish agreements for study with international institutions.

1. C. RELATIONSHIP OF THE PROPOSED NEW PROGRAM TO OTHER EXISTING PROGRAMS AT THE INSTITUTION

A Ph.D. program in geoscience with a strong environmental orientation will inevitably involve faculty from other programs (including chemistry, biology, CIS, and engineering) and centers (such as the Center for Sustainable Communities). We anticipate that interdisciplinary research and teaching opportunities will arise from this cooperation.

1. D. CAMPUS WHERE PROGRAM WILL BE OFFERED

The Earth and Environmental Science Department currently offers courses on the Main and Ambler campuses. The proposed program will center on the main campus. Cooperation with the Center for Sustainable Communities would involve the Ambler campus. It is possible that, depending on types of international projects which might develop, students or teachers might also be based on foreign campuses, such as Temple Rome, Japan, or China.

1. E. CONDITIONS THAT MAKE TEMPLE A UNIQUE OR APPROPRIATE PLACE TO INITIATE A PH.D. PROGRAM IN GEOSCIENCE

The proposed Ph.D. is consistent with Temple University’s historic mission as a university serving an urban population, in particular the focus of the program that includes urban geoscience. Furthermore, the proposed program lines up with new initiatives at Temple to promote globalization, sustainability, service learning, and science education.

The geographic location of Philadelphia, the Delaware Valley, and the coastal areas of New Jersey are perfect for the execution of our proposed Ph.D. program. Philadelphia is situated at the interface of several environmentally sensitive ecosystems. The Schuylkill and Delaware Rivers surround and bisect downtown Philadelphia and then unite and flow into Delaware Bay. We are influenced by tidal forces which create environmentally sensitive wetlands. Certain suburbs just outside of the city are underlain by caves which occasionally collapse. The coastal areas of New Jersey are affected by storms which destroy beaches and property.

All of these varied ecosystems are greatly impacted by our industrial, economic, and recreational activities. We see the degradation of watersheds and marshlands via pollution, reclaimed lands that subside and destroy neighborhoods, catastrophic failures of piers, and numerous vacant lots and brown fields. We see numerous pharmaceuticals in our rivers. We deplete our natural resources. Throughout the entire region, aggressive growth and development impacts these delicate ecosystems. But we are in turn affected by the forces of nature.

How will we need to change our metropolitan infrastructure in order to cope with these changes? The answers to all of these questions will be based in a thorough understanding of the
interrelationship between geological and environmental processes and our society. Only by understanding the effects that our society has on the environment, and in turn how the environment affects us, can we develop a course of action to meet the environmental challenges ahead. This understanding of the interplay between society and environment must be over both the short term and long term. By looking into the geologic past, we can see how our activities have modified this region over the past several hundred years. We can determine the rates of environmental change, both natural and anthropogenic. Not all natural processes act on the same timescale, or the same rate. For this reason, a department that is comprised of specialists in both modern and ancient ecosystems, and the associated physical and chemical processes that control them, is vital to understanding how we interact with our surroundings. Implementation of the Ph.D. program and hiring of new faculty will allow The Earth and Environmental Science Department at Temple University to provide the expertise and research to assess and solve both global and regional problems.

1. F. OTHER INSTITUTIONS OPERATING SIMILAR Ph.D. PROGRAMS

In southeastern Pennsylvania, only two other institutions offer a Ph.D. within a department of Earth and Environmental Science, and a third offers a degree in Environmental Science, but through a consortium of departments. These programs are distinct from the program that we propose to create at Temple University.

The EES program at Lehigh was created in 1991 in response to a university-sponsored Environmental Initiative. The Department of Geology was integrated with the environmental biologists from the Department of Biology in an effort to create a center of excellence focused on understanding the interaction and effects of human activity on the environment. The scientific focus of the Lehigh EES program is quite varied and ranges from research on large-scale fundamental geologic processes and how they affect climate and environment to small scale studies of microbial ecology. The overall philosophy is to understand the fundamental dynamics of ecosystems and environments as influenced by geologic processes. See Appendix A for faculty numbers and degree requirements. Research is carried out at the masters and Ph.D. level. Of the 19 active faculty, the majority are geologists (14), with the remainder a combination of ecologists and bio(geo)chemists (5).

The EES program at Penn is similar in philosophy to that of Lehigh. The Penn program promotes a focus on the interaction of humans with the natural environment. The approach at Penn is grounded in both traditional geologic theory complimented with biological and biogeochemical research programs. The EES program at Penn is part of a larger university-wide consortium of faculty within the Institute for Environmental Studies that focuses on policy, toxicology, and engineering, as well as earth sciences. Of the 15 active faculty, 9 are geologists. The remainder are comprised of a combination of biologists, bio(geo)chemists, and ecologists. See Appendix A for faculty numbers and degree requirements.

Drexel University does not have a department of Geology, Geoscience, or Earth and Environmental Science. They offer an undergraduate degree in Environmental Science through the Department of Biology. They offer graduate degrees (M.S. and Ph.D.) in Environmental
Science by bringing together faculty from a variety of disciplines. Only one of the faculty has formal training in geology/geosciences so they do not provide a degree in geosciences.

The Ph.D. program that we are proposing at Temple University is similar in some respect to those at Lehigh and Penn, but differ in other respects. We would be totally distinct from the program at Drexel. We are similar in that we also will have a combination of researchers involved in classical geologic investigations and researchers evaluating environmental impacts of anthropogenic activity. We differ, though in the focus of our proposed program. Our goal is to develop an interdisciplinary research program founded on the establishment of national and international collaborations with educational, government, and NGO organizations. Our plan of aggressive, targeted hires over the next several years will allow us to expand into emerging areas of research, such as urban geoscience and climate change, that would benefit from our proposed interdisciplinary and international approach.

1. G. ESTIMATE THE NUMBER OF NEW STUDENTS DURING THE FIRST YEAR

We propose to have approximately 3 to 4 Ph.D. students in residence in the first year of the program. Some of these students may be transfer students, brought into the program by senior faculty hired from other institutions. The number of students will increase by 3 to 4 each subsequent year until the steady state number of 10 – 14 students is attained.

1. H. ASPIRATIONS OF EXCELLENCE AND ASSESSMENT

We will use a variety of internal and external mechanisms to evaluate the curriculum and overall effectiveness of the Ph.D. program. The Ph.D. Program Director, in consultation with Ph.D. faculty members, will annually review student progress, grades, and pass/fail rate on preliminary examinations, enrollments, and advising.

We will collect impact indicators of our students’ success by tracking such quality indicators as:

- Publications, including book chapters, peer-reviewed journal articles, and books
- Conference Presentations
- Invited Presentations
- Awards and Honors
- Fellowships
- Grants
- Job placements, including post-doctoral and faculty positions, as well as leadership positions in Governmental and Non-governmental Organizations (NGO), industrial (petroleum and mining), and faculty positions

In addition, effectiveness of the Ph.D. program will be tracked by determining:

1. Program attrition (dropouts, dismissals)
2. Time to complete the Ph.D. degree
Finally, students' perceptions of the programs will be assessed through:

1. Teaching evaluations  
2. Student surveys on different aspects of the program (e.g. Zoomerang e-survey)  
3. Exit interviews

Information from these and other sources will be used by the Chair, Ph.D. program director, and affiliated faculty to discuss, evaluate, and adjust aspects of the program.

1. I. QUALITY OF FACULTY MEMBERS TO SUPPORT THE PROGRAM

The proposed graduate program in Geoscience will include faculty members in the Department of Earth and Environmental Science, as well as certain faculty with overlapping interests from other departments and campuses. For example, research and teaching faculty in the Center for Sustainable Communities at Ambler may become involved in some aspects of the program, possibly in supporting humanitarian efforts and teaching some elective courses. Similarly, some ecologists and environmental biologists (Biology Department), geomaterials researchers (Chemistry), and environmental toxicologists (Public Health) may become affiliated with this program, providing course instruction and research support.

Faculty in EES have obtained Ph.D. degrees from distinguished institutions including: Yale, Princeton, and Stanford Universities, and the Universities of Wisconsin, Nebraska, and Pennsylvania. Some faculty have obtained post-doctoral experience. Abbreviated curriculum vitae of faculty are included in Appendix C.

Faculty in EES have been very active in publishing and obtaining external funding for research. Faculty are or have been Investigators or Co-Investigators on grants obtained from NSF, NASA, DOD, DOE, DOI, USDA, William Penn, Chevron Corporation and other funding sources. Faculty in EES have good publication rates in internationally-recognized peer reviewed journals with high citation indices, including Nature, Science, Geology, Bulletin of the Geological Society of America, Palaios, Geochimica et Cosmochimica Acta, Ground Water, Economic Geology, and the Journal of Geophysical Research.

2. SHORT- AND LONG-TERM EFFECTS ON OTHER UNIVERSITY PROGRAMS

Demand for Courses

The proposed program will have a limited immediate effect on demand for courses. The addition of Ph.D. students and new faculty will require addition of new courses. New courses will include the two required Ph.D. courses, Research Methods (3 cr) and Manuscript/Proposal Preparation Techniques (3 cr), as well as elective graduate and undergraduate courses in Isotope Geochemistry, Geophysics or Tectonics, and Climates and paleoclimate modeling. These courses may also be open to MS and undergraduate students and to students from other departments. Our current majors and graduate-level courses have attracted students not only from Geology and
Environmental Sciences, but also from Anthropology, Chemistry, Physics, Biology, and Engineering. We anticipate that the new courses, including courses such as climate modeling, will be of interest to students from those departments and also possibly CIS. These new courses will be phased in over a three to five year period as new faculty are hired and as students enter the Ph.D. program.

Loss or Addition of Students

We are proposing that the Ph.D. program, when fully implemented, will consist of from 10 to 14 students. We anticipate that the current MS program will remain at about its current number, ca. 10 students. The MS program serves an important function to provide trained geologists for employment in regional Environmental and Geotechnical firms, the New Jersey and Pennsylvania Departments of Environmental Protection; regional government agencies, such as the U.S. EPA; education, and mining and petroleum companies (Figure 2). Employment for such graduates will remain the same or increase in coming years, thus the MS program should continue at its current size. Therefore, the total number of graduate students will more than double, from 10 to ca. 25. The new Ph.D. program may make our masters program more attractive to applicants since they will have the opportunity to complete both degrees at Temple. We also anticipate that initiation of the Ph.D. program and hiring of new faculty will provide new and exciting opportunities for undergraduate students. This may produce some increase in undergraduates majoring or doing research in Geology and Environmental Science.

3. ANALYSIS OF IMPACT ON SPACE RESOURCES (OFFICE, LAB, CLASS)

The new faculty and students will require additional equipment, space, and support personnel. The department currently has only one secretary and one full-time and one part (half) time support staff members. The department should add one new secretary and two more laboratory technicians, who may be shared with the Materials Science Center and supported, in part, through external funding. The amount of additional space required will depend, in part, on research specializations of the new faculty, amount and type of equipment required for research, and possible use of common laboratory facilities. As a preliminary estimate (assuming ca. 150
ft²/faculty office, 50 ft²/student office, 100 ft²/secetary or laboratory technician, and an average of 600 ft²/faculty laboratory), a minimum of ca. 4,950 ft² additional departmental space would be required.

4. IMPACT OF PROPOSED CHANGES ON STAFF AND FACULTY PERSONNEL

EES currently has only seven tenure track faculty. This is not a sufficient number for a broadly based Ph.D. program offering a diversity of experience for students. As discussed above, additional faculty are required. EES proposes to expand the department with five to seven hires over the next four to five years. The additional faculty will be chosen in selected disciplines to move the department into new research areas while building research depth and collaboration with current faculty. These new faculty will also complement existing strengths in the department, while providing a unique direction and role for Temple University in several emerging areas of research and public needs.

As mentioned above, additional secretarial and laboratory support personnel will also be required. At present the department has only one secretary. At least one more full-time secretary should be hired to handle admissions, grant proposal preparation, submission, and budgets. Two more laboratory technicians should be hired to maintain, operate, and train students in use of new laboratory instruments, such as mass-spectrometers. These technicians may be shared with the Materials Science Center and supported, in part, through external funding.

5. FIVE-YEAR BUDGET SHOWING MARGINAL IMPACT

The Five-year budget plan (Table 3), which was prepared by the CST Dean’s office, contains budget estimates based on the following assumptions:

1. To implement the Ph.D. program in Geoscience, six new tenure track faculty will be hired in EES over the next three years (including two this year [year 1]). We anticipate that five junior faculty will be hired at initial salaries of approximately $70,000 and one senior member at a salary of approximately $85,000). This produces first year salary increments of $435,000. Faculty should be hired early, if possible, to provide critical research and advising mass for incoming Ph.D. students.

2. Based on demographic data, the CST Dean’s office estimates that during this period as many as 12 senior faculty will retire or leave the college. These retirements will entirely offset salaries of newly-hired EES faculty.
### Table 3. Five-year estimated budget showing marginal impact

<table>
<thead>
<tr>
<th>Faculty Hire/Discipline</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isotope Geochemist</td>
<td>70,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>70,000</td>
</tr>
<tr>
<td>Geohazards</td>
<td>70,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>70,000</td>
</tr>
<tr>
<td>Geographic Information Systems</td>
<td></td>
<td>70,000</td>
<td></td>
<td></td>
<td></td>
<td>70,000</td>
</tr>
<tr>
<td>Geomorphology</td>
<td></td>
<td></td>
<td>70,000</td>
<td></td>
<td></td>
<td>70,000</td>
</tr>
<tr>
<td>Climate modeling</td>
<td></td>
<td></td>
<td></td>
<td>70,000</td>
<td></td>
<td>70,000</td>
</tr>
<tr>
<td>Materials/medical geology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>85,000</td>
<td>85,000</td>
</tr>
<tr>
<td></td>
<td>140,000</td>
<td>140,000</td>
<td>155,000</td>
<td></td>
<td></td>
<td>435,000</td>
</tr>
</tbody>
</table>

Anticipated CST Faculty
Retirements:

<table>
<thead>
<tr>
<th>Year</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
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<tbody>
<tr>
<td>4</td>
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</tbody>
</table>

Additional Funds Required

<table>
<thead>
<tr>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 6. LIST OF FACULTY GROUPS AND RELEVANT ADMINISTRATORS THAT WERE CONSULTED

The following activities and consultations preceded submission of this proposal:

- **April 2008** - Development of a strategic plan by the faculty and presentation to Dean Dai

- **July 2008** - Writing of a Ph.D. pre-proposal and circulation to interested parties including: The Chairs of Biology, Chemistry, Physics, CIS, the Dean of the Ambler College, the Head of the Center for Sustainable Communities, and the Science Librarian.

- **July 2008** – Writing of a Ph.D. Pre-proposal and submission to Dr. Zeb Kendrick of the Graduate School
September 2008 – Critique and feedback on Pre-proposal from Dr. Zeb Kendrick and EES Chair.

November 2008 – Discussion of Ph.D. Pre-proposal between Dr. Zeb Kendrick and the EES faculty.

November 2008 - January 2009 – Extended discussions by EES faculty and the writing committee on Ph.D. proposal content.

7. IMPLEMENTATION PLAN WITH CHRONOLOGY

Spring 2009 – Submit proposal to the Graduate School for review, followed by submissions to the Provost, President, and the Academic Affairs Committee of the Board of Trustees.

Summer 2009 – Develop new promotional and advising materials to publicize the new degree once final University approval is received.

Prepare revisions to the Ph.D. Advising Handbook, the Graduate Bulletin, and the website entries for the Graduate School, and College of Science and Technology.

Once University approval is received, change ISIS course numbering and Class Schedules to include Doctoral research and other courses.

Implement transition plan for introducing the Ph.D. program in the Fall of 2009.

a). prepare and disseminate advertising materials and announcements for the new Ph.D. program

b). prepare and disseminate the Geoscience Ph.D. handbook to administrators, faculty, staff, and incoming students.

c). get program and course descriptions included in the Graduate School Website and the online Graduate Bulletin.

Depending on timing of approval of the program by the University and Trustees, the first Ph.D. students may be admitted or transfer into the program (accompanying newly hired senior faculty members) as early as Fall 2009.

Library, computer, and student aid

The proposed changes will not have a significant impact on these facilities and services. The Ph.D. Program Director will consult with the library about new acquisitions as the need arises. Other than individual computers for newly hired faculty and staff, the proposed program does
not require additional computer resources. Education and research requiring computers or other similar technologies can be accommodated within current EES computer laboratories. Students will be supported by Research Fellowships and as Teaching Assistants. We also expect that students enrolling in the program will be competitive for University fellowships and external funding.

**Type of Change Proposed**

The proposal is to create a new program. This change does not involve renaming, restructuring, or closing a department.
## Appendix A: Program Comparison

<table>
<thead>
<tr>
<th>Program</th>
<th>Size of Faculty/# of Doctoral Students*</th>
<th>Total Credit Hours</th>
<th>Didactic Credits</th>
<th>Required Courses</th>
<th>Exams</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temple U.: Proposed Ph.D. program in Geoscience</td>
<td>10-12 faculty</td>
<td>29-35 cr beyond MS</td>
<td>7 classes or 24 credits from the MS; additional credits TBD with committee for students without an MS</td>
<td>Research methods in Geoscience; no more than 2 courses outside department; at least 2 outside speciality (breadth) but within the department; no more than ¼ below 5000 level.</td>
<td>Comprehensive Exam; Research Proposal and Orals; Dissertation Defense</td>
</tr>
<tr>
<td>Temple U. MS of Geoscience</td>
<td></td>
<td>22-29</td>
<td>7 classes</td>
<td>Participation in Seminar (1 cr)</td>
<td>Comprehensive Exam; Research Proposal and Orals; Thesis Defense</td>
</tr>
<tr>
<td>Rutgers U.: Ph.D. in Geological Science</td>
<td>30 faculty; 8 research scientists/adjuncts; 5 staff</td>
<td>72 credits (from a BA/BS)</td>
<td>33 credits</td>
<td>3 course credits from each of the 3 major categories: Mineral/Petrology / Meteoritics and Sedimentary Geology and Geophysics/Structure</td>
<td>Oral and written Qualifying Exam; Dissertation Defense</td>
</tr>
<tr>
<td>U. of Pennsylvania: Ph.D. in Earth and Environmental Science</td>
<td>9 faculty, 9 adjuncts, 2 research fellows, 7 staff</td>
<td>TBD</td>
<td>20 units from a BA/BS; 12 from an MS</td>
<td>none</td>
<td>Prelims; Dissertation Defense</td>
</tr>
<tr>
<td><strong>U. of Delaware:</strong> Ph.D. in Geological Sciences</td>
<td>12 faculty; 12 “secondary appts”; 2 staff</td>
<td>program developed with the student's dissertation committee</td>
<td>GEOL 601-Geoscience at Delaware and GEOL 605-Stratigraphy; at least 9 credits dissertation research</td>
<td>Oral and Written Proposal and Dissertation Defense</td>
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</tr>
<tr>
<td><strong>Cornell U.:</strong> Ph.D. in Geological Science</td>
<td>24 faculty; 6 adjunct; 20 research staff; 10 tech. and admin. staff</td>
<td>5 - 7 years</td>
<td>TBD by committee</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td><strong>MIT:</strong> Ph.D. in Earth, Atmospheric and Planetary Science</td>
<td>41 faculty; 11 Lecturers; 38 research staff; 28 staff</td>
<td>~5 years</td>
<td>Individualized program</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td><strong>California Institute of Technology:</strong> Ph.D. in Geology</td>
<td>41 faculty; 4 research faculty, 70 technical and research staff</td>
<td>135 units (-45 units if entering with MS)</td>
<td>Two our of the three courses Ge 102, 103, and 104, which also satisfy the basic division requirement, and 36 units in 100-level science or engineering courses taken outside the GPS division; 54 units are required in 100- or 200-level courses within the GPS division; ACM/ESE 118</td>
<td>Oral exam; Dissertation Defense</td>
<td></td>
</tr>
<tr>
<td><strong>Stanford U.:</strong> Ph.D. in Geological and Environmental Science</td>
<td>24 faculty; 15 affiliated faculty; 20 staff</td>
<td>Individualized program</td>
<td>4 letter-graded courses</td>
<td>3 courses from 4 different faculty</td>
<td>Qualifying Exam; Dissertation Defense</td>
</tr>
<tr>
<td>Institution</td>
<td>Faculty Members</td>
<td>Required Credits</td>
<td>Course Requirements</td>
<td>Research Requirements</td>
<td></td>
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</tr>
<tr>
<td>Washington University, St. Louis:</td>
<td>17 teaching faculty; 6 research faculty; 1 lecturer; 26 Research Scientists and Staff; 23 other staff</td>
<td>72 semester units from a BA/BS</td>
<td>15 units</td>
<td>Six Breadth courses: Two courses in “Geology”, two in “Geochemistry”, two in “Geophysics”</td>
<td>Research paper during 4th semester, Orals, Dissertation Defense</td>
</tr>
<tr>
<td>Lehigh U.: Ph.D. in Earth and Environmental Science</td>
<td>19 faculty; 3 research scientists; 5 staff</td>
<td>72 credits from BA/BS; 48 credits from MS</td>
<td>18 credits</td>
<td>students are required to take two of the Department’s three core courses: Tectonic Processes, Paleoclimatology, or Aquatic Ecosystems</td>
<td>Qualifying Exam; General Exam (Dissertation Defense)</td>
</tr>
<tr>
<td>SUNY Buffalo: Ph.D. in Geology</td>
<td>16 faculty; 14 research or adjunct faculty; 6 staff</td>
<td>72 credit hours</td>
<td>24 credits</td>
<td>none</td>
<td>Qualifying exam; Dissertation defense</td>
</tr>
<tr>
<td>Binghampton University: Ph.D. in Geological Sciences</td>
<td>13 faculty; 1 adjunct; 7 staff</td>
<td>24 credit hours</td>
<td>Language-research requirement</td>
<td>Oral Exam; Proposal Defense; Dissertation Defense</td>
<td></td>
</tr>
<tr>
<td>U. of Rochester: Ph.D. in Earth and Environmental Science</td>
<td>7 faculty; 3 research associates; 3 adjunct; 3 staff</td>
<td>At least 4 years</td>
<td>3-5 semesters</td>
<td>None</td>
<td>Qualifying Exam; Dissertation Defense</td>
</tr>
<tr>
<td><strong>CUNY: Ph.D. in Earth And Environmental Science</strong></td>
<td>90 across all colleges; 8 adjunct</td>
<td>60 credits (up to 30 credits from MS can be applied)</td>
<td>2 years</td>
<td>Earth Systems I and II (EES 716-717), The Nature of Scientific Research (EES 704) and field courses</td>
<td>First Exam after 30 credits; Second Exam is Proposal Defense after 60 credits; Dissertation Defense</td>
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</tr>
<tr>
<td><strong>Utah State U.: Ph.D. in Geology</strong></td>
<td>10 faculty; 5 adjunct; 1 research associate; 2 staff</td>
<td>90 credits beyond a BS/BA; 60 credits beyond an MS</td>
<td>30 credits beyond a BS; 21 credits beyond the MS</td>
<td>15 credits of 7000-level coursework; 3 credits of PhD Seminar</td>
<td>Written Comprehensive Exam; Research Proposal and Proposal Defense; Dissertation Defense</td>
</tr>
<tr>
<td><strong>U. of Alabama: Ph.D. in Geological Sciences</strong></td>
<td>14 faculty; 3 adjunct faculty; 4 research staff; 3 administrative staff</td>
<td>72 hours</td>
<td>48 hours beyond BA/BS (24 from a MS)</td>
<td>4 hours of Graduate Seminar</td>
<td>Dissertation Proposal Defense; Preliminary Exam during 5th semester; Annual Evaluation; Final Exam/Dissertation Defense</td>
</tr>
<tr>
<td><strong>West Virginia U.: Ph.D. in Geology</strong></td>
<td>24 faculty; 8 staff; 4 adjunct or research faculty</td>
<td>No formal course requirements</td>
<td></td>
<td></td>
<td>Preliminary Exam during 1st semester, Proposal Defense by 3rd semester, Comprehensive Exam at end of 2nd year, Dissertation Defense</td>
</tr>
<tr>
<td><strong>Washington State U.:</strong> Ph.D. in Geology</td>
<td>12 faculty; 5 NTT; 3 administrative staff; 6 lab staff</td>
<td>72 hours from BA/BS</td>
<td>34 hours from BA/BS</td>
<td>30 hours of 500+ level; up to 9 credits of non-graduate coursework; 2 semesters of Seminar Two courses in Chem/Phys above 300 level OR Two course in CS/Stats OR Math through Differential Eq. OR Foreign Language Translation Exam</td>
<td>Preliminary Exam; Final Exam</td>
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</tbody>
</table>

| **U. of Illinois at Urbana-Champaign:** Ph.D. in Geology | 15 faculty; 3 affiliate faculty; 4 research staff; 8 adjunct faculty | At least 96 hours from BA/BS | At least 40 hours from BA/BS; 16 hours from MS | At least 20 hours at 500 level; at least 4 hours outside of department; at least 12 hours within the department | Qualifying exam during 4th semester; Preliminary Exam during 6th semester; Final Exam between 9th and 12th semester |
## APPENDIX B. EARTH AND ENVIRONMENTAL SCIENCE DEPARTMENT FACULTY

<table>
<thead>
<tr>
<th>Tenure Track Faculty Members</th>
<th>Degree, Institution, Year</th>
<th>Research Specialties</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAVATZES, Alexandra</td>
<td>Ph.D. – Stanford University, 2006</td>
<td>Physical Sedimentology, Planetary Geology</td>
</tr>
<tr>
<td>Assistant Professor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DAVATZES, Nicholas</td>
<td>Ph.D. – Stanford University, 2005</td>
<td>Structural Geology, geothermal energy</td>
</tr>
<tr>
<td>Assistant Professor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GRANDSTAFF, David</td>
<td>Ph.D. – Princeton University, 1974</td>
<td>Low-temperature geochemistry</td>
</tr>
<tr>
<td>Professor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MYER, George</td>
<td>Ph.D. – Yale University, 1965</td>
<td>Mineralogy,</td>
</tr>
<tr>
<td>Professor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NYQUIST, Jonathan</td>
<td>Ph.D. – University of Wisconsin, Madison, 1986</td>
<td>Environmental Geophysics</td>
</tr>
<tr>
<td>Professor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TERRY, Dennis</td>
<td>Ph.D. – University of Nebraska, Lincoln, 1998</td>
<td>Paleopedology, stratigraphy</td>
</tr>
<tr>
<td>Associate Professor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TORAN, Laura</td>
<td>Ph.D. – University of Wisconsin, Madison, 1986</td>
<td>Hydrogeology</td>
</tr>
<tr>
<td>Professor</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Non-Tenure Track Faculty Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLYNN, Natalie</td>
</tr>
<tr>
<td>FRIEL, John</td>
</tr>
<tr>
<td>TUMARKIN-DERATZIAN, Allison</td>
</tr>
<tr>
<td>VALENTINO, Richard</td>
</tr>
<tr>
<td>VRAZO, Matthew</td>
</tr>
</tbody>
</table>
APPENDIX C. Faculty *Curriculum Vitae*

DAVATZES, Alexandra  
DAVATEES, Nicholas  
FLYNN, Natalie  
FRIEL, John  
GRANDSTAFF, David E.  
MYER, George H.  
NYQUIST, Jonathan  
TERRY, Jr., Dennis O.  
TORAN, Laura  
TUMARKIN-DERATZIAN, Allison  
VALENTINO, Richard  
VRAZO, Matthew
Alexandra Krull Davatzes
Department of Earth and Environmental Science
Temple University
Philadelphia, PA  19122
215-204-3907 • alix@temple.edu

Professional Preparation:
Pomona College        Geology        BA, 1995
Stanford University    Geological & Environmental Science Ph.D., 2006
NASA Postdoctoral Fellow   NASA Ames Research Center  2007

Appointments:
2008-present           Assistant Professor, Department of Geology, Temple University
2007-present           HiRISE Team Member, Mars Reconnaissance Orbiter Mission, NASA
2007                   NASA Postdoctoral Fellow, NASA Ames Research Center, Moffett Field, CA
2005-2006               NASA Ames Education Associate, NASA Ames Research Center, Moffett Field, CA
2004-2005               School of Earth Sciences Public Outreach Graduate student Coordinator, Stanford University.
Summer, 2002            Lecturer, University of Oklahoma Honors College; Norman, Oklahoma

Publications:

Journal Publications:

• Davatzes A., Gulick, V.C., Davatzes, N.C. (to be submitted to GRL) Development of fluid pathways within relay zones on Mars: Insight from HiRISE images.

• Davatzes A.E., Byerly G.R., Lowe D.R., (to be submitted to EPSL) Evidence for a low O₂ Archean atmosphere from nickel-rich chrome spinels in 3.24 Ga impact spherules, Barberton greenstone belt, South Africa.


**Extended Abstract Publications:**


- Gulick, V, **Davatzes, A.**, Kolb, K. and the HiRISE team. (2007) Some insights on gully morphology and formation on Mars from HiRISE. *Seventh International Conference on Mars*


**Abstracts:**


* indicates publication by student advisee

**Other Publications:**

• Davatzes, A., Gulick, V. (2007) Imaging Mars at High Resolution: Activity Book, for grades K-3; 4-8; 9-14. (Three levels available) Published online at the HiRISE website: [http://hirise.lpl.arizona.edu/epo/epo.php](http://hirise.lpl.arizona.edu/epo/epo.php)

**Invited Talks:**

• *November, 2008; seminar series, Lehigh University;* “Ancient and Active Processes on Mars as Revealed by the HiRISE Camera on the Mars Reconnaissance Orbiter”

• *November 2008; seminar series, Dickinson College;* “Ancient and Active Processes on Mars as Revealed by the HiRISE Camera on the Mars Reconnaissance Orbiter”

• *July, 2008; NASA Astrobiology Institute, NASA Ames Research Center;* “Observing Mars at High Resolution with the HiRISE camera onboard MRO”

• *October 2003; IGPP seminar series, UC Santa Cruz;* “Why the dinosaurs got off easy: Evidence of mega-impacts in the Archean”

• *June 2003; NASA Astrobiology Field Conference: Archean Surface Processes, Barberton, South Africa;* “Compositional variability in the S3 spherule bed: A key to the condensation history of rock vapor clouds”

• *May 2003; Ocean Waves from Asteroid Impacts Workshop, UC Santa Cruz;* “Evidence for tsunamis in the Archean spherule beds of the Barberton Greenstone Belt, South Africa”

**Synergistic Activities:**

• Reviewer for “Geology” (journal), “From Fossils to Astrobiology” (published by Springer)
• 2008 American Geophysical Union (AGU) session convener: New Developments in the Study of Fluvial Systems on Mars
• Assisted in the development and implementation of the Education and Public Outreach (EPO) program for the HiRISE Camera on the Mars Reconnaissance Orbiter, including a Student Challenge Program which has involved 675 school groups representing over 8000 students from 45 states and 42 countries.
• Organized workshops and given presentations at K-12 schools, the California Science Teacher’s Conference, and Sally Ride Festival as part of the HiRISE EPO effort and as part of the outreach program at Stanford University.
• Elected Geoscience Councilor for the Council on Undergraduate Research (CUR), 2008-2010.

Honors:
2007; NASA Postdoctoral Fellowship recipient, NASA Ames and Oak Ridge Associated Universities
2005; Outstanding poster, NASA Astrobiology PI Conference, NASA Ames, for best student research
2002; Lieberman Fellowship recipient, Stanford University, selected based on scholarly achievements, demonstrated interest and ability in teaching, and dedication to serving the larger community
2000 and 2001; McGee Grant recipient, Stanford University, for student research
1999; The D.B. McIntyre- H. Stanton Hill Award, a senior commencement award from the Geology Department at Pomona College
1999; Senior Service Award, a senior commencement award for service to the Pomona College community
1999; Sigma Xi Honor Society
1998; Mortar Board Honor Society, Pomona College
1997-99; Pomona Scholar (GPA>3.7)
1998; Isabel F. Smith Award from the Geology Department of Pomona College for women in geology
1996; Academic All-American in waterpolo
1995; Science Fair Inc. College Scholarship

Courses Taught:
The Early Earth (U. of Oklahoma); Sedimentology (Stanford University); Evolution and Extinctions (Temple University); Environmental Seminar (Temple University); Sedimentary Petrology (Temple University, graduate level).

Collaborators:
Collaborators: Gary Byerly, LSU; Linda Conrad, NASA Ames; Nicholas Davatzes, Temple University; Glenn Deardorff, NASA Ames; Herbert Frey, NASA GSFC; Bob Kanefsky, NASA Ames; Laszlo Keszthelyi, USGS; Jacqueline Leonard, Temple University; Alfred McEwen, ASU
Thesis advisor: Donald Lowe, Stanford University
Postdoc advisor: Virginia Gulick, NASA Ames Research Center/SETI Institute
Dissertation advisees: Michael Wyant, MS student, Temple University; Elizabeth Scroggs, MS student, Temple University

**Funding:**

**Funded Support**

*Title:* Fluvial and hydrothermal systems on Mars and HiRISE mission support

*Funding Agency:* SETI Institute/NASA Ames Subcontract

*Award Duration:* June-August 2008

*Award Amount:* $25,822

*Person Mo./year:* 2.5

**Pending Support:**

*Title:* Recovery and Evolution of the Earth's Surface System Following Late Heavy Bombardment: Drilling in the Barberton Greenstone belt, South Africa  
*PI:* Donald Lowe

*Funding Agency:* PIRE, NSF

*Award Duration:* 1/1/2010-12/31/2014

*Award Amount:* app. $3,900,000

*Location:* Various

*Person Mo./Year:* 1

*Title:* Adventures in Mathematics and Technology: The Bessie Coleman Project  
*PI:* Jacqueline Leonard

*Funding Agency:* NSF 08-609

*Award Duration:* 07/01/09 - 06/30/12

*Award Amount:* $447,586

*Person Mo./year:* 1
Research Overview

Focus:
The future of energy research and the future development of society depend on Earth’s dynamic resources. The supply of accessible geothermal heat and future petroleum extraction are all controlled by the movement of fluids through faults and fractures in the Earth’s crust. My research investigates the properties of fractures, the stresses that cause them to remain closed, slip or open, and the geological processes that glue them shut by forming new minerals. Thus I study the conditions necessary to enhance and maintain permeability. This same understanding of fracture properties is critical to petroleum systems, contaminant transport, the formation of ore deposits, and earthquake hazards.

Research Approach:
My research incorporates geomechanical analysis with insight from theory and numerical analysis and practical constraints from direct field and borehole observations to investigate how the physical properties of fault zones arise from the processes that deform rock during faulting.

Academic Appointments

2008-present Assistant Professor of Earth and Environmental Science, Temple University, Philadelphia, PA, USA

2008-present Invited Visiting Professor, RES School of Renewable Energy Science, Akureyri, Iceland
(Teach Geothermal Drilling and Logging (GEO605) part of the International M.Sc. degree program in Geothermal Energy Science)

Education

CA: Investigating host rock mineralogical and petrophysical controls on fracture permeability in the Coso Geothermal Field, CA

2003-2004 Post-doctoral Research Fellow, Stanford University

1998-2003 Ph.D., Stanford University, Stanford, CA, Department of Geologic and Environmental Science, Structural geology and Geomechanics:
Fault architecture as a function of deformation mechanism in clastic rocks with an emphasis on sandstone
Adviser: Dr. Atilla Aydin,

1994-1998 B.A., Bucknell University, Lewisburg, PA
Majors: Geology & Philosophy double major. GPA: 3.7/4.0
Magna Cum Laude, with Honors in Geology

HONORS & AWARDS

2008, 2009 Invited Visiting Professor RES School of Renewable Energy Sciences, Iceland

2008 Visiting Scientist, U.S. Geological Survey, Earthquake Hazards Team

2004-2007 Mendenhall Postdoctoral Fellowship

1998-2002 Dr. and Mrs. Thomas Davies Barrows Fellowship: Stanford University

Spring 2002 Shell Grant: Stanford University for funding participation in conferences (Gordon Conference on Rock Deformation, IL Ciocco, Italy)

1998-2001 McGee Grant: Stanford University, grant to fund novel research topics

1998 Bucknell University:
Harold W. Miller Prize: Best honors thesis
Richard P. Nickelsen Prize: Excellence in geology

1998 Phi Beta Kappa

1998 Sigma Xi

1994-1998 Dean’s list

1993 National Merit Scholar Finalist

PROFESSIONAL AFFILIATIONS

American Geophysical Union
American Association of Petroleum Geologists
Geological Society of America
Geothermal Resources Council
## RESEARCH FUNDING

(Total Direct Funds to date: $594,778.30 + TBA)

### PENDING

<table>
<thead>
<tr>
<th>Funding Years</th>
<th>Project</th>
<th>Total Project Funds or Sub-Project</th>
<th>Direct Funds to Temple &amp; PI/CO-I</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>Agency: Department of Energy, Energy Frontiers Research Centers</td>
<td>$15,064,049</td>
<td>TBA</td>
</tr>
<tr>
<td></td>
<td>Title: Center of Rheology and Colloids for Efficient Energy Production, Transportation, and Conservation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Co-PI's: Ronjia Tao, Brad Wayland, Eric Borguet, Hai-Lung Dai, R.Cohen, S. Kong, E. Galinski</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### CURRENT FUNDING

<table>
<thead>
<tr>
<th>Funding Years</th>
<th>Project</th>
<th>Total Project Funds or Sub-Project</th>
<th>Direct Funds to Temple &amp; PI/CO-I</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Title: Evolution of hydraulic and mechanical properties of clay-rich fault rocks</td>
<td></td>
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<tr>
<td></td>
<td>Co-PI's: John G. Solum, David Lockner</td>
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</tr>
<tr>
<td></td>
<td>Description: PI on proposal to characterize the evolution of fault rock properties that control the permeability, trap potential, and strength of fault rocks. Project includes chemical, mineralogic, and rock mechanics measurements of fault and host rocks.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009-2010</td>
<td>Agency:</td>
<td>$17M</td>
<td>$99,643</td>
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<tr>
<td></td>
<td>• Department of Energy, Geothermal Technologies Program Project</td>
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<td></td>
<td>• AltaRock Energy, Inc. (Cap. Venture)</td>
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<tr>
<td></td>
<td>Title: Use of multiple stimulations to improve economics of Engineered Geothermal Systems in shallow high temperature intrusives</td>
<td></td>
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<td></td>
<td>FOA: DE-PS36-08GO98008</td>
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<tr>
<td></td>
<td>Co-PI's: Susan Petty, John L. Smith, Roy Baria, Bill Livesay, Joseph L. Iovenitti, Daniel Bour, Pete Rose, Guy Simmons, Ahmad Ghassemi</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Description: CO-I on proposal for 2009-2010 to stimulate permeability in well penetrating igneous rocks on the periphery of the Geysers Geothermal Field, CA. Responsible for well</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
logging, fracture, stress, and permeability analysis.

2009

**Agency:** Nevada Geothermal Power, Inc.  
**Title:** Blue Mountain Geothermal Project  
**Co-PI’s:** Steve Hickman, Glenn Melosh  
**Description:** Logging and Stimulation of Blue Mountain Geothermal Prospect, NV: PI responsible for fracture, stress, and permeability analysis of blind (no surface expression) geothermal prospect investigating (1) crustal permeability and its relationship to stress, fracture and rock mineralogy, (2) Tectonics of the central Great Basin. Understanding of blind systems is critical to estimating the U.S. geothermal energy reserve.

<table>
<thead>
<tr>
<th>Sub-project:</th>
<th>TBA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>$125K +</strong> Equipment cost-share</td>
<td></td>
</tr>
</tbody>
</table>

2008-2009  

**Agency:**  
- Department of Energy: Geothermal Technologies Program Project  
- Ormat  
**Title:** Development of an Enhanced Geothermal System at Desert Peak, NV  
**FOA:** DE-FC07-01ID14186.  
**Co-PI’s:** Pete Rose, Steve Hickman, Ann Robertson-Tait, Joseph Moore, Sue Lutz, Ernie Majer, Mack Kennedy  
**Description:** Co-PI on proposal to engineer permeability in an area of high heat flow where natural permeability in the rock is inadequate for producing electricity.

<table>
<thead>
<tr>
<th>Sub-project:</th>
<th>TBA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>$120K</strong> Cost-Share</td>
<td></td>
</tr>
</tbody>
</table>

2008-2009  

**Agency:** Great Basin Center for Geothermal Research  
**Title:** Characterizing Structural Controls on Geothermal Systems in the Northern Great Basin through Integrated Structural Analysis and Modeling  
**FOA:**  
**Co-PI’s:** Jim Faulds, Mark Coolbaugh, Gary Oppliger

2008

**Agency:** U.S. Geological Survey, Earthquake Hazards Team, Menlo Park, CA  
**Title:** Visiting Scientist  
**Description:** Expenses during summer 2008 for spending approximately 2 months in Menlo Park, CA and in the field for collaborative research on Enhanced Geothermal Systems

<table>
<thead>
<tr>
<th>Total Project Funds or Sub-Project</th>
<th>Direct Funds to Temple &amp; PI/CO-I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel &amp; Expense: <strong>$6,180</strong></td>
<td>N/A</td>
</tr>
</tbody>
</table>

2006-2007

**Agency:**  
- Department of Energy, Geothermal Technologies Program Project  
- U.S. Geological Survey Geothermal Assessment Project

| **$175K** | N/A |

**PAST**

<table>
<thead>
<tr>
<th>Funding Years</th>
<th>Project</th>
<th>Total Project Funds or Sub-Project</th>
<th>Direct Funds to Temple &amp; PI/CO-I</th>
</tr>
</thead>
</table>
**Title:** Visiting Scientist  
**Description:** Expenses during summer 2008 for spending approximately 2 months in Menlo Park, CA and in the field for collaborative research on Enhanced Geothermal Systems | Travel & Expense: **$6,180** | N/A |

| 2006-2007     | Agency:  
- Department of Energy, Geothermal Technologies Program Project  
- U.S. Geological Survey Geothermal Assessment Project | **$175K** | N/A |
Title: Creation of an Enhanced Geothermal System through Hydraulic and Thermal Stimulation: Co-PI on proposal to DOE Enhanced Geothermal Systems Program.
FOA: DE-FC07-01ID14186.
Co-PI’s: Pete Rose, Steve Hickman, Jesse McCulloch, Joseph M. Moore, Katie Kovac, Mike Adams, Mike Mella, Phil Wannamaker, Bruce Julian, Gillian Foulger, Dan Swenson, Shekhar Gosavi, Ashish Bhat, Keith Richards-Dinger, Frank Monastero, Ralph Weidler, Stefan Baisch, Ahmad Ghassemi, Thomas Kohl, Thomas Megel.
Description: Development of Enhanced Geothermal Systems technology on the flank of the Coso Geothermal Field, CA.

2004-2006
Agency: U.S. Geological Survey, Mendenhall Postdoctoral Fellowship
Title: Investigating host rock mineralogical and petrophysical controls on fracture permeability in the Coso Geothermal Field, CA
**PUBLICATIONS**

**PEER REVIEWED PUBLICATIONS**

| In Prep. | Development of fluid pathways within relay zones on Mars: Insight from HiRISE images (Davatzes A., Gulick, V.C., Davatzes, N.C.) to be submitted to *Journal of Geophysical Research* |
| In Prep. | Life-Cycle of Crustal Strength and Permeability in Geothermal Systems. (Davatzes, N.C. and Hickman, S.H.) to be submitted to *Geology* |
| In Prep. | Feedback between fault rock evolution and permeability. (Davatzes, N.C. and Hickman, S.H.) to be submitted to *Journal of Structural Geology* |
| In Prep. | The Effect of Brine Composition and Concentration on Strength of Expandable Clays. (Lockner, D., Solumn, J, Davatzes, N.C.) to be submitted to *Science* |
| In Prep. | Stress, Faults and Persistent Fluid Flow in the Coso Geothermal Field. (Lockner, D., Solumn, J, Davatzes, N.C.) to be submitted to *Journal of Geophysical Research* |
| In Prep. | Fault-related clay authigenesis along the Moab Fault: Implications for calculations of fault rock composition and mechanical and hydrologic fault zone properties. (Solumn, J, Davatzes, N.C., Lockner, D.) **invited** to be submitted to *Journal of Structural Geology* (**Special Issue on Chemical and Mechanical Interactions**) |


*Nov. 2003:* Overprinting faulting mechanisms in high porosity sandstone of SE Utah (Davatzes N.C., Aydin, A., in *Journal of Structural Geology*, v. 25, no. 11,


**CONFERENCE PROCEEDINGS**


January 2009 Stress and Faulting in the Coso Geothermal Field: Update and Recent Results from the East Flank and Coso Wash (Davatzes, N.C., and Hickman, S., 2006, 31st Stanford University Workshop on Geothermal Engineering, January 30-February 1, SGP-TR-179, pp. 12)


Jan. 2009  **Borehole Logging (Davatzes, N. and Hickman, S.), In: Desert Peak EGS Project Department of Energy Stage Gate Review, (Suemnich, G. editor)**

Jan. 2009  **Borehole log Analysis, Fractures, stress and fluid flow prior to stimulation of well 27-15, Desert Peak, Nevada, EGS project (Davatzes, N.C. and Hickman, S.), In: Desert Peak Annual Report (Rose, P. editor), 39 pp.**

**Autumn 2008**  **July 1 – September 31, 2008: Borehole log analysis, fractures, stresss and fluid flow prior to stimulation of well 27-15, Desert Peak, Nevada, EGS project (Davatzes, N.C., Hickman, S.), In: Desert Peak EGS Third Quarter Report (Rose, P. editor), 66 pp.**

**Autumn 2008**  **Mechanical Constraints on Permeability Distribution in Great Basin Geothermal Fields (Davatzes, N.C.), 3 pp.**

**Spring 2006**  **Creation of an Enhanced Geothermal System through Hydraulic and Thermal Stimulation (Co-PI on report to DOE (along with 19 others), PI: Peter Rose, 237 pp.**

**Spring 2005- 2006**  **Mendenhall PostDoctoral Research Fellow Quarterly and Annual Reports (Davatzes, N.C.) Report to the U.S. Geological Survey.**

**Autumn 2004- 2006**  **Enhanced Geothermal Systems Quarterly and Annual Reports: Mechanical, Mineralogical, and Petrophysical Analysis of Fracture Permeability (Davatzes, N. C. and Hickman, S.H.) Report to the Department of energy as part of the Enhanced Geothermal Systems Project.**

**Summer 2004:**  **Coso surface mapping and laboratory analysis work plan: Revision after June 2004 field reconnaissance: (Davatzes, N.C.) Report to Navy Geothermal Program office, 37 pp.**

**2003- 2004**  **Structural Heterogeneities and Pale Fluid Flow in an Analog Sandstone Reservoir (PI David Pollard, Co-PI Atilla Aydin), Contributing author on slip surface development in fault rocks offsetting quartz arenite.**

**WORKSHOPS & SHORT COURSES TAUGHT**

**July 14-18, 2008**  **Hedberg Conference (AAPG), Casper Wyoming: Faulting Panel discussion leader. Invitation only meeting limited to 75 Participants.**

**Sept. 2007**  **Geothermal Research Council: Invited Lecturer on Borehole Geophysical Methods in the development of geothermal reservoirs.**


**Jan. 2004**  **Stanford Sedimentology Research Group fieldtrip to Southern Nevada: Designed and lead field trip to Buffington Pockets and Valley of Fire State**
Gordon Research Conference: Rock Deformation (Il Ciocco, Italy): Sequence and distribution of two distinct deformation mechanisms along a slipping normal fault in sandstone


EXPERT PANELS


DOE Sponsored Working Group: Enhanced Geothermal Systems Reservoir Creation Workshop: Invited member of working group to identify key issues for enhancing geothermal systems where either permeability or fluid saturation is inadequate. Houston, TX.


DOE Sponsored Working Group: Exploration Research Planning Meeting: Invited member of working group to identify key research needs for development of geothermal resource explorations technology
**INVITED SEMINARS AND SPECIAL PRESENTATIONS**

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb. 2009</td>
<td><strong>University of Pennsylvania, Department of Earth and Environmental</strong></td>
</tr>
<tr>
<td>Feb. 2007</td>
<td><strong>Chevron Corporation (San Ramon, CA):</strong> Stress, faulting, and fluid flow in the Coso Geothermal Field; Insights into active processes from borehole logs.</td>
</tr>
<tr>
<td>Oct. 2006</td>
<td><strong>UC Davis Department of Geology Lecture Series (Davis, CA):</strong> Controls on Geothermal System Permeability at the Coso Geothermal Field, CA.</td>
</tr>
<tr>
<td>April 2006</td>
<td><strong>Shell Petroleum Company (Houston, TX):</strong> The distribution and generation of fault rocks and fault properties along the Moab fault, Utah.</td>
</tr>
<tr>
<td>Nov. 2005</td>
<td><strong>Society for Petrophysicists and Well Log Analysts (SWPLA) (Bakersfield, CA):</strong> Comparison of Acoustic and Electrical Image Logs from the Coso Geothermal Field, CA.</td>
</tr>
<tr>
<td>May 2005</td>
<td><strong>Volcano Hazards Team, U.S. Geological Survey (Menlo Park):</strong> Insights into fracture controlled fluid flow above a magmatically heated geothermal system, Coso, CA; Preliminary results and questions.</td>
</tr>
<tr>
<td>Feb. 2005</td>
<td><strong>Coso Enhanced Geothermal Systems Workshop, 2005:</strong> Investigation of fracture and fault characteristics in the EGS area: From core, mapping, and image log interpretation</td>
</tr>
<tr>
<td>Feb. 2005</td>
<td><strong>Temple University Geology Department (Philadelphia, PA):</strong> Impact of deformation mechanisms on faulting and fault zone hydrology</td>
</tr>
<tr>
<td>Sept. 2004</td>
<td><strong>Earthquake Hazards Team, U.S. Geological Survey (Menlo Park, CA):</strong> Impact of deformation mechanisms on fault zone architecture and hydrology in sedimentary rocks: An Example from the Moab fault</td>
</tr>
<tr>
<td>Aug. 2004</td>
<td><strong>Energy and Geoscience Institute (EGI), University of Utah (Salt Lake City, UT):</strong> Impact of deformation mechanisms on fault zone architecture and hydrology in sedimentary rocks: An Example from the Moab fault</td>
</tr>
<tr>
<td>Dec. 2002</td>
<td><strong>ChevronTexaco Petroleum Company (San Ramon, CA):</strong> Fault seal and conduit dichotomy: Impact of deformation mechanism and fault geometry on fault properties in sandstone</td>
</tr>
</tbody>
</table>
August 2002  ConocoPhillips Petroleum Company (Bartlesville, OK): Geologic modeling of fault architecture: Representing 3-D structures & fault characteristics

June 2002  Phillips Petroleum Company (Bartlesville, OK): Detailed anatomy of deformation in sandstone units along the Moab Fault (Utah) and controls on fluid flow and cementation

**PROFESSIONAL MEETING ABSTRACTS (TALKS GIVEN WHEN FIRST AUTHOR)**


2007  Evolution of vertical permeability in Coso Geothermal Well 58A-10 (Davatzes, N.C. and Hickman, S.H.) American Geophysical Union National Meeting, Abstracts with Programs, San Francisco, California,


2007  Factors controlling the development and maintenance of fault seals in

2006

Stress, faulting and fluid flow in the Coso Geothermal Field, CA. (Davatzes, N.C. and Hickman, S.) American Geophysical Union, Abstracts with Programs, 2006 National Meeting. # NG54A-01.

2006

The Effect of Brine Composition and Concentration on Strength of Expandable Clays. (Lockner, D., Solum, J., and Davatzes, N.C.) American Geophysical Union National Meeting, Abstracts with Programs, San Francisco, California. # T31F-03.

2006

Relationship of fault geometry to catastrophic outflow on Mars. (Davatzes, A.E.K., Gulick, V.C., Davatzes, N.C.) American Geophysical Union National Meeting, Abstracts with Programs, San Francisco, California. # P23B-0062.

2006


2006

Characterizing the formation of clay-bearing fault rocks: techniques and applications for understanding fault seal behavior (Solum, J. G., Davatzes, N. C., D. Lockner) American Association of Petroleum Geologists National Meeting.

2005

Fault rock mineralogy and fluid flow in the Coso Geothermal Field, CA. (Davatzes, N.C. and Hickman, S.H.) American Geophysical Union Fall Meeting, Abstracts with Programs, San Francisco, California # T23B-0546.

2005


2005


2003

Mechanical controls on the spatial and temporal variability of faulting mechanisms in sandstone along the Moab normal fault, Utah (Davatzes, N. C. and Aydin, A.), American Geophysical Union National Meeting, Eos Transaction, San Francisco, California, v. 84, p. F1366. # T22B-0506.

2003

Processes of fault development in a layered sandstone and shale sequence: An example from the Moab fault, Utah (Davatzes, N. C. and Aydin, A.) Geological Society of America, Abstracts with Programs Annual Meeting,


2002 Sequence and distribution of two distinct deformation mechanisms along a slipping normal fault in sandstone (Davatzes, N.C. and Aydin, A.), Gordon conference or Rock Deformation Mechanisms, Monday Morning Session.

PROFESSIONAL ACTIVITIES & SERVICE

PROFESSIONAL ACTIVITIES

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>June – Aug. 2008</td>
<td><strong>Visiting Scientist, U.S. Geological Survey (USGS) (Menlo Park, CA):</strong> Invited and supported to collaborate on Enhanced Geothermal Systems research through the USGS Earthquake Hazards Team Research Campus in Menlo Park, CA.</td>
</tr>
<tr>
<td>Jan. 2006</td>
<td><strong>Convener</strong> of a paired special session focused on the Enhanced Geothermal Systems project at Coso at the 31st Workshop on Geothermal Reservoir Engineering</td>
</tr>
<tr>
<td>2004-2007</td>
<td><strong>Geologist U.S. Geological Survey, Mendenhall Postdoctoral Fellow:</strong> Conducting research on fracture-controlled permeability and diagenesis in the Coso geothermal field, CA, using earthquake, well-log, core, and outcrop data. The study focuses on how structurally derived permeability is produced and maintained in geochemically and structurally active environments. This work also involves conducting image log analysis, SEM/XRD/XRF, and geomechanical modeling of fracture and stress-controlled fluid flow as part of scientifically directed stimulation in deep geothermal production and injection wells. This research is supported by the DOE Geothermal Energy Program, the Navy Geothermal Program, and the Coso Operating Company.</td>
</tr>
<tr>
<td>Autumn 2004</td>
<td><strong>Consultant Personnel Protection Technologies LLC:</strong> Developed Matlab scripts to analyze radar data from a new tool being developed to detect suicide bombers.</td>
</tr>
<tr>
<td>Autumn 2004</td>
<td><strong>Consultant Greystone Pictures production of the documentary Countdown to Armageddon:</strong> Expert consultant on plate tectonics and geology of Earth’s evolution.</td>
</tr>
<tr>
<td>2003-2004</td>
<td><strong>Stanford University Rock Fracture Project, Postdoctoral Fellow:</strong> Investigated strike-slip fault linkage and statistical repeatability of fault zone structures related to linkage as a basis for more realistic subsurface fluid flow simulations in structurally influenced hydrocarbon reservoirs.</td>
</tr>
</tbody>
</table>
Summer 2002: ConocoPhillips Petroleum Company, Internship: Developed best practice work flow to address structural heterogeneity and related risk in faulted petroleum reservoirs, including the development and evaluation of 3-D fault and fracture models of structurally controlled petroleum reservoirs and building of teaching module.

Spring 2002 British Petroleum Company (BP) well core study: Examined deformation mechanisms in core from the Clair Field in the North Sea to elucidate boundary conditions controlling formation of deformation bands.

1999-2003 Research Assistant, Stanford University: Research focused on fault geometry, the structures composing faults in sandstone and shale, the evolution of fault zones, analytical fracture mechanics, and numerical simulations of fault mechanics.

Summers of 1999 & 1998 Southwest Research Institute, Center for Nuclear Waste Regulatory Assessment, Internships: (1) Conducted structural analysis of faults in Owens Valley, CA, using inferences of past fault activity to assess seismic risk. (2) Conducted magnetic study of dikes in San Raphael volcanic field, UT, as an analogue to assess the risk of lateral dike propagation into the proposed Nuclear Waste Repository at Yucca Mtn., NV.

1997-1998 Honors Thesis Research (Bucknell U.): Conducted independent research on strain in the Appalachian fold and thrust belt.

University Committees

2008 Middle States Assessment Committee
2008 Ph.D. Proposal Writing Committee
2008 Candidate Search: Positions in (1) Isotope Geochemistry, (2) Natural Hazards
2008 Proposal for Plasma Screen Display to advertise Department (to College of Science and Technology Dean’s Office)

Departmental Projects

2008 Proposal for Plasma Screen Display to advertise Department (to College of Science and Technology Dean’s Office)
## Collaborators

### External Collaborators

<table>
<thead>
<tr>
<th>Name</th>
<th>Role and Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peter Eichhubl</td>
<td>Research Scientist, Bureau of Economic Geology, John A. and Katherine G. Jackson School of Geosciences, University of Texas at Austin</td>
</tr>
<tr>
<td>Mariana Eneva</td>
<td>Research Scientist and Owner, Imageair, Inc., San Diego, CA</td>
</tr>
<tr>
<td>Jim Faulds</td>
<td>Research Geologist/Graduate Faculty, Nevada Bureau of Mines and Geology, Mackay School of Mines, University of Nevada, Reno</td>
</tr>
<tr>
<td>Eric Flodin</td>
<td>Research Scientist, Technology Research Group, Chevron Energy Technology Company</td>
</tr>
<tr>
<td>Steve Hickman</td>
<td>Research Geophysicist, Earthquake Hazards Group, U.S. Geological Survey</td>
</tr>
<tr>
<td>Susan Petty</td>
<td>Chief Executive Officer, AltaRock Energy, Seattle, WA</td>
</tr>
<tr>
<td>Ann Robertson-Tait</td>
<td>Vice President, Business Development/Senior Geologist, Geothermex Inc., Richmond, CA</td>
</tr>
<tr>
<td>Peter Rose</td>
<td>Research Assistant Professor, Energy and Geoscience Institute (EGI), University of Utah, Salt Lake City, Utah</td>
</tr>
<tr>
<td>John Solum</td>
<td>Research Geologist, Research Lab, Shell Petroleum Company, Houston, TX</td>
</tr>
</tbody>
</table>

### Industry Collaborators

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AltaRock Energy</td>
<td>Venture Capital company developing geothermal resources and resource enhancement technology.</td>
</tr>
<tr>
<td>Ormat</td>
<td>International geothermal electricity producer.</td>
</tr>
<tr>
<td>Shell Petroleum Company</td>
<td>International Petroleum Company (5th largest international Energy Company).</td>
</tr>
<tr>
<td>Nevada Geothermal Power</td>
<td>New geothermal electricity production company developing blind geothermal systems in Nevada.</td>
</tr>
<tr>
<td>Coso Operating Company</td>
<td>Operator of 2nd largest in place geothermal resource in the United States.</td>
</tr>
<tr>
<td>ConocoPhillips</td>
<td>Petroleum production and refining company (3rd largest in the United</td>
</tr>
</tbody>
</table>
TEACHING ACTIVITIES

CURRENT STUDENTS

<table>
<thead>
<tr>
<th>Year</th>
<th>Student Name</th>
<th>Project Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008-09</td>
<td>Nwachukwu Anyamele (Masters)</td>
<td>Characterizing mechanisms of clay gouge formation and implications for fault zone permeability, Moab fault, Utah</td>
</tr>
<tr>
<td>2009</td>
<td>Kevin McGinn (Undergraduate)</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>Christopher Hanratti (Undergraduate)</td>
<td>Hydrothermal alteration and deformation style in granite of the Coso Geothermal Field</td>
</tr>
</tbody>
</table>

FORMER STUDENTS

GRADUATE STUDENT COMMITTEES

<table>
<thead>
<tr>
<th>Year</th>
<th>Student Name</th>
<th>Project Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008-09</td>
<td>Catherine Jedrzejczyk (Masters)</td>
<td>Monitoring the Effectiveness of Storm Water Management Practices at Pennypack Creek Ecological Restoration Trust in Montgomery County, Pennsylvania</td>
</tr>
</tbody>
</table>

CLASSES TAUGHT

<table>
<thead>
<tr>
<th>Year</th>
<th>Course Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>Introduction to Structural Geology (Capstone in Major), Temple University</td>
</tr>
<tr>
<td>2008</td>
<td>Quantitative Structural Geology (With an introduction to Continuum Mechanics), Temple University</td>
</tr>
<tr>
<td>2008</td>
<td>Drilling Techniques and Logging Methods (Borehole geology and interpretation of alteration mineralogy of drill cuttings and cores; geophysical well logging; 3D imaging; fracture imaging; stress orientation and stress characterization; and hydraulic fracturing.), RES School For Renewable Energy Science, Iceland</td>
</tr>
</tbody>
</table>

OUTREACH & EDUCATION

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb. 2009</td>
<td>High School Science Fair Project, Penn Charter High School</td>
</tr>
</tbody>
</table>
2007  **USGS Earthquake Hazards Program Earthquake Question**: Volunteer to answer emailed public questions about earthquake science.

*Spring 2006**  **Transforming Instructional Design in Earth Science (TIDES)**: Panel member of subject matter experts to identify critical content knowledge of earth science concepts to aid in teacher and student training in Earth Science at K-8 level.

*Spring 2006**  **USGS Open-House: Fault Zone Drilling for Geothermal Energy**: Designed exhibit to introduce the public to Geothermal Energy and investigations of stress in the shallow Earth’s crust.

*Spring-Summer 2006**  **Content Review Panel (CRP) member of the “2006 Science Adoption for K-8 Textbooks”**: Reviewed submitted science textbooks and teaching aids to ensure scientific accuracy, standards, and teaching criteria for the state of California.

*Autumn 1998- Autumn 2002**  **Teaching Assistant, Stanford University**: Assisted a variety of classes including:

- GES 1: Introductory Geology
- GES 151: Depositional Systems
- GES 217: Characterization and Hydraulics of Rock Fractures
- GES 254: Diagenesis and Transfer Processes in Sedimentary Basins

*1996-1998**  **Teaching Assistant, Bucknell University**: Assisted a variety of classes including:

- GES 100: The Dynamic Earth (introductory physical geology)
- PHIL 103: Philosophy of Logic
OTHER

TECHNICAL SKILLS

|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ANALYTICAL TECHNIQUES | • Petrographic Microscope  
• Scanning Electron Microscope (SEM)  
• X-Ray Diffraction (XRD) Analysis  
• X-Ray Fluorescence (XRF) Analysis |
| FIELD EXPERIENCE | • Mapping and field analysis in the: Basin and Range, Colorado Plateau, Eastern California Shear Zone, Appalachian Fold and Thrust Belt, Sevier and Laramide structures in Montana, looking at:  
  • Mesoscale deformation structures in faulted igneous and sedimentary rocks  
  • Geometry of Folds and faults within normal, strike-slip, and reverse tectonic settings  
  • Neotectonic faulting of the Bishop Tuff and the Coso Mountains, SE CA  
• GPS-based surveying  
• Remote sensing interpretation and use in field work |
| WELL LOG ANALYSIS | • Analysis of stress, rock strength and natural fracture characteristics from Acoustic and electrical image logs (includes experience in log acquisition)  
• Fracture occurrence and rock strength from  
  • Image logs (Micro-Resistivity and Acoustic)  
  • Velocity logs  
  • Density logs (Litho-Density and Neutron Density)  
  • Resistivity and Induction logs  
  • Mud logs  
• Fluid flow anomalies identified with  
  • Mud logs  
  • Temperature logs |
| COMPUTER SKILLS | • Boundary element codes such as Poly3D  
• Data analysis programs such as Matlab™ and Microsoft Excel  
• CAD programs such as goCAD  
• GIS systems such as ArcGIS  
• GPS data managers such as Trimble Pathfinder Office  
• Desktop publishing software including Adobe Suites (Pagemaker, Acrobat, Illustrator, Photoshop), Microsoft Word, and PowerPoint  
• Web page development software such as Adobe GoLive. |
ADDITIONAL INFORMATION

EXTERNAL LEADERSHIP

GeoKids Fundraising Committee Member (2005-2007)

Treasurer, Las Casitas Home Owners Association (2006-2007)

Stanford Climbing Wall (2000-2001): Managed independent, nonprofit climbing wall during its first year. I established safety/use practices, hired and trained 8 paid staff members and managed the operating budget. I taught basic rock climbing skills class. I also developed a program with a local high school to teach rock climbing to students as part of their physical education curriculum.

VOLUNTEER

• GeoKids Day Care Center of Menlo Park
• RAFT (Resource Area for Teachers)
• Habitat for Humanity
• The San Francisco Zoo
EDUCATION

Currently: a Doctoral student, Curriculum, Instruction and Technology, Specializing in Science Education.

1996 Masters of Art - Geology; Temple University, Philadelphia, PA

   Masters Thesis: An electron microprobe study of the geothermometric effects of some kimberlite dikes cross-cutting coal, salt and shale.

1987 Bachelors of Science; Drexel University, Philadelphia, PA

EXPERIENCE

2001 to Present: Adjunct Professor, LaSalle University, Department of

   Geology, Environmental Science and Physics, Philadelphia, PA

   Earth Materials - Mineralogy 202, Lecture and Lab, Earth Materials 203 - Petrology, Lecture and Lab, Structural Geology, Experiments in Mathematics and Science IMS 160 and 161, Optical Mineralogy

1997 to Present: Geology Instructor, NTT, Temple University, Philadelphia, PA

   Introduction to Geology, Introduction to Geology Lab, Catastrophic Geology, Catastrophic Geology Lab, Environmental Resources, Environmental Resources Lab. Igneous and Metamorphic Petrology

PUBLICATIONS

   August, 2007 Water-Rock Interaction Conference presentation:

Water-Rock Interactions between Igneous Intrusions and Evaporite Horizons.


Abstracts


PRESENTATIONS


May, 1995 The International Goldschmidt Conference, University Park, PA. EMP Data and the Temperature of Emplacement of some Kimberlites in Bedded Salts, near Ithaca, NY

May, 1994 Mini-Conference on Kimberlites. The Pennsylvania State University, University Park, PA Ore Deposits Research Section Department of Geosciences. Study of Assimilation a Kimberlitic Apophyses

GRANTS

1995 and 1996 American Federation of Mineralogical Societies (AFMS), Scholarship Foundation, Inc. Topeka, KS $4000.
1996 $8000 completion grant from Temple University, Philadelphia, PA.

MEMBERSHIPS

Association for Women Geoscientists, Founding member of Delaware Valley Chapter, Geological Society of America, American Geophysical Union.

Thesis, research and samples currently held for public at the following museums: American Museum of Natural History, Smithsonian Institute, Washington, DC New York State Museum, Albany, NY Bryn Mawr Universities Vaux Mineral Collection, Bryn Mawr, PA
Curriculum Vitae of Dr. John J. Friel

Personal
John J. Friel
676 Swamp Rd.
Furlong, PA 18925
215 794-0413 home
267 987-3565 mobile

Married with four adult children
Excellent health

Highlights
- Physical scientist with expertise in: geology, chemistry, and materials
- Teaching experience at various levels from 8th grade to graduate school
- Internationally known in the fields of microscopy and microanalysis
- Numerous publications (tabulated at the end of this document)
- Recent publication (Mar. 2008)

Areas of Expertise
- Research and teaching physical science—geology, materials science, chemistry
- Internationally known expert in: electron probe microanalysis, image analysis and hyperspectral imaging with x rays
  - Chairman ASTM subcommittee on X-ray and Electron Metallography
  - Past President Microbeam Analysis Society
  - USA “expert” on ISO TC 202 on x-ray microanalysis
  - Frequent invited speaker in the US and Europe
- Corrosion
- Aviation
- Web design
**Education**

Post doctoral—Lehigh University Dept. of Materials Science & Engineering

My work with Prof. Joseph I. Goldstein consisted of experiments on lunar samples and their synthetic analogs. We conducted studies and published results in both lunar geology and lunar metallurgy.

Prof. Goldstein is an internationally acclaimed expert in meteoritics and electron optical instrumentation and analysis. During my time with him, I learned the theory and application of electron probe microanalysis and electron microscopy, and I began teaching in Lehigh’s annual short course on scanning electron microscopy. While in the Metallurgy Dept., I also taught the labs for the graduate x-ray diffraction course with students from both metallurgy and geology.

Ph. D.—University of Pennsylvania Dept. of Geology

My graduate course work at Penn consisted primarily of geochemistry and petrology courses along with others in the Geology Dept. I also took advanced inorganic chemistry in the Chemistry Dept. and thermochemistry of materials and advanced materials in the Materials Science Dept. During my graduate studies at Penn, I gave several Oceanography lectures and taught various geology laboratory sections.

My dissertation was Stability of Synthetic Armalcolite and High Pressures and Varying Oxygen Fugacities. In addition to being published in Dissertation Abstracts, the work was published in Geochemica et Cosmochemica Acta.

My dissertation committee was chaired by Prof. Ian Harker of Penn and included Prof. Gene Ulmer of Temple.

M. A.—Temple University, Dept. of Geology

My graduate course work at Temple consisted of a broad survey of geology courses with concentration in high temperature geochemistry and crystal chemistry. My thesis was Oxygen Fugacity Geothermometry of the Oka Carbonatite. My committee was chaired by Prof. Gene Ulmer and included Prof. George Myer of the Geology Dept. The work was published in the American Mineralogist. During my time at Temple, I taught various geology laboratory and recitation sections, including environmental geology.

B. A.—University of Pennsylvania, Natural Science

My undergraduate work was an interdisciplinary program in natural science. Within this program, I took courses in the natural sciences including: chemistry, physics, biology, and geology. I also took six courses in psychology along with the usual core curriculum in the humanities and foreign language. To complete the requirements for graduation in this major, I wrote a paper on Memory Transfer by RNA.
University courses beyond the Ph.D.

I have also taken the following university courses:

**Credit**
- Surface Chemistry (Lehigh U.)
- Advanced Organic Chemistry (Lehigh U.)
- Managerial Finance (Lehigh U.)
- Transmission Electron Microscopy (Lehigh U.)
- Management (Allentown College)
- C programming (Bucks Co. CC)
- Web authoring (Bucks Co. CC)
- Java (Bucks Co. CC)
- Advanced Visual Basic Programming (Bucks Co. CC)

**Non-credit**
- Solidification (Lehigh U.)
- Phase transformations (Lehigh U.)
- Interpretation of Regression Statistics (Lehigh U.)
- X-ray Diffraction (Lehigh U.)
- Strategy of Experimental Design (short course Drexel U.)

**Experience (Teaching)**

- Temple University - Geology 50
  - Taught introductory Geology to 170 students from various majors.
- Temple University – Geology 701
  - Taught geological materials characterization by electron probe microanalysis.
- Oversaw student activity on the EPMA at Temple U.
- Adjunct Professor of Ceramics at Rutgers U.
- High School substitute teacher of earth science, chemistry, and physics.
- Commanding Officer, Fleet Training Group Det. 104
- Commanding Officer, Office of Naval Research Det. 204.
• Faculty of the annual Lehigh U. short course on Electron Microscopy. I have been invited to teach in the premier short course on electron microscopy in the US for 30 years.

• Certificated flight instructor. I have been teaching student and rated pilots for many years without an accident or incident. I am rated to teach ground school and conduct flight training for private, commercial, instrument, and multi-engine flight. In some of my ground instruction in weather and navigation, I have called upon my geological training at Temple.

• Instructor pilot with the Civil Air Patrol. In this role, I teach navigation and weather to young people. I have also been invited to lecture on navigation to engineering students at Notre Dame University.

Teaching Philosophy

I believe that undergraduate students should be exposed to the principles of a scientific discipline in a clear and coherent manner. Those principles should not be over simplified, nor should they be made unnecessarily complex to showcase the professor’s knowledge. The natural sciences are as essential to a liberal arts education as are language and history of civilization. University students should be treated with the respect owed to those at the college level, and they deserve active instruction. However, they must be held accountable for learning the subject with appropriate help from faculty and staff. I can adjust the level of a lecture or course to fit the level of the students from high school in Bucks Co. to graduate students at Temple, Princeton, Penn, Rutgers, Lehigh and Notre Dame.

Experience (Industrial)

Princeton Gamma-Tech, Princeton, NJ

Technical Director

• At Princeton Gamma-Tech (PGT), I worked with university faculty members to solve geological & materials problems using PGT’s x-ray microanalysis and image analysis. In this capacity, I often conducted joint research with faculty members, including Prof. Ulmer of Temple. I served on two dissertation committees at Rutgers U. Dept. of Ceramic Engineering. My role was to bring to the faculty and students expertise beyond that which was available in their departments.

• The Technical Director was responsible for guiding development of x-ray and image analysis products. My role as head of advanced development was to identify research needs in universities, industry, and government labs, and guide the software and marketing departments to develop products to meet those needs.

• One of PGT’s most popular innovations was a hyperspectral imaging system called position-tagged spectrometry (PTS). This hardware/software combination collects and stores an entire electron-excited, x-ray spectrum at every pixel forming an x-ray image of composition on a sub–micrometer scale. From the PTS file, one can extract maps for any element, or x-ray spectra for any region.
• In the past x rays had to pass through a beryllium window before reaching the detector. In response to competition, I developed and patented ultra-thin x-ray windows. Using my knowledge of materials, I conducted research to identify and develop an ultra-thin material (<100nm) that would withstand a pressure differential of one atmosphere and pass soft x rays with little attenuation. My window was patented in the USA and several other countries.

• With time, I became the company’s outside voice to the scientific world. In this role, I was often invited to give graduate seminars at universities, invited talks at scientific meetings, and in-house seminars in companies. These lectures were presented at facilities throughout the United States and in Europe.

• Webmaster. Princeton Gamma-Tech constructed the first web site of any company in its industry. At first, I provided the content, but when the webmaster retired, I took over the site and was responsible for both the content and the style. Although the company no longer manufactures x-ray microanalysis products in the US, the site I managed can be viewed at: www.pgt.com

• Radiation Safety Officer. In this role, I was responsible for several thousand x-ray and gamma-ray sources and for the radiation safety program throughout the company.

_Bethlehem Steel Corp._, Bethlehem, PA

**Senior Research Scientist**

• Conducted research on minerals for ironmaking. This research led to identifying minerals and processes to increase blast furnace productivity. Results were published in *Metallurgical Transactions*. During this time, the corporation funded Prof. Ulmer at Temple to conduct basic research in iron ore reducibility. Results of this joint research were published in the *Journal of the American Ceramic Soc.*

• Established the organic geochemistry of the coal-to-coke transformation. Using a variety of analytical techniques, the chemical reactions that lead to the destructive distillation of coal were established and published in an American Chemical Soc. Symposium Volume.

• Led the atmospheric corrosion group. As supervisor of the atmospheric corrosion research group, I was responsible for atmospheric corrosion testing of 11,000 specimens placed in various environments for long-term evaluation. One significant result of this work was the establishment of the corrosion mechanism of zinc-aluminum coatings in industrial, marine, and rural environments. The results were published in *Corrosion*.

**Research Interests**

X-ray microanalysis

Quantitative microscopy/Image analysis

Phase equilibria

Weathering/corrosion
Society Participation & Licenses

Society Membership

- Microbeam Analysis Soc.
  - Past President
  - Past Director
- ASTM Int’l—Chairman of E04.11 on X-ray and Electron Metallography
- ISO TC 202 on x-ray microanalysis
- Microscopy Society of America
- ASM Int’l

Former Member

- Mineralogical Society of America
- Geological Society of America
- American Geophysical Union
- American Institute of Mining, Metallurgical, and Petroleum Engineers
- Meteoritical Society
- Geochemical Society
- American Ceramic Society

Licenses

Commercial pilot – single- and multi-engine airplane, instrument

Certificated flight instructor – single- and multi-engine airplane, instrument

Awards

- Blickwede Award for Research Excellence 1981—Bethlehem Steel Corp.
- Wyman Award for Metallography 2004—ASTM Int’l
- Best paper 2005—International Society for Failure and Testing Analysis
- Best paper 1998—American Ceramic Society Engineering Division
- Best ceramographic contest poster 1996—American Ceramic Society

Patents


Publications

Books & Book Chapters


**Journal Articles and Extended Abstracts**

**Related to Geology and Materials**


Temperature Superconducting Oxides, Advanced Ceramic Materials 2 [3b], 539-555.


and Microanalysis, 50A-50E.


**Related to x-ray microanalysis**

**Invited paper**


**Review Article**


Friel, J. J. (2005) Throughput in Quantitative Analysis—from 23 Elements per Point to 50,000 Points per Element, Microscopy and Microanalysis 2005 11 Suppl.2 1330-1331.


Friel, J. J. (1996) Forty years of X-ray Mapping from the Beginning to Position-Tagged
Spectrometry, Microscopy Today [95-1], 12.


**Related to Image Analysis**


**Related to Hyperspectral Imaging**


Curriculum Vitae

DATE: February 2009

NAME: GRANDSTAFF, David E.

ADDRESS:

OFFICE: Department of Earth and Environmental Science
Temple University
Philadelphia, PA 19122
215-204-8228 (Voice)
215-204-3496 (FAX)
grand@temple.edu

EDUCATION, UNDERGRADUATE AND GRADUATE:

University of California, Santa Cruz, Santa Cruz, California 1965-1969
  B.A. Chemistry - June 1969
  B.A. Geology - June 1969

Princeton University, Princeton, New Jersey 1969-1973
  M.A. Geology - June 1972
  Ph.D. Geology - January 1974

DOCTORAL DISSERTATION:


D. E. Grandstaff

POSITIONS HELD:

Temple University
  Instructor 1973-1974
  Assistant Professor 1974-1980
  Associate Professor 1981-1986
  Professor 1987-present
  Chair, Department of Geology 1987-1990, 2005-

YEAR APPOINTED AT TEMPLE AND RANK AT APPOINTMENT: 1973, Instructor
YEAR TENURED IF APPOINTED UNTENURED: 1981
YEAR PROMOTED TO ASSOCIATE PROFESSOR IF APPOINTED BELOW THAT RANK: 1981
YEAR PROMOTED TO FULL PROFESSOR IF APPOINTED BELOW THAT RANK: 1987

AWARDS:

Best Paper Award, Nuclear Division, American Ceramic Society. 1990.
Best Paper Award, Hydrology Section, American Geophysical Union, to Mandira Mandal, for presentation of her MA thesis, 1998.
Best Paper Award, Geological Society of America Meeting, Northeast Section, to Richard Staron, for presentation of
Best Paper Award, SEPM, Doreena Patrick, 2004, for presentation of her MA thesis.

PUBLICATIONS:

RESEARCH ARTICLES PUBLISHED OR IN PRESS:


Martin, J. E.; Patrick, D; Kihm, A. J.; Foit, Jr., F. F.; Grandstaff, D. E., 2005. Lithostratigraphy, Tephrochronology, and Rare Earth Element Geochemistry of Fossils at the Classical Pleistocene Fossil Lake Area, South Central Oregon. Journal of Geology, 113(2), 139-156.
Grandstaff, D.E. and Terry, D.O., Jr., 2007. Evolution of the rare earth element composition of Paleogene groundwaters as recorded in vertebrate fossils from Toadstool Geologic Park, Nebraska, USA, in 12th International Symposium on Water-Rock Interactions (T. Bullen and Y. Yang, eds.).


OTHER WORKS PUBLISHED OR IN PRESS:

ABSTRACTS:


[M. Mandal received a Best Student Paper Award in the Hydrology Section of the American Geophysical Union]


Ulmer G. C., and D. E. Grandstaff, REDOX STABILITY OF MOISSANITE (SiC) AND DIAMOND FLUID INCLUSIONS: IMPLICATIONS FOR THE MANTLE (1999), Geological Association of Canada (abstract).


(R. Staron received a best paper award for student presentation)


Sectional Meeting, volume 34.


**PAPERS PRESENTED AT PROFESSIONAL MEETINGS:**
In addition to those with abstracts, enumerated in the previous section:


Paleontology Research Group (PPRG), Stanford, CA.


pH and O2 geothermal sensors. Water-Rock Interactions (WRI) 10 Symposium, Sardinia, Italy.


**PUBLISHED RESEARCH REPORTS:**


**INVITED ADDRESSES:**


WORKS SUBMITTED FOR PUBLICATION:

RESEARCH IN PROGRESS:

GRANTS AND CONTRACTS, EXTERNALLY FUNDED:

“Equipment for Oceanographic Research”
Principal Investigators: J. K. Adams, D. E. Grandstaff
Funding: $10,000

"Quantitative analysis of reaction products in the system basalt-simulated spent fuel-groundwater"
Principal Investigators: D. E. Grandstaff, G. C. Ulmer
Period: September 1980 - September 1988
Funding: $1,300,000 plus $350,000 equipment

Development of Advanced Electrochemical Instruments for Accurate pH Measurements in Hydrothermal Solutions at Temperature up to 450°C.
Funded by National Science Foundation, 2 years, $460,000. 1998-2001.

"Igneous Pothole Structures and Their Significance for Platinum Group Mineral Petrogenesis"
Agency: NSF
Funding Requested: $475,627. (not funded) 1984.

"Association between Platinum and carbon in the Layered Mafic Intrusives at Stillwater, Montana and Bushveld, South Africa"
Agency: American Chemical Society - Petroleum Research Fund
(not funded) 1990

"Teaching Environmental Science to High School Students"
Principals: G. C. Ulmer, B. S. Grandstaff, D. E. Grandstaff; and others
Agency: NSF
(not funded) 1990
"Moissonite Stability"
Principals: G. C. Ulmer, D. E. Grandstaff
Agency: NSF
1992 (not funded),

"Calcite dissolution kinetics: Influence of organic ligands"
Principals: D. E. Grandstaff

"Ion Chromatography in Environmental Geochemistry"
Agency: NSF
Principals: D. E. Grandstaff (not funded, 1994).

“REE Signatures and Taphonomy” (2000)
Principals: D. E. Grandstaff, D. O. Terry, Jr., B. S. Grandstaff (not funded)

“Laser Ablation” (2000)
Principals: D. O. Terry, Jr., D. E. Grandstaff (not funded)

“REE Signatures and Taphonomy”

“REE Signatures and climate proxies”

TEACHING:

LIST COURSES TAUGHT IN THE LAST FIVE YEARS:
Geology 050. Introductory Physical Geology
Geology 081. Environmental Resources
Geology 261. Introduction to Geochemistry
Geology 381. Environmental Seminar
Geology 461. Low Temperature Geochemistry
Geology 462. Advanced Low-Temperature Geochemistry

NAME SPECIAL AWARDS RECEIVED FOR TEACHING EXCELLENCE:

INDEPENDENT STUDY COURSES:

MASTER'S THESSES SUPERVISED:
Moore, Elizabeth L. Hydrothermal interaction of Columbia River Basalt from the Umtanum Formation with its coexisting groundwater. 1983.

McKeon, Gail L. Hydrothermal reaction of simulated spent fuel with Columbia Plateau basalt from the Umtanum Flow at 100°C, 200°C, and 300°C and at 30 MPa (300 bars). July 1984.

Edelman Michael J. Description and implications of the chemistry and mineralogy of three early Precambrian paleoweathering profiles from South Africa. 1985.

Korn, Rosemary A. A comparison of the hydrothermal stability of the Columbia Plateau basalts from the Umtanum and Cohassett flows at 100°, 200°, and 300°C; and at 30 MPa. 1986.


Lazaar, Paul I. A study of the hydrothermal stability of copper as a container material for a nuclear waste repository. June 1988


Anton, John, Modes of staining in fossil sharks teeth from Big Brook, New Jersey. (August 1991).


Kaown, D. The effect of quartz and clay minerals on retardation of ammonium in groundwater (December 1993).


Jones, T. P., Geochemical controls on aluminum, iron, and other species in the New Jersey Pine Barrens (July 1994).

Teng, H. The dissolution of basaltic glass: effects of pH and organic ligands (July 1994).


Bowen, Bradford. Factor analysis of changes in stream composition following storms (in progress).


Harvey, A. M., Paleoenvironmental reconstruction in the Duncannon Member, Catskill Formation, PA (May 1998).

Mandal, M. Composition of precipitation, throughfall, and soil moisture in Wharton State Forest, NJ. (July 1997).


Staron, R., Rare Earth Signatures and reworking of fossils in the Main Fossiliferous Layer, Hornerstown Formation, NJ (1999).

Dedic, N. Trace element concentrations in suspended sediments in Darby Creek and Tinicum Marsh, PA (2000)

Doreena Patrick. Rare Earth Element (REE) signatures in modern and fossil vertebrates (July 2002).

Crilley, D. Biotite Dissolution. (July 2004).


Holly Sobocinski, Mobility of lead leached from shotgun pellets in spodic soils, Pine Barrens, NJ (July 2008).

**DISSEDITIONS SUPERVISED:**

**MASTER' AND DOCTORAL COMMITTEE SERVICE IN ADDITION TO STUDENTS YOU SUPERVISED:**

M.A. Students (Committee Member):

Joseph Toth 1978
John DeSantis 1979
Mark Gallagher 1980
William Schryba 1981
Crawford Elliot 1982
Robert Brozdowski 1982
Thomas Buntin 1983
David Weiss 1985
Richard Sacks 1987
David Valentino 1988
Mark Moats 1989
Benjamin Hanson 1989
Linus Farius 1989
Charles Handschin, 1990
Daniel Sirkis, 1993
William Schneider, 1992
John Hill, 1992
John Boynton, in progress
Tarja Wolf, 1996
Natalie Flynn, 1996
Takahashi Shinkawa, 1997
Robert Weaver, 1997.
David Heebner (1998)
Cheryl Sinclair (1998)
Elissa Koch (1998)
Christopher Zeliznak, 1999
Eric Roman, 1999
Jamie Stynchula, 2005
Lisa Perry, in progress
Matt McCoy, 2002
Louis Factor, 2002
Matt Weikel, 2003
Patricia Jannett, 2004
Mark Manna, 2002
Jennifer Tancredi, 2004
Christine Metzger, 2003
Mark Russell, 2005
Marina Suarez, 2005
Hallie Meighan, in progress.
Kathleen Gross, in progress.
Aclam Kapepkasse, 2006
Youa Yang, 2006
Christian Obasi, 2008

Ph. D. Dissertations (committee member).
Ruth W. Foster (Department of Environmental Engineering, Rutgers University, 1994).
Partick, Doreena (Earth and Environmental Sciences Department, University of Pennsylvania), 2006.
Michael J. Palmieri, Jr. (Department of Chemistry, Temple University).
Greg Lattanzi (Anthropology Department, Temple University).

SERVICE:

SERVICE TO THE PROFESSION:

SERVICE TO THE UNIVERSITY:
Co-chair (with G. C. Ulmer) of Environmental Forum Symposium on Waste Disposal and Risk Analysis.

SERVICE TO THE COLLEGE:
Tenure review committee (1980-83)
Ad hoc computer committee (1988-1989)
Representative Faculty Senate (1990-1992, 2004-2006)
Technology Committee (1997-2000)
SERVICE TO THE DEPARTMENT:


SERVICE TO THE COMMUNITY RELATING TO PROFESSIONS:

PAID CONSULTANCIES:


PROFESSIONAL MEMBERSHIPS:

Geochemical Society    1973-
International Association of Geochemists and Cosmochemists 1985-
American Geophysical Union    1973-
American Ceramic Society 1988-
Materials Research Society 1983-
CURRICULUM VITAE

DATE: October 27, 2006

NAME: GEORGE H. MYER

EDUCATION, UNDERGRADUATE AND GRADUATE:

University of California at Santa Barbara, California
Major: Geology, Attended: 4 years, Degree: A.B. 1959

Yale University, New Haven, Connecticut
Major: Geology, Attended: 5 years, Degree: Ph.D. 1965

DOCTORAL DISSERTATION:
Sponsor: Prof. Horace Winchell and Prof. Brian Skinner

Award: Commendation for Excellence of Dissertation Defense.

POSITIONS HELD:
Yale University, Associate in Instruction, 1964-1965
University of Maine, Assistant Professor 1965 - 1970

YEAR APPOINTED AT TEMPLE AND RANK AT APPOINTMENT:
1970, Assistant Professor

YEAR TENURED IF APPOINTED UNTENURED:
1973

YEAR PROMOTED TO ASSOCIATE PROFESSOR IF APPOINTED BELOW THAT RANK:
1980, Associate Professor

YEAR PROMOTED TO FULL PROFESSOR IF APPOINTED BELOW THAT RANK:
1990, Full Professor

AWARDS:

PUBLICATIONS:

BOOKS PUBLISHED:
Chapter in Books


TEXTBOOKS PUBLISHED:


RESEARCH ARTICLES PUBLISHED OR IN PRESS:


Proposal for Ph.D. in Geoscience


SUPERCONDUCTING GRAPHITE-TRANSITION METAL CARBIDE COMPOSITE 
FIBERS VIA DECOMPOSITON OF POWDER COMPLEXES. Materials Research Bulletin, 
vol. 23, No. 2, pp. 78-83.

27. Bloom, S., Kuric, M., Guertin, R.P., Jee, C., Nichols, D., Emgusnov, O., Lin, C.L., 
Kaczanowicz, E., Crow, J.E., Myer, G.H. and Salomon, R.E., "Pressure and Field Dependence 

KOMMOS AS AN INDICATOR OF PROVENANCE. Proceeding of the 24th International 
Archeometry Symposium, eds., Olin, J.S. and Blackman, M.J., Smithsonian Institution Press, 
Washington, D.C. 20560.

29. Yuen, T., C.L. Lin, J.E. Crow, G.H. Myer, R.E. Salomon, P. Schottmann, N. Bykovetz and 
Warren N. Herman, "Mossbauer Study of the Lattice Dynamics in $^{119}$Sn-doped 

and R.P. Guertin, "Evidence for d-electron Localization in YBa$_2$(Cu$_{1-x}$Zn$_x$)$_{07-y}$ for $0 \leq x \leq .16$ 

Crow, T. Mihalisin, G.H. Myer and P. Schottmann, Transport and Meissner Effect Studies 

32. A. M. Ponte Goncalves, Chan-soo, Jee, D. Nichols, J.E. Crow, G.H. Myer, R. E. Salomon 
and P. Schottmann, "EPR Spectroscopy of Oxygen Deficient and Zn-substituted YBa$_2$Cu$_3$O$_{7-x}$, 

Mihalisin, G.H. Myer, I. Perez, R. E. Solomon, P. Schottmann, S.H. Bloom, M. V. Kuric, 
Y.S. Yao and R.P. Guertin,1988, "D-Hole Localization and the Suppression of 
Superconductivity in YBa$_2$(Cu$_{1-x}$Zn$_x$)$_{3}O_{7-y}$, J. of Superconductivity, vol. 1, p. 63-78.

34. Kebede, A., Jee, C., Nichols, D., Kuric, M.V., Crow, J.E., Guertin, R.P., Mihalisin, T., 
Myer, G.H., Perez, I., Salomon, R.E. and Schottmann, P., 1988, (Y,Pr)Ba$_2$Cu$_3$O$_7$; Evidence for 
Ag Pair Breaking in a High T$_c$ Superconductor, J. Magnetism and Magnetic Materials, 76 & 
77, p. 619-620.

35. Yuen, T., Perez, I., Crow, J.E., Myer, G.H. and Schlottman, P., 1988, Magnetic 
Susceptibility and Specific Heat Study on the Nonmagnetic to Magnetic Transition in 
URh$_2$B$_x$(0<x<1) System, Journal De Physique, Colloque C8, Suppl.2, Tome 49, pp.489-490.

R.P., Mihalisin, T. and Schottman, P., 1988, Thermodynamics and Pressure Dependent 

37. Jee, C., Kebede, A., Nichols, D., Crow, J.E., Mihalisin, T., Myer, G.H., Perez, I., Salomon, 
R.E. and Schlottman, P., 1989, Depression of Superconductivity, Heavy Fermion Behavior


**ABSTRACTS:** See papers presented at Professional meetings

**PAPERS PRESENTED AT PROFESSIONAL MEETINGS:**


Seyebahmadian, M., Yuen, T., Salomon, R.E. and Myer, G.H., Magnetic Susceptibility and Mossbauer Studies of High Tc Superconductivity Related System (Y,Pr)Ba$_2$Fe$_2$O$_8$, American


Yuen, Tan, Lin, C.L., Myer, G. and Crow, J.E., Study of an Anomalous Magnetic System UnixSn with 1<x<2, High Magnetic Field Conference '98.

INVITED ADDRESSES:


RESEARCH IN PROGRESS:
1. Crystallographic research on minerals and ceramic materials. Anomalous crystallographic physical properties of chlorite Phyllosilicates in carved vessel from Turkey, 9000 BP. Project 2006

2. Mineral interfaces:
   1) Silica minerals and lung physiology.
   2) Role of cavities in mineral surfaces as host to biota.

3. An INSTAP proposal has been funded for research on ceramic wares of early Greece. There appears that a large void has occurred within the petrographic analysis of Grecian sites where “Aeginetan Ware” presumably has been found. My earlier descriptions of Volcanic Ash fabrics from Lerna, Crete are considered the standard and should be enlarged rather than redefined. Project Investigator is Dr. Christine Shriner, Ph.D. Indiana University, 1999. Project 2006.

GRANTS AND CONTRACTS, EXTERNALLY FUNDED:

NEH 1979-83 (P.I.) Betancourt, P.P., (Faculty Associate), Myer, G.H., Interdisciplinary Study of Early Minoan III, Pottery. $70,911.


GRANT PROPOSAL:

Title: Development of a New Standardized National Dental Abrasion Test Utilizing Synthetic Collagen-Hydroxyl Apatite Substrates.

P.I Gene C. Ulmer, Co-P.I.s, David E. Grandstaff and George H. Myer, not funded

GRANTS AND CONTRACTS, INTERNALLY FUNDED:

R.I.F., 1985, (Co-P.I.) Myer, G.H. and Betancourt, P.P., Ceramic Petrography of Pottery from Lerna, Greece. $1,900.00
TEACHING:
LIST COURSES TAUGHT IN THE LAST FIVE YEARS:

Undergraduate courses:

Mineralogy 201. This course (with subtitle, Mineral Science) has undergone further upgrading to include developments in biologic aspects of mineral crystallization, geophysical aspects of upper mantle crystallization anisotropy and the stability of mineral surfaces. Computer graphic support is integral to the course.

Common rock-forming minerals with emphasis on symmetry (point and space group theory), polyhedral bonding chemistry, physical properties and phase diagrams remain as a backbone of the course. Three written answer examinations are given. The comprehensive laboratory aids in analysis of crystallographic and mineralogic aspects of primary mineral groups.

In the previous year, Petrology 301 had been developed to meet requirements of the study leave of Dr. Gene C. Ulmer. The course content included theory of high temperature silicate crystallization in magmas ranging from low to high viscosity in depth zones to 200 km. Metamorphic recrystallization reactions in subduction zones interfaced with plate tectonic explanations for geostrophic terranes. Supported with PowerPoint, overheads, petrographic analysis and computer computations. Course was highly successful and provided new directions for this spring’s course.

Graduate courses:

X-ray Crystallography 402. This graduate course is offered for study of crystalline materials by powder X-ray diffractometry methods, in particular, computer controlled measurement and analysis. Two examinations are given.

Tectonics 802. This graduate course studies the processes by which deformation of the Earth’s crust occurs at regional to global scale. Specific orogenic belts are studied. Active and Neotectonic techniques and results are discussed. This course builds on a knowledge of Structural Geology at the undergraduate level. Topic presentations are given by class members and a Final Examination in Essay form is given. Course created for Spring 2006.

INDEPENDENT STUDY COURSES:

Geology 190. Gary Paulachok, "Environmental Quality of Tacony-Frankford Creek, Phila., PA".


**MASTER'S THESES SUPERVISED:**


Bruce R. Cushing, "Metamorphic and Deformational History within the Martic Shear Zone, Unionville and Coatesville Quadrangles, Southeastern PA.", 1988.

Jennifer Zarnowsky, "Ultramafic mineralogy, West Chester, PA", 1995

Robert Weaver, **Surface Stability of CaCO₃ and FeCO₃ under Acidic Atmosphere:**

**An Atomic Force Microscopy Study**, May 1997

**MASTER'S COMMITTEE SERVICE IN ADDITION TO STUDENTS YOU SUPERVISED:**

- Michael Edelman M.A., 1985
- Rosemary Korn M.A., 1986
- David Shock M.A., 1986
- Patrick Rush M.A., 1987
- David Side M.A., 1987
- George Kacandes M.A., 1989
- Linus Farias M.A., 1989
- Youngdo Park M.A., 1991
- Barbara Bloomfield M.A., 1994
- Terri DeMaio M.A., 1994
- Loratoo Dube M.A., 1994
- Paul James M.A., 1994
- Dugin Kaown M.A., 1993
- Gary Solar M.A., 1993
- Richard Valentino M.A., 1993
- Jeff Woodward M.A., 1994
- Tarja Wolf M.A., 1996
- Cheryl Sinclair M.A., 1998
- Christopher Zeliznak M.A., 1999
- Eric Roman M.A., 1999
- Matt McCoy M.S., 2001
- Louis Factor M.S., 2002
- Mark Manna M.S., 2002
- John Rivers M.S., 2002
- Louise Langford M.A., 2002 (Art History)
- Jeffrey Seier M.S., 2002
- Patricia Jannett M.S., 2004
- Mark Russell M.S., 2005
- John Peake M.S., 2005
- Celina Suarez M.S., 2005
- Herbert Beller M.S., 2005
- Ming Chen M.S., 2006
DOCTORAL COMMITTEE SERVICE IN ADDITION TO
STUDENTS YOU SUPERVISED:


Informal member of a number of successful Ph.D. Candidates in Solid State Physics (Condensed Matter Program) during the academic years 1987-89. Specific names are not available at this time.

Abebe Kebede, Ph.D. Oral Examination Committee, Department of Physics, Temple University, July 27, 1990.


Jorge Macho, Ph.D. Oral Examination Committee, "Development of a Novel Synthetic Route to Produce Ceramic Oxide Superconductors, The Xerogel Method", Department of Chemistry, Temple University, December 7, 1992.


Draper, Jerome P., Ph.D. Oral Examination Committee, “Reactivity of Heteropoly Keggin and Dawson Type Catalysts in Selective Homogeneous and Heterogeneous Reactions”, May 1996, Department of Chemistry, Temple University.


SERVICE:

SERVICE TO THE PROFESSION:


Member of Program Committee for the Association of American State Geologists, Field Trip on the Anthracite Coal Region and Mineral Deposits, April 14, 1982.


Chair of Technical Program “Geochemistry” for N.E. Geological Soc. of America Meeting in King of Prussia, PA, March 1997.

Manuscript Reviewer for Geochemica Cosmochemica Acta (Journal).


Textbook Reviewer for Wiley and Sons. “Mineral Science” by Klein


Event Editor for BBC News on Science Discoveries. Current.

Expert Commentary for NBC NEWS, Current.


Event Editor for BBC News on Science Discoveries. Current.
Expert Commentary for NBC NEWS, Current.

**SERVICE TO THE UNIVERSITY:**
Unofficial Temple University advertising at conferences.

**SERVICE TO THE COLLEGE:**
Research and Study Leaves, 1999
Faculty Responsibility – Lab Safety, 2001-02
Promotion and Tenure Committee, 2005 –

**SERVICE TO THE DEPARTMENT:**
Department Chair, 1997-August 30, 2004
   In particular: Policy developments
Graduate Chair, 2006 –
Safety Representative to EHS

**SERVICE TO THE COMMUNITY RELATING TO PROFESSIONS:**
The Pennsylvania Junior Academy of Science, Region #1, Science Fair Judge, current

**PAID CONSULTANCIES:**
Beta-Participant for software by The MathWorks, Inc. MATLAB for Microsoft Windows, 1993-current.
Wadsworth Publishing. Editorial Assistant in Reviews, current.

**PROFESSIONAL MEMBERSHIPS:**
Mineralogical Society of America, 1961 to Present
Geological Society of America, 1961 to Present
American Crystallographic Association, 1971 to Present
Sigma Xi, 1965 to Present
CURRICULUM VITAE

DATE: October, 2006

NAME: Dr. Jonathan E. Nyquist

EDUCATION:

Ph.D. in Geophysics, University of Wisconsin, Madison, WI, 1982-1986

Masters Degree in Physics, University of Maryland, College Park, MD, 1980-1982.


DOCTORAL DISSERTATION:

Thermal and Mechanical Modeling of the Mid-Continent Rift. The thesis involved interpretation of seismic data, mechanical modeling of plate flexure during basin subsidence after rifting, and thermal modeling to estimate oil maturation. Graduate studies also included work in the Polar Research Program conducting ground-penetrating radar, magnetic, and seismic studies in Antarctica.

POSITIONS HELD:

TEMPLE UNIVERSITY, 1997-present

Weeks Chair in Environmental Geology

Recent research emphasizes electrical methods for monitoring groundwater remediation.

OAK RIDGE NATIONAL LABORATORY, 1986 - 1997

Research Staff II, Geology and Geophysics Group, Environmental Sciences Division. Conducted research on the development and application of geophysical methods to environmental site characterization and monitoring.

Adjunct Professor, Department of Geosciences, University of Tennessee, Knoxville.

YEAR APPOINTED AT TEMPLE AND RANK AT APPOINTMENT:

Appointed Associate Professor, September 1997.

Promoted to Full Professor: 2008

AWARDS:
Northwest Associated Colleges Fellowship, ARCO Graduate Scholarship, Best Paper SAGEEP ’92.

PEER-REVIEWED PUBLICATIONS:


MAGAZINE ARTICLES


PRESENTATIONS WITH FULL PAPERS IN THE CONFERENCE PROCEEDINGS

(NOTE: SEG expanded abstracts are peer-reviewed)


Nyquist, J. E., (1988), A positioning and data logging system for geophysical surveys: First International


PRESENTATIONS WITH ABSTRACTS ONLY


characterization of the Oak Ridge Reservation using helicopter geophysics: Presented at the International Workshop on Airborne Electromagnetic Methods, Sponsored by the Laboratory for Advanced Surface Imaging.


Nyquist, J. E., (1990), Modeling soil venting at Hill Air Force Base: Presented at the Oak Ridge Workshop on Mathematical Geology, Oak Ridge National Laboratory.


**REPORTS**

(Note: ORNL and EPA reports are peer-reviewed internally)


Installation Restoration Program Site Investigation at Site 2 156th tactical fighter group Muniz Air National Guard Base Puerto Rico Air National Guard, Muniz Field, San Juan, Puerto Rico. February,


**SESSIONS CHAINEED**


**RESEARCH IN PROGRESS:**
(Additional information is available in a separate research statement.)

- Geophysical characterization of groundwater/surface water interaction (NSF funded).
- Use of 2D and 3D multielectrode resistivity for the characterization of shallow karst terrain. (In collaboration with Lafayette College.)
- Multifractal characterization of geophysical data. (SERDP funded)
- The relationship between spontaneous potential and redox chemistry.

**GRANTS AND CONTRACTS, EXTERNALLY FUNDED (CURRENT):**

(Additional information is available in a separate research statement.)

**Title:** Multifractal Characterization of Geologic Noise for Improved UXO Detection and Discrimination  
**Agency:** SERDP (DOE/DOE/EPA consortium)  
**Amount:** $98,000  
**Term:** One year pilot, (03/01/06 to 04/01/07)

**Title:** Geophysical monitoring of groundwater-lake interactions  
**Agency:** NSF  
**Amount:** $51,090  
**Term:** 09/01/05 to 08/31/06 (extended to Jan 1, 2007).

**Title:** Mapping Spatial and Temporal Heterogeneity of Lake Seepage  
**Agency:** NSF  
**Amount:** $289,212  
**Term:** 07/01/06 to 06/30/09

**OTHER RECENT GRANTS AND CONTRACTS, EXTERNALLY FUNDED**

Evaluation of Seismic Surface Waves for Cavity Detection  
**Agency:** Temple University Summer Research and Grand-in-Aid  
**Amount:** $7,500  
**Term:** 2005/07/01 to 2005/06/30

Evaluation of 2D vs. 3D multielectrode resistivity for the characterization of shallow karst  
**Source:** NSF  
**Amount:** $104,980
Term: 2002/06/01 – 2004/05/31 (extended to 05/2005)

Enhanced processing of airborne magnetic data  
Source: DOE via subcontract with ORNL, managed by UT/Batelle  
Amount: $31,644  
Term: 2000/07/18 – 2002/08/31

Post-process airborne magnetic data collected for UXO mapping, Massachusetts Military Reservation, MA  
Source: DOE  
Amount: $5,000  
Term: 2002/09/02 – 2002/09/30

Geophysical characterization of Landfill Areas, Camp Roberts, CA  
Source: DOE  
Amount: $13,047  
Term: 2000/05/01 – 2000/09/01

Development of airborne electromagnetic system for detection and mapping of UXO  
Source: DOE  
Amount: $26,974  
Term: 2001/03/01 – 2001/08/01

Processing and analysis of airborne geophysical data from Edwards Air Force Base, CA  
Source: Lockheed Martin  
Amount: $57,750  
Term: 1998/01/01 – 1998/12/31

**Total external funding since coming to Temple in 1997:** $678,900

*NOTE: These dollar amounts are the monies coming to Temple, not the total size of the awards to all collaborators, some of which are much larger.*

**TEACHING:**

*(Additional information is available in a separate teaching statement).*

**Geology 51: Catastrophic Geology**

**Course Description:** This class is very similar to geology 81 (see below), although there is more emphasis on natural geohazards such as earthquakes, volcanoes, landslides and floods. The course is certified as satisfying the University requirements as core curriculum science B laboratory class, and is offered in sequence with Geology 50. Most of the students are non-science majors completing their core distribution science requirement. The class consists of two 80-minute lectures, and a single one-hour recitation each week. The large enrollment generally necessitates use of one the large Beury Hall lecture rooms.
Geology 81: Environmental Resources

**Course Description:** This class is divided into two parts, the first half of this class covers environmental hazards such as earthquakes, volcanoes, floods, and landslides. In the second half of this class humanity strikes back. We discuss air pollution, surface water pollution, groundwater pollution, and issues such as global warming and ozone depletion. The prerequisite for this class is introductory physical geology (Geology 50). Most of the students are non-science majors completing their core distribution science requirement. The class consists of three one-hour lectures, and a single one-hour recitation each week.

Geology 310: Remote Sensing of the Environment

**Course Description:** This class was originally titled "Microcomputers in Geology" and covered mainly statistical data analysis. The new focus of this class is on remote sensing technologies and geographic information systems. Remote sensing is a dynamic field; new, high-resolution satellites are coming on line almost daily, and there has been an exponential growth in applications of remote sensing data during the past decade, including: mineral exploration, precision agriculture, watershed management, land use classification, military intelligence, and climate monitoring. In fact, the commercial satellite data is getting so good that the American military spent a small fortune buying exclusive rights to all of the satellite data collected over Afghanistan during recent military operations. The demand for college graduates with experience in this field is growing exponentially as well. The goal of the class is to give students a fundamental understanding of the uses and limitations of remote sensing data for environmental applications, and familiarity with geographic information systems.

Geology 381W/391H: Environmental Issues

**Course Description:** This class, originally entitled "Environmental Seminar", covered special topics in geology selected by the instructor. It is now certified as a "writing intensive" class, where the students read about, write about, and debate environmental policy and its scientific underpinnings, or lack thereof. The textbook for the class, "Taking Sides," is a collection of pro and con articles covering 18 hot-button environmental issues such as ozone depletion, Superfund reauthorization, the Endangered Species Act, and global warming (new editions of the textbook are published annually or biannually). We also read and discuss the best-selling book, "A Civil Action." The class is open to both geology majors and non-majors. In the spring of 1998 the University Writing Committee certified this class as meeting the requirements of a writing intensive class. In the fall of 1999 the class was added to the Honors Program catalog. The class meets twice a week for 80 minutes.

Geology 454: Environmental Geophysics

**Course Description:** This graduate-level class provides an introduction to geophysical exploration methods for the shallow subsurface, such as gravity, magnetic, seismic, electromagnetic, and borehole surveys. The emphasis is on environmental applications, although the same methods apply to mineral exploration, oil exploration, archeology, and geologic mapping. Class instruction relies heavily on take-home problems sets, computer exercises, and field demonstrations. It meets twice a week for 80 minutes.

**MASTER’S THESES SUPERVISED:**
• Steve Jenkins: Geophysical survey of sinkhole development, Northhampton Co., PA, August, 1999.
• Matt Weikel: Corrections for altitude fluctuations in airborne magnetic data collected to detect UXO, August, 2003.
• John Peake: A comparison of electrical resistivity techniques to characterize karst geology, Easton, PA, May, 2005
• Paul Freyer: The use of underwater resistivity to augment the understanding of groundwater/surface water interactions in karst terrain, South-Central Pennsylvania, August, 2006.

SERVICE TO THE PROFESSION: PROFESSIONAL SOCIETIES

Although I am a member of quite a few professional societies, I have been most active in three organizations: the American Geologic Institute (AGI), the Society of Exploration Geophysicists (SEG) and the Environmental and Engineering Geophysical Society (EEGS).

American Geologic Institute

AGI is an over-arching organization that represents numerous geological societies, keeping its members informed advances in all field of geoscience, developing educational materials, and reporting on budget and legislation activity in congress affecting the sciences. I served for four years on the editorial board of Geotimes, the principle publication of the AGI. This commitment involved attending editorial board meetings, occasionally writing an article for geotimes (see list of publications), and soliciting articles from other contributors.

The Society of Exploration Geophysicists

For decades SEG has been the premier international society for geophysicists working in oil and mineral exploration. Its annual convention draws thousands of geophysicists, and SEG has published the well-respected journal Geophysics since the 1930's. In 1990's, with the rise in the number of geophysicists practicing environmental geophysicists, SEG created the Near Surface Geophysics (NSG) section of SEG. I have been involved with NSG from its inception. I chaired the Groundwater Committee for a several years, presented papers, chaired sessions, and I was have served as secretary, and have served on the executive board as society webmaster.

The Environmental and Engineering Geophysical Society

My involvement in EEGS has been even more extensive than SEG. I started the EEGS web page and acted as the EEGS Web master for about five years. I have served on the EEGS research committee, education committee, and chaired several special sessions at the annual SAGEEP meetings. I don't believe that I have missed any of the annual meetings, where I have generally contributing at least one paper to the conference proceedings (The SAGEEP conference proceedings are immensely popular among educators and consultants as they are a collection of case histories captures the start of the
practice in environmental geophysics). I've contributed to the newsletter, and currently serve as Editor-in-Chief of the Journal of Environmental and Engineering Geophysics (JEEG).

NOTE: I served on many committees, working groups, review panels, and school presentations during my 11 years at Oak Ridge National Laboratory that are not discussed here. The above list covers only the period since I began working at Temple University in September, 1997.

CURRENT SERVICE TO THE UNIVERSITY:
- Member of the University Writing Committee
- Member of the Educational Policies and Planning Committee
- Elected member of the University Faculty Senate

CURRENT SERVICE TO THE COLLEGE:
- Undergraduate advisor for the CST Environmental Studies majors

CURRENT SERVICE TO THE DEPARTMENT:
- Serve as Geology Department Undergraduate Advisor

SERVICE TO THE COMMUNITY RELATING TO THE PROFESSION:
- Presentations at various local universities.
- Taught an evening geology class at a branch of the Free Library of Philadelphia sponsored by the Wagner Institute

PROFESSIONAL MEMBERSHIPS:
- Society of Exploration Geophysicists
- American Geophysical Union
- Engineering and Environmental Geophysical Society
- Geological Society of America
- European Association of Geoscientists & Engineers
Dr. Dennis O. Terry, Jr.
CURRICULUM VITAE
(Updated October 25, 2006)

Work Address:  
Department of Geology  
Temple University  
Philadelphia, PA 19122  
doterry@temple.edu

Contact Numbers:  
Ph: (215) 204-8226  
FAX: (215) 204-3496  
Email:

EDUCATION:


M.S., Geology, Bowling Green State University, Bowling Green, Ohio 43403, May 10, 1991. Thesis title: The Study and Implications of Comparative Pedogenesis of Sediments from the Base of the White River Group, South Dakota.


RESEARCH INTERESTS:

- Paleosols and their application to the rock record (paleoclimates, paleoenvironments)
- Nonmarine stratigraphy, sedimentology and depositional environments
- Paleogene stratigraphy and paleoclimatology of the Great Plains
- Influence of Laramide tectonic features on Paleogene stratigraphy and sedimentology
- Application of sedimentology and paleopedology to vertebrate taphonomy
- Nonmarine sequence stratigraphy
- Clastic sediments in karst systems
- K/T boundary studies in SW South Dakota
- Application of rare earth elements to vertebrate taphonomy

EMPLOYMENT:

Present Position:  Associate Professor and Honors Faculty Member, Department of Geology, Temple University, Philadelphia, PA 19122 (7-1-05 to present, tenure and promotion). Teaching duties: Soils and Paleosols, Physical Geology, Basin Analysis, and Facies Models.

Assistant Professor, Department of Geology, Temple University, Philadelphia, PA 19122 (9-1-99 to 7-1-05). Teaching duties: Soils and Paleosols, Physical Geology, and Facies Models.

Visiting Assistant Professor, Dept. of Geology, Washington and Lee University, Lexington, VA 24450. (8-1-98 to 6-1-99): Duties included full time teaching of lectures and labs for Geomorphology, Soils and Paleosols, Physical Geology, Environmental Geology, Introductory Field Methods, and Advanced Field Methods.

Lecturer, Dept. of Geology, University of Wisconsin-Oshkosh, (9-1-97 to 8-1-98). Duties included teaching lecture and laboratory sections of Physical and Environmental Geology, a two-week field course for 1st and 2nd year geology students, and field camp.

Graduate Teaching Assistant, Dept. of Geology, University of Nebraska-Lincoln, 8-1-96 to 12-31-96. Duties included teaching a Physical Geology laboratory class and development of course material.
Research Assistant, Dept. of Geology, University of Nebraska-Lincoln, 6-1-95 to 8-1-96. Responsible for the field and laboratory investigations, grant administration, and preparation of final reports for two cooperative research agreements between the Department of the Interior and the University of Nebraska-Lincoln.

Instructor, Dept. of Geology, University of Nebraska-Lincoln, 8-1-92 to 6-1-95. Responsible for teaching three lecture sections of Physical Geology and developing course material.

Geologist, U.S. Forest Service, Chadron, NE 69337, 1994 (Summer months). Duties included protection of federal lands from vertebrate fossil poaching and development of interpretive displays on geology and paleontology for visitors.

Graduate Teaching Assistant, Dept. of Geology, Univ. of Nebraska-Lincoln, 8-17-91 to 5-5-92. Duties included teaching four Physical Geology lab classes & development of course material.

Teaching Assistant, geology field camp, Bowling Green State University, Bowling Green, Ohio 43403, 6-10-91 to 7-22-91. Responsibilities included instruction of students in the field and organization of field activities, resources, supplies, and equipment.

Graduate Teaching Assistant, Dept. of Geology, Bowling Green State University, Bowling Green, Ohio 43403, 8-25-88 to 7-31-90. Duties include teaching seven laboratory sections of Historical Geology and developing course material, three laboratory sections for Geology of the National Parks, and two Physical Geology laboratory classes. Served as laboratory coordinator for Historical Geology and National Parks class. Appointed coordinator of sedimentology laboratory.

Geologist/paleontologist, National Park Service, Badlands National Park, Interior, SD 57750, 1987, 1988, 1989 (Summer months). Duties included field and laboratory research on various paleontological and geological problems, and the development of interpretive displays and programs on geology and paleontology for visitors.

Undergraduate Research Fellow, Depts. of Geology and Physics, Ball State University, Muncie, IN 47306, 9-9-86 to 5-5-87. Responsible for the testing and upkeep of laboratory equipment and initial analysis of geochemical data related to the development of x-ray fluorescence techniques for chemically fingerprinting cultural artifacts.

Engineering Aide, Water Management Branch, Indiana Department of Natural Resources, Indianapolis, IN 46204, 5-10-85 to 9-9-85. Responsible for the collection and laboratory analysis of water samples for geochemical fingerprinting of aquifers in northeastern Indiana. Duties also included coordination of sampling schedules, data input, and drafting of maps for digitizing.

RESEARCH GRANTS AND CONTRACTS: Total funding to date: $705,342

(A) Current Funding:

2003-2006 Department of the Interior: Documentation of Significant Paleontological Localities within the Poleslide Member, Brule Formation, Badlands National Park; with R. Benton, Badlands National Park, E. Evanoff, Univ. of Colorado-Boulder, and C. Herbel, South Dakota School of Mines and Technology ($291,630 total with $114,750 over three years to TU. Project starts Summer 2003).


(B) Previous Awards:
2004 Terry, D. O., Jr., Acquisition of Cathodoluminescence and Digital Imaging Instrument: Technology Fee Fund Proposal, College of Science and Technology, Temple University ($34,986).


1996 Geological Society of America: Geochemical analysis of superimposed paleosol profiles within the uppermost portion of the Eocene Chadron Formation, White River Group, Badlands of northwestern Nebraska ($1380.00).

1995 Department of the Interior: Documenting the Extent and Depositional Environments of the Chadron Formation in the South Unit of Badlands National Park: ($60,000: BADL 1300-5101-RPZ).

1995 Department of the Interior: Stratigraphic and Paleopedologic Analysis of Depositional Sequences within the Pig Wallow Site, Badlands National Park: ($5000: BADL 1300-5711-NNZ).

1994 Sigma Xi Grant-in-Aid of Research: Stable Isotope Analysis of Pedogenic Carbonates within the Eocene Chadron Formation, White River Group, Badlands of Northwestern Nebraska ($400.00).

1994 Center for Great Plains Studies; University of Nebraska-Lincoln: Stable Isotope Analysis of Pedogenic Carbonates within the Eocene Chadron Formation, White River Group, Badlands of Northwestern Nebraska ($150.00).

1993 Univ. of Nebraska Research Council Visiting Scholar Grant. Grant written to fund a short course and lecture given by Greg J. Retallack ($900.00).

1993 Shell Summer Research Fellowship; Univ. of Nebraska: ($2000.00)

1992 Center for Great Plains Studies; University of Nebraska-Lincoln: Pedogenic vs. Diagenetic Origin of Silcretes, Nodular Carbonates, and Zeolites within Early Tertiary Paleosols: Nebraska, South Dakota, and North Dakota ($400.00).

1992 Yatkola-Edwards Research Grant; Nebraska Geological Society: Pdeostratigraphic Analysis and Interpretation of Early Tertiary Great Plains Depositional systems; Nebraska, South Dakota, and North Dakota ($250.00).

1990 American Association of Petroleum Geologists: The Study and Implications of
RESEARCH ACTIVITIES:

(A) Active Projects:

1. Investigation of Late Cretaceous asteroid impact sections in SW South Dakota: paleoseismicity, geochemistry, mineralogy, and stratigraphy.

2. Detection of geochemical signatures of late Eocene bolide impacts across the northern Great Plains.

3. Paleosol-based interpretations of vertebrate taphonomy of Oligocene bone beds, Badlands National Park, SD.

4. Rare earth element geochemistry of vertebrate fossils and their paleoenvironmental and taphonomic significance.

5. Application of paleopedology to orbital forcing models of stratigraphic accumulation and regional correlation along the Dorset Coast of England.

6. Geochemical taphonomy and paleopedology of the Crystal Geyser dinosaur site, Utah

7. Paleosol-based interpretations of paleoclimatic and paleoenvironmental change across the Eocene/Oligocene Boundary in Nebraska, North Dakota, South Dakota, and Wyoming.

8. Lithostratigraphic revision, reinterpretation, and correlation of White River Group (Eocene/Oligocene) deposits of Nebraska, North Dakota, South Dakota, and Wyoming.

9. Collection of samples from the White River Group of Nebraska and South Dakota for analysis of stable isotopes from pedogenic carbonates across the Eocene-Oligocene Boundary (with D. Fox, Univ. of Minnesota).

(B) Projects in Planning Stage (2007 field season):

1. Continue measurements of regional variability of northern Great Plains Paleogene stratigraphic units in relation to Paleogene basin evolution and uplift of the Black Hills.

2. Continue detailed sedimentological, geochemical, and stratigraphic study of a latest Cretaceous asteroid impact event in SW South Dakota.

PUBLICATIONS: (Underline denotes student author)

(A) Books:


(B) Refereed Journal Articles/Book Chapters:


Terry, D. O., Jr., and LaGarry, H. E., 1998, The Big Cottonwood Creek Member: A New Member of the Chadron Formation in Northwestern Nebraska; in Terry, D. O., Jr., LaGarry, H. E., and Hunt, R.
M., eds., Depositional Environments, Lithostratigraphy, and Biostratigraphy of the White River 
and Arikaree Groups (Late Eocene to Early Miocene, North America): Geological Society of 
America Special Paper #325, p. 117-141.

Evans, J. E. and Terry, D. O., Jr., 1994, The Significance of Incision and Fluvial Sedimentation in the 
Basal White River Group (Eocene-Oligocene), Badlands of South Dakota, U.S.A: Sedimentary 
Geology, v. 90, p. 137-152.

Terry, D. O., Jr., and Evans, J. E., 1994, Pedogenesis and Paleoclimatic Implications of the 
Chamberlain Pass Formation, Basal White River Group, Badlands of South Dakota: 

(C) Manuscripts in Preparation/Review/Revision:

Jannett, P. A. and Terry, D. O. Jr., (in review), Stratigraphic expression of a regionally extensive impactite 
within the Latest Cretaceous Fox Hills Formation of southwest South Dakota; submitted for 
 inclusion within a SEPM/GSA special paper volume entitled The Sedimentary Record of 
Meteorite Impacts.

Suarez, C., Suarez, M., Terry, D. O. Jr., and Grandstaff, D. E., (accepted pending revision), Rare Earth 
Element Geochemistry and Taphonomy of the Early Cretaceous Crystal Geyser Dinosaur Quarry, 
East-Central Utah; Palaios, v. XX n. XX p. X-X.

Suarez, M., Suarez, C, Grandstaff, D. E. and Terry, D. O., Jr., (accepted pending revision), Sedimentology, 
Stratigraphy and Depositional Environment of the Crystal Geyser Dinosaur Quarry, East-Central Utah; 
Palaios, v. XX n. XX p. X-X.

Zanazzi, A., Kohn, M., MacFadden, B., and Terry, D. (in revision), Abrupt temperature drop across the 
Eocene-Oligocene Transition, central North America; Submitted to Nature

(D) Field Trip Guides/Other:

Benton, R. C., Evanoff, E., LaGarry, H. E., and Terry, D. O., Jr., (unpublished) Hayden’s Lakes Revisited: 
The origin and new stratigraphic interpretations of the White River Sequence, South Dakota, 
Nebraska, and Wyoming; Field Trip Guidebook, 1996 Geological Society of America National 
Meeting.

LaGarry, H. E., and Terry, D. O., Jr., 1997, Regional distribution of lithotopes within the Chadron 
Formation of northwestern Nebraska, in Hunter, A., ed., The Geology and paleontology of the 
White River Formation, Tate Geological Museum Guidebook No. 2: Tate Geological Museum, 
Casper College, p. 9-22.

Ashworth, A. C., Benton, R. C., Biek, R. F., Murphy, E. C., Shurr, G. W., Stevens, K. K., and Terry, D. 
O., Jr., 1996, A field guide to Tertiary tectonism in the Northern Great Plains: Road Log, Field 
Trip 1; in Paterson, C. J., and Kirchner, J. G., eds., Guidebook to the Geology of the Black Hills, 

Trackways, Ecosystems, and Lithostratigraphic Revision, Redefinition, and Redescription, in 
Flowerday, C. A., ed., Geologic Field Trips in Nebraska and Adjacent parts of Kansas and South 
Dakota, Parts of the 29th Annual Meetings, North-central and South-central Sections, Geological 
Society of America: Conservation and Survey Division Guidebook No. 10, Institute of Agriculture 
and Natural Resources, University of Nebraska, Lincoln, NE, p. 43-57.

(E) Contract/Open File Reports:


(F) Invited Abstracts:


Terry, D. O., Jr., 1997, The Peanut Peak Member of the Chadron Formation: A Key Lithologic Unit for Correlation of the White River Group Across the Northern Great Plains, in The Geology and


(G) Other Published Abstracts:


Becker, M., Chamberlain, J. A. Jr., and Terry, D. O. Jr., 2003, Chondrichthyans from the Fairpoint Member of the Fox Hills Formation (Maastrichtian), Meade County, South Dakota: Geological Society of America Abstracts with Programs, V. 34, no. 7, p. 497


Grandstaff, D. E., Terry, D. O., Jr., and Patrick, Doreena, 2001, Rare earth element (REE) signatures in fossils from marine and terrestrial environments: Society of Vertebrate Paleontology Abstracts of Papers, v. 21, supplement to no.3, p. 56A.


Terry, D. O., Jr., 1995a, Paleopedology of the Big Cottonwood Creek Member of the Eocene Chadron Formation, White River Group, Badlands of Northwestern Nebraska: Proceedings, 105th Annual Nebraska Academy of Sciences, Earth Science Section, p. 57.


(H) Invited Lectures:


2002 Terry, D. O. Jr., The K/T Boundary in Badlands National Park, South Dakota: Department of Geology, Ball State University, Muncie, IN.


2000 Chamberlain, J. A., Jr., and Terry, D. O., Jr., A marine K/T Boundary section in Badlands National Park, South Dakota: a glimpse of the Western Interior Seaway and its biota in the last moments of the Cretaceous: School of Earth and Environmental Sciences, Queens College, NY.


1999 Terry, D. O., Jr., Paleoclimatic interpretations from Quaternary cave deposits in Virginia cave systems: Department of Geology Seminar Series, Temple University.


1992 Terry, D. O., Jr., Fluvial Baselevel Changes in the Lower Part of the White River Group, Eocene Oligocene, Badlands of South Dakota: Department of Geology Alumni Advisory Board, University of Nebraska.

(I) Popular Press Interviews/Appearances/Articles:


2004 Voice-over work for a new interpretive video produced by the National Park Service for Badlands National Park.


2003 WOBM Radio 92.7 FM (Bayville, NJ): Interview on GEO 211 (Facies Models) students studying the effects of Hurricane Isabel on Long Beach Island.


PROFESSIONAL ACTIVITIES:


2006 Reviewer for Palaios (2x), the Journal of Geological Education, and the Journal of Geology

2004 Reviewer for National Science Foundation Grant Proposals (EAR)

2004 Reviewer for Petroleum Research Fund Proposals.

2004 Reviewer for Journal of Sedimentary Research

2004 Reviewer for Paleobios special volume

2003 Reviewer for Palaios and Geology

2002 Reviewer for Faculty grants at the City University of New York.

2001 Reviewer for National Science Foundation Grant Proposals (EAR)

2000-present Geological Society of America Campus Representative

2000 Reviewer for Journal of Geology


1996  Chair, Petroleum Geology session, Geological Society of America National Meeting.


1996  Co-Chair, Earth Science Section, Nebraska Academy of Science.

1996  Field trip co-leader: *Paleogene Stratigraphy and Sedimentation*, Geological Society of America Meeting, Rocky Mountain Section, Rapid City, SD.

1995  Co-Chair for North-Central/South-Central Geological Society of America Symposium: *Depositional Environments, Lithostratigraphy, and Biostratigraphy of the White River and Arikaree Groups*.

1994  Chair, Earth Science Section, Nebraska Academy of Science.


1989  President of Bowling Green State University Chapter, Sigma Gamma Epsilon.

1986  Vice-President of Ball State University Chapter, American Association of Petroleum Geologists.

**CONSULTING:**


1994-present: U.S. Forest Service, Chadron, Nebraska: Consultation on the development, design, and implementation of interpretive displays for paleontological and geological resources. Consultation on the policies and procedures of paleontological resource protection, interdiction of illegal fossil poaching, and development of future research projects.

1994-2006: National Park Service, Badlands National Park, SD: Consultation on the development of a geological and paleontological resource protection program, resource management, and development of a geological and paleontological research program.

**UNDERGRADUATE STUDENT RESEARCH SUPERVISION:**

**Completed:**

2005  Ryan Bright: Paleopedology of the Oligocene Poleslide Member, Brule Formation, Badlands National Park, SD.

2005  Ashley Edelman: Paleopedology of the Oligocene Poleslide Member, Brule Formation, Badlands National Park, SD.

2005  Frank Graf: Vertical changes in paleosols from the Purbeck Group, Dorset, England

2005  Jason Mintz: Paleopedology of the Oligocene Poleslide Member, Brule Formation, Badlands National Park, SD.

2005  Zerbedia Njanike: Vertical changes in paleosols from the Purbeck Group, Dorset, England


2004  Paul Kosmidis: Sedimentology and Taphonomy of the Poleslide Member, Brule Formation, Badlands National Park, South Dakota.

2004  Jamie Shamrock: Paleopedology of the Mammal Bed, Cretaceous Purbeck Group, Dorset Coast, England


1994-1998  W. B. Wells, University of Nebraska: Stratigraphy and sedimentology of Paleogene deposits in northwestern Nebraska.

1996-1997  J. I. Spence, University of Nebraska: Geologic mapping and fossil resource inventories of Paleogene strata in South Dakota.

GRADUATE STUDENT RESEARCH SUPERVISION (dates indicate expected graduation):

(A) As Thesis Advisor:

Completed:


2004  Patricia Jannett: An impactite without a crater: The preservation potential impact ejecta within deltaic environments of the Fox Hills Formation of Western South Dakota.

2003  Christine Metzger: Use of rare earth element geochemistry and paleopedologic properties to determine original depositional environment of fossil bone: Badlands National Park, South Dakota.

2002  Matt McCoy: Tectonic versus paleoenvironmental control of paleosol morphologies within the Oligocene Scenic Member of the Brule Formation, Badlands National Park, South Dakota.

2002  Lewis Factor: Paleopedological and taphonomic analysis of the Orellan Brian Maebius site, Tyree Basin, Badlands National Park, South Dakota, U.S.A.
In Progress:

2007  Jason Mintz: Paleopedology of the lower part of the Poleslide Member of the Oligocene Brule Formation, Badlands NP, South Dakota

2007  Audra Shemkovitz: Mineralogical analysis of the Cape Fear Formation, North Carolina

2007  Gary Stinchcomb: Regional paleopedology of the Scenic/Poleslide Member Boundary, Oligocene Brule Formation, Badlands NP, South Dakota

(B) As Thesis Committee Member:

Completed:

2006  Karan Dick: Application of Cathodoluminescence Analysis to Taphonomic Investigations within Early Cretaceous (Barremian) units of the Crystal Geyser Dinosaur Quarry, East-Central Utah


2005  Celina Suarez: Rare earth element geochemistry and taphonomy of the Early Cretaceous (Barremian) Crystal Geyser Dinosaur Quarry, East-central Utah.

2005  Mark Russell: Paleoenvironments and cyclic structure of a fourth order sequence in the Upper Silurian Tonoloway Formation, Central Pennsylvania and Western Maryland.

2004  Jennifer Tancredi: Variation in sediment and geochemistry as evidence of changes in flowpaths to a karst spring in southeastern Pennsylvania.

2002  Sarah Black: Site analysis of the Buffalo Alley bone bed, Badlands National Park, SD (through the South Dakota School of Mines and Technology, Rapid City).

2002  Mark Manna: ZrO2-Y2O3 pH electrode behavior


2002  Doreena Patrick: REE comparison of Mosasaur bone material from Pierre Shale, SD vs. Mid Shelf Ocean, NJ.


1999  Richard Staron: Rare earth element signatures and fossil taphonomy in the Hornerstown Formation, Sewell, NJ.

In Progress:

N/A at this time.

UNIVERSITY COMMITTEE APPOINTMENTS:
2006   CST Cosby Scholarship selection committee
2005 - present   CST Study leave committee
2004 - present:  CST Undergraduate Committee
2004 - 2006:  Search committee for new Dean of CST
1999   Alliance for Minority Participation Committee, CST.
1999   Search committee for Director of Environmental Science and Technology, CST

OTHER UNIVERSITY/DEPARTMENT SERVICE:
2006   Acting Geology Undergraduate Advisor for Summer II and Fall semesters.
2004-present:  Guest lecturer for Freshman Seminar, CST 51
2003- present:  Faculty advisor for the Geological Society of Temple University (GSTU).
2002   Developed new recruitment materials for display at regional and national meetings, including department information sheets, poster displays, and handouts.
2000 - present:  CST Recruitment/Open House representative for Geology Department.
2000   Developed new geology department recruitment poster for Beury Hall.
2000 & 2003   Developed new geology graduate recruitment flyer for mass mailing.
1999-present:  Faculty co-coordinator of Geo 50 laboratories.
1999-present:  Department representative for open house/recruitment activities for CST.
1999   Developed new geology undergraduate information flyer used by CST for prospective students.

TEACHING INTERESTS:
Graduate/Undergraduate courses in paleopedology (fossil soils), sedimentology and stratigraphy, nonmarine depositional environments, geomorphology/soil geomorphology, seminars on specific topics within paleopedology, paleoclimatology, stratigraphy, and sedimentology, and introductory geology courses (physical, environmental, historical).

COURSES TAUGHT:
2005+   Associate Professor, Teaching a 2/1 load.

Physical Geology (GEO 50):  Fall 2005:  220 students, Summer 1 2006: 58 students, Fall 2006:  225 students
Facies Models (GEO 211):  Fall 2005:  15 students, Fall 2006: 20 students
Stratigraphic Dynamics (GEO 600):  Spring 2006:  5 students
1999-2005 Assistant Professor, Teaching a 2/1 load for the past 5 years at Temple University. Enrollments as follows:


Facies Models (GEO 211): Fall 2000: 15 students, Fall 2001: 19 students, Fall 2002: 15 students, Fall 2003: 13 students, Fall 2004: 11 students.


1998-1999 Visiting Assistant Professor, one lecture and lab section each of Physical Geology (101a), Environmental Geology (101b), Geomorphology (247), Soils and Paleosols (397/401), Introductory and Advanced Field Methods (160/373), Washington and Lee University.

1997-1998 Instructor, Physical Geology lecture (102), one section, and nine Physical Geology Lab sections, Environmental Geology (150), one section, and four Environmental Geology Lab sections, a two week field course (360), and field camp (344/345), University of Wisconsin-Oshkosh.

1996 Teaching Assistant, Physical Geology Lab (102), one section, University of Nebraska.

1992-1994 Instructor, Physical Geology Lecture (101), three sections, University of Nebraska.

1991-1992 Teaching Assistant, Physical Geology Lab (102), four sections, University of Nebraska.

1991 Teaching Assistant, Field Camp (493/693), one section, Bowling Green State University.

1989-1990 Teaching Assistant and Lab Coordinator, Geology of National Parks (304), three sections, Bowling Green State University.

1989-1990 Teaching Assistant and Lab Coordinator, Historical Geology Lab (105), seven sections, Bowling Green State University.

1988-1989 Teaching Assistant, Physical Geology Lab (104), two sections, Bowling Green State University.

TEACHING SEMINARS/WORKSHOPS:

2000 Diversity Issues-Ujima Roundtable; Alliance for Minority Participation, CST.

1997 Focus on Pedagogy: Teaching controversial subjects in the college classroom, University of Wisconsin-Oshkosh.

COURSES TAKEN:

Undergraduate courses at Ball State University: physical geology, historical geology, geology of Indiana, geomorphology, mineralogy, hand specimen petrology, invertebrate paleontology, optical mineralogy, stratigraphy, micropaleontology, structural geology, field methods, engineering geology, computer applications to geosciences, field camp, oceanography, geophysics, petroleum geology, sedimentology.
Graduate courses at Bowling Green State University:

Department of Geology:
  Introductory Geochemistry  (J. Frizado)
  Solid Earth Geophysics  (J. Parrish)
  Seminar in Basin Analysis  (J. E. Evans)
  Sedimentary Environments  (C. F. Kahle)
  Advanced Structural Geology  (C. Onasch)
  Carbonate Geology  (C. F. Kahle)
  Seminar in Paleontology  (D. Steinker)
  Seminar in Sedimentary Structures  (J. E. Evans)
  Special Study in Oligocene Paleosols  (J. E. Evans)
  Glacial Geology  (J. Forsyth)

Department of Geography:
  Geography of Soils/Land Use

Graduate courses at the University of Nebraska:

Department of Geology:
  Principles of Stratigraphy  (D. B. Loope)
  Tectonics  (N. Lindsley-Griffin)
  Seminar in Vertebrate Paleontology  (R. M. Hunt and M. R. Voorhies)
  Clay Mineralogy  (M. A. Holmes)
  Regional Field Geology  (R. Nelson)
  Seminar in Sedimentary Environments  (D. B. Loope)
  Mesozoic and Cenozoic Stratigraphy  (D. M. Harwood)
  Global Change  (D. M. Harwood)
  Taphonomy  (M. R. Voorhies)

Department of Biology:
  Scanning Electron Microscopy  (K. Lee)

Department of Agronomy:
  Soil Chemistry and Mineralogy  (D. McCallister)
  Soil Morphology and Genesis  (D. Lewis)
  Independent Study in Soil Morphology and Genesis  (D. Lewis)

MEMBERSHIP IN PROFESSIONAL SOCIETIES:

Geological Society of America, Society of Economic Paleontologists and Mineralogists, International Association of Sedimentologists.

HONORS AND AWARDS:

(A) Best Paper Awards:

1997  *Geological and Paleontological Resource Assessment of the Eocene Chadron Formation in the South Unit of Badlands National Park, South Dakota:* Earth Science Section, Nebraska Academy of Science.

1996  *Stratigraphy, Paleopedology, and Depositional Environment of the Conata Picnic Ground Bone Bed (Orellan), Brule Formation, Badlands National Park, South Dakota:* Geology Graduate Student Seminar, University of Nebraska, Lincoln, NE.
1995  *Provisional Lithostratigraphic Revision and Correlation of the Lower Portion of the White River Group: Nebraska to South Dakota, in Depositional Environments, Lithostratigraphy, and Biostratigraphy of the White River and Arikaree Groups*  
  Geological Society of America North-Central/South-Central Section Meeting, Lincoln, NE.

1995  *Paleopedology of the Gilman Canyon Formation, Buzzard's Roost Locality, Gothenburg, Nebraska:*  
  Earth Science Section, Nebraska Academy of Science.

1993  *Lithostratigraphic Refinement and Correlation of Basal White River Group Sediments: Nebraska and South Dakota:*  
  Earth Science Section, Nebraska Academy of Science.

(B) Teaching Awards:

2005  Appointed to Honors Faculty, Temple University.

2005  *Christian R. and Mary F. Lindback Foundation Award for Distinguished Teaching,*  
  Temple University.

1997  Teaching Award:  *Certificate of Recognition for Contributions to Students,*  
  University of Nebraska, Lincoln, NE.

(C) Other Awards:

2006  Four (4) units of merit, Category A, Teaching & Research/Creative work

2005  Three (3) units of merit, one each for outstanding teaching, research, and special achievement.

2004  Two (2) units of merit, one each for outstanding teaching (Category I) and outstanding research (Category II)

2003  One (1) merit unit for outstanding research (Category II), Temple University

2002  One (1) merit unit for outstanding research (Category II), Temple University

2001  Two (2) merit units for outstanding special achievement (Category IV), Temple University

1996  Bukey Memorial Fellowship:  University of Nebraska, Lincoln, NE ($1000.00).

1996  Regents Tuition Fellowship:  University of Nebraska, Lincoln, NE.

1996  Graduate Assistantship:  University of Nebraska, Lincoln, NE.

1996  Geological Society of America:  Student Travel Grant ($100.00).

1996  Geological Society of America:  Student Field Trip Award ($155.00).

1996  Sigma Xi Student Travel Grant:  University of Nebraska Chapter ($150.00).

1994  Graduate Assistantship:  University of Nebraska, Lincoln, NE.

1993  Graduate Assistantship:  University of Nebraska, Lincoln, NE.


1992  Shell Graduate Fellowship:  University of Nebraska, Lincoln, NE.
1991  Graduate Assistantship: University of Nebraska, Lincoln, NE.
1990  Outstanding Graduate Student Award: Bowling Green State University.
1989  F.V. Hayden Geology/Paleontology Internship: Badlands National Park.
1989  Amoco Graduate Fellowship: Bowling Green State University.
1989  Sigma Gamma Epsilon Earth Science Honorary: Bowling Green State University.
1988  F.V. Hayden Geology/Paleontology Internship: Badlands National Park.
1988  Amoco Graduate Fellowship: Bowling Green State University.
1986  Undergraduate Research Fellowship: Ball State University.
1986  Sigma Zeta Science and Mathematics Honorary: Ball State University.
1984  Alpha Lambda Delta Academic Honorary: Ball State University.
Dr. Laura Toran  
Temple University  
Department of Geology  
Philadelphia, PA 19122  
ltoran@temple.edu  
215-204-2352, 215-204-3496 (fax)

Education

1976 - 1980 Macalester College St. Paul, MN  
*B.A. Geology Summa Cum Laude*

1982 - 1986 Univ. of Wisconsin Madison, WI  
*Ph.D. Geology*  
THESIS: Sulfate contamination in groundwater near an underground mine: hydrogeochemical modeling, microbiology, and isotope geochemistry

Professional experience

1997 - present Temple University Dept of Geology Philadelphia, PA  
*Weeks Chair in Environmental Geology, Associate Professor*

1986 - 1997 Oak Ridge National Laboratory Oak Ridge, TN  
*Wigner Fellow and Research Associate*

*Research associate for Dr. William Back*

Awards Received

- Fellow, Geological Society of America
- Faculty Mentor Award, Temple College of Science and Technology 2007
- Weeks Chair in Environmental Geology (Temple University)
- Wigner Fellowship (Oak Ridge National Laboratory)
- American Geophysical Union Horton Research Grant, 1985
- Univ. of WI Graduate School Fellowship

Professional Activities

- Technical Program Committee, Geological Society of America 2004-2006
- Board of Directors, Consortium of Universities for Advancement of
Hydrologic Research, Inc. (CUAHSI), 2005-present

- National Academy of Sciences -- Committee on Accelerated Cleanup of High Level Radioactive Waste 2003-2004
- Geological Society of America O.E. Meinzer Award selection committee 2001-2003
- American Geophysical Union Spring 2000 Meeting Program Chair- Hydrology
- Associate Editor, Water Resources Research, Oct 1996 - 2000
- Homepage editor, American Geophysical Union Hydrology Section 1996-1999
- Registered Professional Geologist, Pennsylvania

University Service

- Executive Committee, University Academic Planning
- Gened executive committee, 2005-2007
- College merit committee, 2006-present
- Environmental studies committee, 1997-present
- Environmental Studies CST Director, 2008- present
- Web master, Dept of Geology 1997-present
- Dept of Geology alumni newsletter 2005-present
- Freshman Summer Reading Program, 2004-2006
- Graduate committee, 2000-2003 (oversaw conversion of program from MA to MS degree)
- Geo50 lab book coordinator, 2000-2007
- Facilitated founding of student chapter of AIPG, 2006
- Online learning faculty, 1998-2000
- CST faculty responsibility committee, 2003-2004
- Search committee, Dept of Environmental Engineering, 2001-2002
**CURRENT FUNDING:**
$5 million (collaborative)
2007-2009 - Featherstone, J., "Temple-Villanova Sustainable Stormwater Initiative Phase II", William Penn Foundation. $330,000
2006-2009 Toran, L. and Nyquist, J. “Mapping Spatial and Temporal Heterogeneity of Lake Seepage Using Electrical Resistivity and Induced Potential” National Science Foundation (NSF). $287,000

**COURSES TAUGHT:**
Introduction to Hydrology, Advanced Hydrogeology, Climate Change, Introduction to Geology, Groundwater Modeling

**PEER-REVIEWed PUBLICATIONS:**


Herman, E.K., Toran, L., and White, W.B. Quantifying the place of karst aquifers in the groundwater to surface water continuum: a time series analysis study of storm response in Pennsylvania water resources. Accepted pending revisions in Journal of Hydrology.


Toran, L, Herman, E.K., and White, W.B., 2007. Comparison of Flow Paths to a Well and Spring in a


Ham, Jeffrey, Toran, Laura, and Cruz, Jay, 2006. Effect of upstream ponds on stream temperature. **Environmental Geology**. DOI: 10.1007/s00254-006-0186-4


ABSTRACTS (after 1986):


REPORTS:


SAIC, 1993. Interim Corrective Measures Cap Evaluation Report for Waste Area Grouping 6 at Oak Ridge National Laboratory, Oak Ridge, Tennessee. ORNL/ER-


Toran, L., 1986. Sulfate contamination in groundwater near an underground mine: hydrogeochemical modeling, microbiology, and isotope geochemistry. Univ. of Wisconsin, Ph.D.
Curriculum Vitae:
Allison R. Tumarkin-Deratzian

Current Affiliation:
Assistant Professor (Education)  (215) 204-3907 (campus office)
Temple University  (215) 204-3496 (campus fax)
Department of Geology
Beury Hall
1901 North 13th Street
Philadelphia, Pennsylvania  19122

Other Affiliations:
2000-2006 (ongoing)  Crocodyliform Research Specialist, Bahariya Dinosaur Project

Research Interests:
Bone growth patterns in modern and fossil archosaurs
Cretaceous vertebrate faunas of North America and Africa
Histology of modern and fossil bone
Ontogeny, evolution, and phylogeny of ceratopsian dinosaurs

Education:
2003  Ph.D.  University of Pennsylvania, Department of Earth and Environmental Science, Philadelphia, PA
Dissertation:  “Bone surface textures as ontogenetic indicators in extant and fossil archosaurs: macroscopic and histological evaluations.”
Dean’s Scholar  (awarded yearly to approximately twelve graduate students from the School of Arts and Sciences)

1997  B.S.  Lafayette College, Department of Geology and Environmental Geosciences, Easton, PA
Honors Thesis:  “Sedimentology, taphonomy, and faunal review of a multigenic bonebed (Bonebed 47) in the Dinosaur Park Formation (Campanian) of southern Alberta, Canada.”

Summa cum laude

Highest Cumulative GPA in graduating class
Dean’s List
James L. Dyson Geology Award
Phi Beta Kappa
Sigma Xi

Funded Research:
2005  “Effects of Protein Malnutrition on Limb Bone Microstructure during Growth in the Rat (Rattus norvegicus)”
Vassar College Dean’s Fund--$2,082
2002 “Bone Surface Textures as Ontogenetic Indicators in Modern and Fossil Archosaurs”
   Geological Society of America--$2,500
   The Jurassic Foundation--$2,600
   University of Pennsylvania Summer Stipends in Paleontology--$1,700
   “Evaluation of Periosteal Aging in the Canada Goose (Branta canadensis)”
   The Paleontological Society--$500
2001 “Evaluation of Bone Surface Textures as Ontogenetic Indicators in Centrosaurine Horned Dinosaurs”
   The Paleontological Society--$500
   “Investigations of Bone Surface Textures as Ontogenetic Indicators in Horned Dinosaurs and Modern Birds”
   University of Pennsylvania Summer Stipends in Paleontology--$3,000
2000 “Evaluation of Periosteal Aging in Modern Archosaurs”
   Sigma Xi--$300
1999 “Investigations of Bone Growth in Modern and Fossil Vertebrates”
   University of Pennsylvania Summer Stipends in Paleontology--$2,000
1998 “Fracture Repair in Extant and Extinct Archosaurs”
   The Paleontological Society--$500
   “Comparative Fracture Healing in Modern and Fossil Archosaurs”
   University of Pennsylvania Summer Stipends in Paleontology--$2,000

Publications:

Peer-reviewed Papers


Manuscripts In Press:


Manuscripts in Review:

Tumarkin-Deratzian, A.R. Fibrolamellar bone in wild adult Alligator mississippiensis. The Journal of Herpetology

Conference Proceedings:


Peer-reviewed Abstracts / Conference Presentations:


and Brachyceratops. *Journal of Vertebrate Paleontology.* 25: 125A


**Manuscripts in Preparation:**

**Tumarkin-Deratzian, A.R., Grandstaff, B.S., Lamanna, M.C., Smith, J.B., Attia, Y., and Dodson, P.** New material of *Libycosuchus* (Crocodyliformes, Mesoeucrocodylia) from the Upper Cretaceous of Egypt.

**Tumarkin-Deratzian, A.R.** and Chinsamy, A. Are incidents of trauma reflected in skeletal growth of birds?
Tumarkin-Deratzian, A.R. and Dodson, P. Ontogeny, evolution, and the possibility of paedomorphosis in centrosaurine dinosaurs (Ornithischia, Ceratopsidae).

Tumarkin-Deratzian, A.R. Histological basis of ontogenetic bone texture changes in *Centrosaurus* (Ornithischia: Ceratopsidae).

**Invited Lectures:**

2004 “How to Age a Fossil Bone: Lessons from Dinosaurs and Their Modern Relatives”
Department of Geosciences, Indiana University-Purdue University, Fort Wayne, IN

2001 “Around the World in 150 Million Years: Paleobiology in Desert, Swamp, and Laboratory”
Department of Geology and Environmental Geosciences, Lafayette College, Easton, PA
“Paleohistological Approaches to Deciphering the Biology of Fossil Vertebrates”
Department of Geology, Temple University, Philadelphia, PA

1998 “Studies on Enigmatic Ceratopsians and Bone Fracture Healing in Dinosaurs”
Delaware Valley Paleontological Society, Philadelphia, PA

**Interviews:**

2004 Interviewed for:

**Teaching Experience:**

2006 Lecturer, Department of Geology, Temple University
Introductory Physical Geology
Introductory Historical Geology (developed and taught)

2003-2006 Visiting Assistant Professor, Department of Geology and Geography, Vassar College
Introductory Physical/Environmental Geology with Laboratory
Introductory Historical Geology with Laboratory (developed and taught)
Intermediate Sedimentology and Stratigraphy
Intermediate Paleontology (developed and taught)
Advanced Seminar: Dinosauria (developed and taught)
Advanced Seminar: Topics in Vertebrate Paleontology (developed and taught)
Advisor for independent student projects:
“The Permian-Triassic Extinction”
“Paleoecology of *Carcharodon megalodon*”

2002 Teaching Assistant, Department of Earth and Environmental Science, University of Pennsylvania
Introductory Physical Geology (led recitation sections, graded assignments)

1998-2001 Instructor, Department of Animal Biology, School of Veterinary Medicine, University of Pennsylvania
Gross Anatomy (presented pre-lab orientation talks; assisted with student dissections; participated in development, administration, and grading of practical and written examinations; lectured on musculoskeletal and cardiovascular systems)

1997-1998 Teaching Assistant, Department of Earth and Environmental Science, University of Pennsylvania

   Introductory Physical Geology Laboratory (developed and taught lab curriculum)
   Introductory Historical Geology (led recitation sections; graded assignments; developed, administered, and graded examinations)

1995 Teaching Assistant, Department of Geology and Environmental Geosciences, Lafayette College

   Intermediate Historical Geology with Laboratory (assisted with laboratory exercises and field trips)

Field Experience:

   2000 Bahariya Dinosaur Project, Bahariya Oasis, Egypt
       Vertebrate fossil prospecting and excavation

1999-2000 Dinosaur fauna of the Morrison Formation, South-central Montana, USA
   (University of Pennsylvania and Academy of Natural Sciences joint expedition)
   Vertebrate fossil prospecting, excavation, and preparation

1995-1998 Royal Tyrrell Museum of Palaeontology Field Experience Program, Dinosaur Provincial Park, Alberta, Canada
   Vertebrate fossil prospecting, excavation, and preparation; site and sedimentological mapping; training of field volunteers

Other Academic Awards and Honors:

2003 Finalist Speaker for Alfred Sherwood Romer Prize, 63rd Annual Meeting, Society of Vertebrate Paleontology (the society’s highest award for graduate student research)

1998 National Science Foundation Graduate Student Research Fellowship
       Delaware Valley Paleontological Society Paul Bond Scholarship

1997 Honorable Mention, USA Today All-USA College Academic Team

Current Professional Affiliations:

Geological Society of America
Society for Sedimentary Geology
Society of Vertebrate Paleontology
The Paleontological Society
Phi Beta Kappa
Sigma Xi
Curriculum Vita

Richard W Valentino

Department of Geology
Temple University
Philadelphia, Pennsylvania

valenrick@aol.com
5056 Pennell Road
Aston, PA 19014
(610) 494-6168

Education:

B.A., Temple University, 1983
Graduate study, Temple University, 1985
Working leave of absence, 1985-1988
Masters of Arts, Temple University, 1988-1993

Grants and Honors:

Graduate Assistantship in Geology, Temple University, 1989-1992

Publications:

Peer Reviewed Journal Papers

Journal of Geodynamics, D.W. Valentino, S. Peavy and R.W. Valentino, Alleghanian Orogen Parallel Reactivation of the Marctic Thrust Dextral Transpression in the Central Appalachians, 2004


Abstracts for Meetings


Geological Society of America, Abs. with Prog., v. 21, p. 72, Valentino, R.W.,
1989.

Thesis

Research in Progress:

With the collaboration of Dr. D.W. Valentino, beginning this summer I will be conducting a petrographic analysis of over 400 oriented thin-sections from the Tucquan region of the Pennsylvania piedmont, Lancaster County. Thin-sections will be digitally photographed to document rock fabrics. Inclusion trails in larger overgrowth minerals will be looked at in detail. This fabric analysis may aid in understanding the tectonic history of the region.

Teaching Experience:

Department of Geology, Temple University

Lecture Classes:

Physical Geology 50, summer 2001 to spring 2006
Catastrophic Geology 51, fall 2006 taught lecture and labs
Environmental Resources 81, summer 2002 -2006, fall 2004 taught lecture and laboratory
Regional Geology 702, developed and taught class for Philadelphia School System Teachers, spring 2003
Structural Geology 302, spring 2006 developed and taught senior level capstone geology course

I am currently teaching Environmental Resources Geology 81 including all labs. I am also teaching Geology 50 during the evenings.

References:
Temple Geology Department

Dr. D. E. Grandstaff
Temple University Geology Department
Room 322b
(215) 204 - 8228
Dr. G. Myer  
Temple University Geology Department  
Room 207  
(215) 204 – 7173  

Others  

Wil Orndorff  
Virginia Karst Program  
540-831-4056 (work)  
540-951-8403 (home)  

Samuel T. Peavy  
Associate Professor of Geology  
Dept. of Geology and Physics  
Georgia Southwestern State University  
800 Wheatley St.  
Americus, GA  31709  
Office: Roney 206  
ph: (229) 931-2330  
fax: (229) 931-2770  

Richard W Valentino
Matthew Benjamin Vrazo

261 Hermitage St.,
vrazomatt@hotmail.com
Philadelphia, PA 19127 Tel: (267) 474-2739

Education: University of Bristol, Bristol, UK
M.S. Palaeobiology (Honors), January 2006.
Thesis supervisor: Dr. Simon J. Braddy

University of Bristol, Bristol, UK
B.S. Biology and Geology (Upper Second Class), July 2004.
Geological thesis title: Tetrapod tracks from the Mauch Chunk Formation, Pennsylvania. Project supervisor: Prof. Mike Benton
Biological thesis title: Testing the effects of environmental stress on a freshwater algal community. Project Supervisor: Dr. Marion Yallop

Employment: Geologic Specialist in Environmental Cleanup Program
Pennsylvania Department of Environmental Protection-SERO
April 2007 - Present
-Promoted from Geologic Trainee to Specialist in April, 2008

Environmental Trainee in Air Quality Division
Pennsylvania Department of Environmental Protection-SERO
July 2006 – April 2007

Contributing Science Writer

University of Bristol, UK – The Bob Savage Memorial Fund Award, 2005.

Interests: Arthropod and evolutionary paleoecology, macroevolution, ecology, conservation biology.
**Skills:**  
*Computing*: Computer-literate with knowledge of Windows and Mac-based applications including MS Office, Adobe Photoshop, Matlab, SPSS and web-design software.  
*Languages*: French.  
*Driver’s license*: Have current US license with clean record.  

### References

**Current Supervisor**  
Walter Payne  
wpayne@state.pa.us  
484-250-5792  
Department of Environmental Protection  
Special Projects Section  
2 East Main St.  
Norristown, PA 19401

**Graduate course director and M.S. thesis supervisor**  
Dr. Simon Braddy  
s.j.braddy@bris.ac.uk  
(011-44-117) 954-5414  
University of Bristol  
Wills Memorial Building  
Queen's Road  
Bristol, BS8 1RJ  
UK

**Undergraduate advisor and B.S. thesis supervisor**  
Prof. Mike Benton  
Mike.benton@bris.ac.uk  
(011-44-117) 954 5433  
University of Bristol  
Wills Memorial Building  
Queen's Road  
Bristol, BS8 1RJ  
UK

**Personal reference**  
Colleen O’Connell  
856-833-9842  
20 East Wayne Terrace  
Collingswood, NJ 08108