

Department of Geosciences
Annual Report
2007-2008

Executive Summary

Learning: Undergraduate

The Department had 87 undergraduate majors this past year; 26 graduated with degrees in one of our four degree options. Twenty-three students participated in research activities with faculty members, mostly through undergraduate research.

The Department awarded \$17,250 in undergraduate academic and research scholarships and excellence awards. In addition, 22 undergraduate students were selected to receive scholarships from our foundation accounts (totaling \$13,500) for the upcoming fall semester.

This was the fourth year of our communication intensive senior capstone course that integrates all facets of our undergraduate curriculum with written, oral, and visual expressions of learning and communication. (See p. 1 for further details.)

Learning: Graduate

Fifty-two graduate students were enrolled full time in the Department this past year; 6 graduated with MS degrees and 9 graduated with PhD degrees. Of these 52 students, 22 are from underrepresented racial and ethnic groups (in Science, women are considered underrepresented and of this total 19 were women). Of our 38 PhD students, approximately 50% were supported on research grants for at least one semester. One-hundred percent of our PhD students were supported on either teaching or research fellowships. Foundation funds in the amount of \$60,000 were used to provide tuition and stipends for at least one semester for five graduate students. Research funds in the amount of \$12,000 were awarded to 14 students; \$32,250 was given as summer stipend support to 12 students; \$14,000 was allotted for teaching and other awards to 6 students.

Of special note, Bing Shen received the COS Outstanding Ph.D. Graduate Student Award for 2008. (See p. 6 for further details.)

Discovery

The title of University Distinguished Professor was bestowed upon Michael Hochella in June 2007. Patricia Dove was inducted as a Fellow to the American Geophysical Union and Shuhai Xiao was inducted as a Fellow to the Paleontological Society. Michal Kowalewski was promoted to full professor in June 2007. John Chermak was recognized by the College of Science for his outstanding teaching and was awarded a Certificate of Teaching Excellence. The 24 full-time tenure-track and research faculty members in Geosciences have been awarded 12 new research grants to go along with 35 continuing research grants totaling \$12,443,448 or \$518,477 per faculty member. Total research expenditures for the past year were \$2.6 million. Eighty-four peer-reviewed research papers and 143 abstracts were published by the Department's faculty this past year. Five post-doctoral associates worked in the Department during the academic year along with three research associates and four visiting scholars.

In preparation for the May 3, 2008 retreat, the faculty of the Department of Geosciences met in three groups to evaluate the strengths weaknesses of our research programs. Those discussions set the stage for detailed planning that will identify new mechanisms for choosing research focus areas, new faculty hiring strategies, and new avenues to gain resources. This planning will continue fall 2008 with the goal of preparing a clear list of goals and a plan, including new faculty hires, for meeting those goals. (See p. 10 for further details.)

Engagement

The Department continues to maintain strong ties with industry as ten companies visited and conducted interviews with our students. As a result of these interviews approximately 8 students were offered internships and/or employment.

The Geology Museum welcomed approximately 5,000 visitors during the past year.

Geosciences Outreach headed by Llyn Sharp is committed to helping meet Pre-School-12th grade (PK-12) needs in geosciences education. The Geosciences Outreach Program has played a strong role in K-12 Teacher Professional Development, offering workshops at conferences and in partnership with school divisions and other agencies.

The Department hosted 32 seminar speakers (AAPG distinguished lecturers, faculty members with related disciplines from outside universities, and in-house faculty) during the academic year. (See p. 13 for further details.)

Diversity

In Fall 2007, the Department added one new female faculty member, Erin Kraal, a research scientist with expertise in planetary geomorphology. With the addition of Kraal, the Department has six female faculty members. Additionally, one-third of the graduate population is currently female.

Madeline Schreiber is a member of the College of Science (COS) Diversity Committee and has been involved in developing programs to enhance diversity of the student population and faculty in COS.

Several faculty members continue to be involved in the University's Advance-VT program. Dr. Bekken's Earth Sustainability series targets "best practices" for improving STEM-literacy among non-science majors and under-represented groups. The VT-STARS program (Summer Training Academy for Rising Students) headed by Madeline Schreiber and Llyn Sharp is designed to recruit low income and under-represented youth and enhance their interest in science. (See p. 24 for further details.)

Goals for 2007-08

In preparation for a retreat on May 3, 2008, faculty in the Department of Geosciences agreed that we need to develop a collective vision and to identify goals to realize that vision. The department will develop a strategic hiring plan for the next 5 years.

Other goals for 2008-2009 are curriculum revision, to put a mentoring committee in place for all Associate and Assistant Professors, to continue to actively encourage companies (oil and minerals) to interview in this department, to continue to actively recruit top-quality graduate students at professional meetings and via personal contacts. In addition, the department will pursue some immediate development goals to enhance the department's endowment situation. Most important, the department will continue planning for the new building with Jim Spotila and Nancy Ross serving as the point people for this project. (See p. 25 for further details.)

*See p. 26 for **Statistical Information**

Undergraduate Learning

Curriculum: The primary goal of the Department of Geosciences in the education of its undergraduate students is to prepare them for productive careers either by directly entering the job market or competing successfully for admission to a graduate program. These goals are formally reflected in a new mission statement:

GEOS Undergraduate Mission Statement: To provide undergraduate majors with a well-rounded education of the Earth's systems and the tools used to study them through four degree options: 1) geology, 2) geophysics, 3) geochemistry, and 4) earth science education. VT Geosciences graduates should be able to compete successfully for jobs or for entry to graduate studies in the Earth and related sciences.

This mission is supported by five learning outcomes that will be assessed annually:

GEOS Undergraduate Learning Outcomes:

- (1) Use appropriate tools to identify geologic materials and features, describe their properties and characteristics, and record information about them using conventions common to the geosciences.
- (2) Identify and describe the dynamic processes that shape the Earth, recognize and describe the tools that geoscientists use to inform our knowledge of these processes, and explain how these processes interact within the Earth's systems.
- (3) Use qualitative and quantitative evidence from geological, physical, chemical, and/or biological observations of Earth's materials and processes to constrain models of the Earth through space and time.
- (4) Use the conventions for communication and information-seeking (ViEWS) common to the geosciences to: 1) search for and evaluate geoscientific and related information, 2) write a geoscientific proposal and report, 3) write a geoscientific abstract and give a companion oral presentation, and 4) design a geoscientific poster.
- (5) Propose a means for studying a typical earth science-related problem, select and apply appropriate scientific methods and tools to generate data, analyze and interpret the data, and describe findings according to the conventions appropriate to the problem.

Academic Assessment: Initial evaluations of student learning according to these criteria will be based on two performance-based measures of student learning: 1) an exit exam that mimics those used for "professional geologist" designations and 2) written materials produced by students during their capstone "Senior Seminar" course. The Geosciences exit exam will be written during the 2008/09 academic year, will assess learning outcomes 1 through 3 and will be based on those used professionally for the title of "Professional Geologist." The communication materials created by students during senior seminar will be evaluated in senior seminar by faculty teaching the seminar and will address criteria in learning objectives 4 and 5. These materials will include visual, spoken, and written examples of a student's ability to propose, undertake, and complete a study and to communicate their findings. Students' proposals, papers, posters and visual materials will be used to assess learning goals 4 and 5.

The department began a discussion during Fall semester 2007, on curricular changes that might better serve our students in the changing earth science employment market and with respect to expectations of graduate schools. The faculty decided that we needed data on learning outcomes in order to make an informed decision on content reorganization. However, it is becoming more widely recognized that courses that emphasize procedural knowledge such as Geoscience Fundamentals (1005) and Senior Seminar (4024) have great value for student learning and career competitiveness. To that end, Don Rimstidt and Maddy Schreiber taught the Careers in Geosciences (1006) course for the first time in Spring, 2008. The course objective was to introduce our students to the fundamentals of career planning and to the variety of careers available within the geosciences. As part of the course, seven geoscience professionals in earth science education, environmental consulting, the oil and gas industry, a natural history museum, and a state agency, gave presentations to the class on their career paths and what they actually do day-to-day as geoscientists. Written assignments included a self assessment, a career plan, a cover letter for a specific job, and a resume. The course evaluations were very positive, and most students recommended that the course be required for all of our majors.

Undergraduate Courses			
Courses	No. Sections	No. Students	Credit Hours
1 st Summer 2007	3	34	117
2 nd Summer 2007	2	31	66
Fall 2007	79	3342	8967
Spring 2008	72	3018	8482

Geosciences has 87 undergraduate majors distributed over four options—geology, geophysics, geochemistry and earth science education.

ViEWS: Due to a year delay in the upgrade of the Scholar course management system, students and faculty were not asked to upload materials to the ViEWS learning goals matrix in 2007/08. Beginning in fall, 2008, students in Geoscience Fundamentals will upload their written materials to the matrix of GEOS learning goals using Scholar. Subsequent courses will be able to use the scholar matrix for archiving student work and incorporate reflective opportunities should that be appropriate. Ultimately, this system will serve two functions for faculty and students: 1) as an interactive archive for assessing gains in students' communication skills in the geosciences, and 2) as an interactive and updatable portfolio through which students can archive professional materials and develop professional ethos.

	ViEWS Program Goals: Geosciences Majors
<i>Visual</i>	Visual Expression as a form of observation or description of geologic information: <ul style="list-style-type: none"> • Create representative maps of observed geologic information • Create representative sketches of field or laboratory observations • Create graphics that describe experimental or modeling methods or procedures
	Visual Expression as a form of interpretation of geologic information: <ul style="list-style-type: none"> • Create sketches of interpreted information • Create 2-D (e.g., maps, cross-sections) and 3-D (e.g., mineral models or phase diagrams) that interpret geologic information. • Create graphs or charts of geologic variables as a function of a geologic parameter (e.g, distance, depth, or time). • Create graphs that show correlations or dependence between variables.
<i>Written</i>	Writing to communicate goals and progress <ul style="list-style-type: none"> • Write a project proposal • Write a progress report
	Writing to communicate methods and findings <ul style="list-style-type: none"> • Write a report that describes and interprets observational field, laboratory, library, or computer data (uses descriptive methods). • Write a report that describes and interprets experimental field, laboratory, library, or computer data (uses experimental methods)
	Writing to summarize findings <ul style="list-style-type: none"> • Create an annotated bibliography • Write a review of a geoscientific topic based on a literature search • Write a professional abstract for a scientific presentation such as GSRs.
	Writing as a review of a peer's work <ul style="list-style-type: none"> • Formally review a peer's performance
<i>Spoken</i>	Speaking to communicate geoscientific methods and findings using presentation software <ul style="list-style-type: none"> • Create and present a poster • Create and present a "professional" talk • Create and present a formal review of a topic, article, procedure, or method

The Department strives to provide contacts for undergraduates with professionals in the Geosciences. This takes two principal forms - regular seminars offered by visiting scientists to the Department and visiting recruiters from major companies. Undergraduate students are encouraged to participate by attending the seminars and by attending special presentations given by recruiters. When recruiting schedules permit sufficient time (which is common) undergraduates are encouraged to interview with recruiters to gain experience and also to gain insight into job opportunities. In fact, many of the major oil companies now do most of their hiring from pools of students who have first served as interns at some point in their academic careers. Historically,

many companies - particularly the major oil companies - have regarded the MS as the terminal degree for students entering industry. Due to work force demographics and large scale retirements now taking place in the oil industry, this hiring practice is beginning to change and oil companies are now starting to hire at the BS level. Hence, it is important for students to meet and talk with recruiters as early as possible in their careers.

Educational Research: In Spring 2008, Barbara Bekken together with a team of seven diverse faculty and post-docs from four different colleges, completed the fourth and final semester of the second cohort of the experimental Earth Sustainability (ES) integrated Liberal Education project begun in Fall 2004. Forty-eight students completed cohort 2 of the ES series and will receive credit for five of the seven areas of the Curriculum for Liberal Education (CLE) in six fewer credit hours than if they had enrolled in the traditional CLE courses, thus providing greater elective flexibility.

The ES program is a teaching and learning laboratory that is designed in accord with a well-established curricular/developmental model that supports student development along three key domains: cognitive/epistemological, interpersonal, and intrapersonal. The series is augmented by a four-year long NSF-supported longitudinal study to evaluate student gains in learning and development along these three domains relative to a control group of students who are enrolled in the CLE.

In fall 2008, a third cohort of students will begin an expanded version of the program in which 180 incoming first-year students can be accommodated. We are optimistic that geoscience majors will take advantage of the series as the need for “green collar” skills and knowledge increases in all sectors.

Academic Advising: The Department strives to provide superior academic and career counseling for their undergraduate students. Every undergraduate is interviewed at the time he or she enters the Department as a new undergraduate or as a transfer and is given information on academic expectations, course requirements, departmental activities, employment opportunities and other professional opportunities. Each student is assigned an academic advisor who oversees the student until graduation. Students are required to meet regularly before pre-registration each Fall and Spring semester to ensure that progress is being made towards their degrees. These meetings consist of two stages: first a meeting with Mrs. Connie Lowe (Student Coordinator) to check the technical details of their plan of studies and registration for the up-coming semester, and second a meeting with their academic advisor to discuss such broader issues as designing and maintaining a plan of study to achieve long term career goals. In combination with student course evaluations, these meetings have also proved to be an important (although un-quantified) source of student feedback on the curriculum.

Scholarship Activity: Undergraduate scholarship activity using Foundation endowed accounts for 2007-2008 follows (22 individuals received scholarships totaling \$13,500):

Undergraduate Excellence Awards (\$8000 total) conferred in late Fall 2007 or Spring 2008:

Joan Baker, Robert Dulin, Joshua Hoover, Rebecca Horne, Alexandra Vallowe, James Kerr, Kathryn Kolodziej, Christine Frasca, John Parker, William Ireland, John McGuirk, Will Nachlas, Meghan Collins, Kathryn Procriv.

Undergraduate Research Fund Awards (appx. \$1500 total): Scott Hutchins, Stuart Hyde, Sally Morgan

Geosciences Outstanding Senior (\$1000): Claire Waller

Geosciences Outstanding Service Recognition Award: Justin Ohlschlager, Lindsey Yann

Wally Lowry Field Camp Scholarships (\$3000 total): Alice Lee, Sally Morgan

Geosciences undergraduates also receive significant scholarships at the College and University level each year. Note that the awards listed above do not include tuition scholarships that were conferred in Spring 2007 but used by students in the 2007-2008 Academic Year.

Graduate Learning

Mentoring: The Department of Geosciences maintains a strong graduate program with a large number of students given the size of the faculty. Although graduate students work with a primary advisor, there is considerable interaction among individual research programs, as collaboration is fundamental in the diverse field of geosciences. The responsibility of mentoring graduate research falls first on the primary advisor, but significant support is provided by a student's thesis committee as well as other faculty within and outside of the department.

Graduate student mentoring, activities, awards, and admissions are coordinated by the Graduate Student Affairs Committee, which is lead by the Graduate Program Director and Associate Chair (J. Spotila). The department administration is aided by a graduate liaison committee that consists of about 6 graduate students, which meets with the Graduate Student Affairs Committee each semester and is a line of open communication for feedback and concerns of graduate students.

The department also offers several programs to facilitate the overall mentoring of graduate students as a collective. Activities include an annual orientation and field trip (August, 2007), a faculty-seminar day and reception (September, 2007), the 2-day Graduate Student Research Symposium (GSRS) (March, 2008), an annual graduate student-faculty meeting, and several dinners, picnics, and socials throughout the academic year. The graduate student orientation in August also includes a review via faculty presentations of the expectations of graduate students, scientific culture and ethics, and graduate career paths. The departmental seminar program is also largely geared to expanding the scholarly horizons of graduate students, nearly all of whom attend on a weekly basis. (See listing of Departmental Seminars on p 13.)

As a result of these activities in graduate mentoring, the Department of Geosciences maintains not just a graduate student body, but a cohesive community of students that interact and help each other, thereby enriching their graduate experience at Virginia Tech.

Recruiting: At the beginning of Fall semester 2008, Geosciences will have 18 M.S. and 42 Ph.D. students (60 total). This includes 19 new graduate students (8 M.S. and 11 Ph.D.). The following summarizes graduate applications and admissions for the 2007-2008 academic year:

Graduate students supported during the 2007-2008 Academic Year: 55

Graduate students successfully completed in 2007-2008 Academic Year: 6 M.S.,
9 Ph.D.

New graduate applications: 74

New graduate applications accepted for admissions: 37

Graduate students offered support: 36

New graduate students accepting offer for admission: 19

Special student recruiting and information booths to promote the Department of Geosciences were set up and tended by faculty and graduate students at the following professional meetings: Geological Society of America (Denver), Southeast Section of Geological Society of America (Charlotte), Society of Exploration Geophysicists (San Antonio) and the American Geophysical Union (San Francisco). In addition, the departmental website continues to be updated and modified on an annual basis. The department also continues to use a web-based pre-application

form to reach potential applicants and to match their research interests with potential faculty advisors.

Academic Assessment: Each graduate student meets routinely with their major advisor, and generally has one or two committee meetings each year. The Graduate Student Affairs Committee also monitors the progress of all graduate students, and provides advice and arbitration as needed. Each student completes an annual report of their research progress, which is evaluated by the advisor, advisory committee, and reviewed by the department head. Each graduate student also generally gives a research seminar at the annual Graduate Student Research Symposium in March, which further provides an opportunity for faculty to assess their progress.

The Graduate Student Affairs Committee modified procedures for evaluating graduate student progress in 2007-2008. For the first time, the committee reviewed all Annual Reports and rated student progress as satisfactory or unsatisfactory. All students were required to have an annual committee meeting this year, with the exception of Ph.D. students in their final year. The structure of the Annual Reports was also revised, such that advisors are now required to write letters of evaluation of student progress to each of their students, based on feedback from the committee meeting. This new system of graduate student evaluation was highly successful, and will be implemented next year as well. We also plan future improvements to the graduate program, including adding structure to the Ph.D. preliminary exam format and timing, and possibly instituting a new "observer" program on advisory committees to ensure quality control and objectivity when evaluating student research performance.

Scholarship Activity: Foundation funds were used effectively to support graduate students in the past academic year. Five graduate students were funded full GRAs (i.e. stipend and tuition) using Foundation funds as follows (appx. \$60,000):

Ellen Gilliland - M. Mikulich and J. Costain Fellowship (Fall)
Aaron Berger - BP Corporation Fellowship (Spring)
Kathleen McFadden - Conoco-Phillips Corporation Fellowship (Spring)
Jiedi Wu - Chevron Corporation Geophysics Fellowship (Spring)
Andras Fall - Geosciences Research Fellowship (Spring)

In Spring 2008, the department held an open competition for research funding for graduate students. Students wrote proposals that were evaluated by the Graduate Student Affairs Committee. A total of 31 proposals were received and evaluated. Awards for research funding, summer stipends (for Summer 2008), and one RA for 2008-2009 were awarded as follows (included are other graduate awards, such as the Tillman Teaching Awards):

Research Awards (\$12,000)

B. Cooper Awards: Kristyn DeMarco, Troy Dexter, Ryan Grimm, Kathleen McFadden, Peter Voice, Di Wang
T.T. Jeffries Award: Juan Liu
W.D. Lowry Awards: Christina Blue, William Rouse, Lisa Tranel
H. Robinson-R.J. Holden Awards: Summer Brown, Youyi Ruan
C.G. "Jake" Tillman Awards: Michael Nakagaki, Amy Smith

Summer Stipend Awards (appx. \$32,250)

D.R. Wones Scholarship: Martin Hernandez-Marin
A.E. Orange Award in Geophysics: Youyi Ruan
C.J. Gose, Jr. Scholarship: Troy Dexter
H. Robinson and R.J. Holden Scholarships: Summer Brown, Kristyn DeMarco
Petroleum Industry Scholarship: James Schiffbauer, Michael Nakagaki, Peter Voice
BP Corporation Scholarships: Sam Denning, Erik Haug, Amy Smith
Conoco-Phillips Corporation Scholarship: Kathleen McFadden

Other Awards (appx. \$14,000)

Clayton Loehn - Outstanding Service Recognition Award
Philip Prince - Tillman Teaching Award
William Rouse - Tillman Teaching Award
John Gannon - Tillman Teaching Award
Erik Haug - Tillman Teaching Award
Ryan Thigpen - Cooper Fellowship (RA for Spring, 2009)

The Department also created an assistantship program for offsetting graduate student fees. For all students at the base pay rate, whose fees were not covered using other scholarship monies, the Department used Foundation funds to pay for \$100 of the student fees for Spring 2008. The Department also used scholarship funds as incentives (i.e. signing bonuses) for all new graduate student recruits. Each new funded student will receive a one-time signing bonus of \$1000 in August 2008. This is based on feedback from students last year, which indicated that these bonuses do actually help communicate to prospective students that the Department is seriously interested in them coming here. These scholarship activities amounted to approximately \$22,500.

The total Foundation scholarship funds granted to graduate students in the past academic year (including summer stipends for 2008) was thus approximately \$140,750 (The exact amount will depend on rate of research expenditures and final accounting on cost of stipends and fees, which will not be available until end of Summer, 2008).

Other creative funding sources were also used to support graduate students, including a total of 5 semesters of funding from the University's 2010 program (i.e 3 students for the entire year), 3 semesters of funding from the Multicultural Academic Opportunities Program support (3 students), 5 semesters of support from IGERT (3 students), as well as support from Cunningham and ICTAS Scholarships.

Geosciences graduate students also win other important external awards, including within and outside of the university. Of note, Bing Shen received the COS Outstanding Ph.D. Graduate Student Award for 2008. Many other students received awards and earned external grants.

Graduate Degrees Completed (June 2007-May 2008):

Johnson, Eleda M., MS, The Elastic Behavior of Plagioclase Feldspar at High Pressure
Advisor - Angel

Loveday, David C., MS. Resolving Small Objects Using Seismic Traveltime Tomography
Advisor – Hole

Spengler, Alison E., MS. Silurian Shelf Sequences, Southern Wabash Platform, Indiana, U.S.A.
Advisor – Read

West, Nicole R., MS. Arsenic release from chlorine promoted oxidation of pyrite in the St. Peter Sandstone aquifer, Eastern Wisconsin
Advisor - Schreiber

Yan, Tingting, MS. Effects of delayed drainage on subsidence modeling and parameter estimation
Advisor – Burbey

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Becker, Stephen , PhD. Fluid Inclusion Characteristics in Magmatic-Hydrothermal Ore Deposits
Advisor – Bodnar

Berger, Aaron L., PhD. A Thermochronological Investigation of Orogenic Architecture, Kinematics, and Tectonic-Climatic Interactions within the St. Elias Orogen, Alaska
Advisor – Spotila

Mitra, Arijit, PhD. Silica dissolution at low pH in the presence and absence of fluoride
Advisor - Rimstidt

Olsen, Amanda A., PhD, Forsterite Dissolution Kinetics: Applications and Implications for Chemical Weathering
Advisor – Rimstidt

Schwartz, Benjamin F., PhD. Quantification of Infiltration and Recharge Through Soil Filled Sinkholes using Electrical Resistivity Tomography and Time Domain Reflectometry
Advisor - Schreiber

Severs, Matthew J., PhD. Experimental, Analytical and Field Studies of Igneous Petrogenesis of Volatile-Rich Magmas
Advisor - Bodnar

Shen, Bing , PhD. Contributions to Neoproterozoic Geobiological Evolution
Advisor – Xiao

Wallace, Adam F., PhD. Biologically controlled mineralization and demineralization of amorphous silica
Advisor - Dove

Wigginton, Nicolas S., PhD. Interfacial and long-range electron transfer at the mineral-microbe interface
Advisor - Hochella

Discovery

Faculty and Staff Honors and Awards 2007-08:

- *Years of Service:*
Barbara Bekken 15 years
Richard Law 20 years
Connie Lowe 25 years
- *Retiring:*
A. Krishna Sinha, Professor of Geology, retiring June 1, 2008 after 37 years of service.
- *Faculty Promotions:*
Michal Kowalewski promoted to full professor in June 2007
- *University Distinguished Professor:*
Michael F. Hochella, Jr., Geosciences, named University Distinguished Professor in June 2007
- *Provost's Alumni Advising Award:*
Connie Lowe, Geosciences, 2008 recipient
- *COS Certificate of Teaching Excellence:*
John Chermak, Geosciences, 2008 recipient
- *Professional:*
Patricia Dove, Fellow, American Geophysical Union
Shuhai Xiao, Fellow, Paleontological Society
Robert Bodnar was recognized for the following:
Edwin Allday Lectureship in Geosciences, University of Texas-Austin, 2007
Ernst Cloos Lecturer, The Johns Hopkins University, 2007
Society of Economic Geologists Silver Medal for 2007
Michael F. Hochella, Jr. was the recipient for the Distinguished Service Medal from the Geochemical Society.
Nancy Ross was recognized for the following:
Elected Vice President of the Mineralogical Society of America, 2007
Selected as a member of the U.S. Department of State's National Screening Committee for Fulbright International Science and Technology Awards for Outstanding Foreign Students, 2007
Elected member of the Committee on Seismology and Geodynamics, Board of Earth sciences and Resources of the National Academies, 2007-2009

Research Grants:

**DEPARTMENTAL ACTIVE RESEARCH GRANTS
2007-2008**

Angel, R	Oxford Diffraction	9/1/02 - 8/31/12	\$50,000.00
Bekken, B	NSF	3/15/05 - 2/29/09	\$115,650.00
Bodnar, R	NSF	10/1-03 - 12/31/07	\$199,748.00
Bodnar, R	NSF	12/15/05 - 3/31/09	\$150,000.00
Bodnar, R	PRF	9/1/07 - 8/31/08	\$45,000.00
Bodnar, R	NSF	7/1/07 - 6/30/08	\$122,692.00
Burbey, T	Rockydale Quarries	7/1/06 - 8/31/08	\$38,053.00
Burbey, T	NSF	8/1/07 - 7/31/08	\$48,305.00
Burbey, T	DEQ	9/1/07 - 8/31/08	\$5,000.00
Burbey, T	Watershed	6/1/07 - 5/31/08	\$1,250.00
Chapman, M	USGS	1/1/07 - 12/31/07	\$59,950.00
Chapman, M	USGS	2/1/07 - 7/31/07	\$14,323.00
Dove, P	DOE	8/10/00 - 10/31/08	\$1,102,560.00
Dove, P	NSF	8/1/05 - 1/31/09	\$379,989.00
Dove, P	NSF	9/15/06 - 8/31/08	\$147,262.00
Hochella, M	DOE	8/10/02 - 5/14/09	\$334,237.00
Hochella, M	NSF	7/1/05 - 6/30/10	\$3,398,801.00
Hochella, M	PNNL	12/21/04 - 9/30/07	\$240,000.00
Hochella, M	NSF	6/1/06 - 6/30/08	\$7,856.00
Hole, J	NSF	8/1/03 - 8/31/08	\$511,126.00
Hole, J	NSF	5/15/08 - 5/14/13	\$842,235.00
King, S.	NASA	11/9/07 - 11/8/08	\$79,460.00
King, S.	NSF	7/1/07 - 7/31/09	\$127,626.00
Kowalewski, M	NSF	5/1/06 - 6/30/09	\$219,290.00
Law, R	NSF	1/1/06 - 12/31/08	\$229,996.00
Law, R	NSF	8/15/07 - 7/31/08	\$110,396.00
Law, R	NSF	8/15/07 - 7/31/09	\$223,335.00
Read, J	NSF	2/15/04 - 3/31/08	\$189,387.00
Read, J	NSF	4/1/07 - 3/31/09	\$134,414.00
Ross, N	COMPRES	5/1/02 - 4/30/08	\$340,825.00
Ross, N	DOE	5/15/05 - 5/14/09	\$219,000.00
Ross, N	NSF	7/1/04 - 6/30/08	\$294,767.00
Ross, N	NSF	7/1/06 - 6/30/08	\$160,862.00
Ross, N	NSF	1/1/08 - 12/31/08	\$143,837.00
Schreiber, M	NSF	9/1/07 - 8/31/09	\$126,479.00
Schreiber, M	NSF	8/1/02 - 7/31/07	\$219,998.00
Schreiber, M	DEQ	6/11/07 - 2/28/09	\$1,250.00
Schreiber, M	MS Cave	11/1/07 - 10/31/08	\$13,386.00
Sinha, A	NSF	9/6/02 - 9/30/08	\$967,316.00

continued

Sinha, A	NCAR	6/1/06 - 12/31/08	\$46,653.00
Sinha, A	NSF	4/15/07 - 4/14/09	\$20,000.00
Spotila, J	NSF	9/15/04 - 8/31/08	\$161,340.00
Weiss, S.	BP America	1/1/08 - 8/18/08	\$19,347.00
Xiao, S	NASA	9/15/05 - 9/14/09	\$209,720.00
Xiao, S	NSF	6/1/06 - 12/31/07	\$140,154.00
Xiao, S	NSF	7/16-03 - 7/31/07	\$150,573.00
Xiao, S	PRF	9/1/05 - 8/31/08	\$80,000.00
	TOTAL		\$12,443,448.00

In preparation for the May 3, 2008 retreat, the faculty of the Department of Geosciences met in three groups to evaluate the strengths weaknesses of our research and teaching programs. Those discussions set the stage for detailed planning that will identify new mechanisms for choosing research focus areas, new faculty hiring strategies, and new avenues to gain resources. This planning will continue fall 2008 with the goal of preparing a clear list of objectives and a plan, including new faculty hires, for meeting those objectives.

Engagement

Departmental Seminars: The following is a list of departmental seminars that took place over the 2007-2008 academic year. The seminars were presented by in-house faculty members, AAPG distinguished lecturers, and faculty members with related disciplines from other universities.

Richard Bambach, Smithsonian Institution, “Marine Diversity Patterns throughout the Phanerozoic”

Michael Carpenter, University of Cambridge, “Anomalous Elastic and Anelastic Properties of Perovskites”

Mark Clementz, University of Wyoming, “When Whales Walked the Earth: New Insights into Cetacean Evolution from Geochemical Proxies”

Joe East and Chris Swezey, U.S. Geological Survey, “The U.S. Geological Survey Oil and Gas Assessment of the Illinois Basin”

Terry Engelder, AAPG Distinguished Lecturer, Pennsylvania State University, “Acadian-Alleghanian Orogenesis as Revealed by Fracturing Within the Appalachian Foreland”

Douglas Erwin, Smithsonian Institution, “Ecological Dimensions of Evolutionary Innovation during the Cambrian Radiation”

Karl Flessa, University of Arizona, “Silence of the Clams: Conservation Paleobiology of the Colorado River Delta”

[Dr. Mark Ghorso, OFM Research - West](#), “Triggering Explosive Volcanic Eruptions”

Art Goldstein, National Science Foundation, “NSF Earth Sciences: Current Activity and Prospects for the Future”

Alan Howard, University of Virginia, “Deciphering the Early Climate of Mars from Geologic Interpretation and Simulation Modeling”

Jerry Hunter, Virginia Tech Nanoscale Characterization and Fabrication Labs, “Introduction to Secondary Ion Mass Spectrometry (aka Ion Probe)”

Shun-ichiro Karato, Yale University, “Geophysical Anomalies in the Central Pacific and Their Implications for the Water Transport by a Plume”

Richard Law, Virginia Tech Geosciences Department “Internal Flow and Extrusion of the Greater Himalayan Slab, Mount Everest Massif: A Cook's Tour of the World's Highest Rocks”

Bill Leeman, National Science Foundation, “Snake River Plain - Yellowstone Silicic Volcanism: Implications for Magma Genesis and Crustal Evolution”

Cynthia Liutkus, Appalachian State University, “The Gray Fossil Site: Sedimentological Investigations into the Formation and Fill History of a Tertiary Sinkhole”

Dan Lizarralde, Woods Hole Oceanographic Institution, MARGINS Distinguished Lecturer, “Controls on Extensional Style: Magma, Slab Windows, Sediment, and Geology in the Gulf of California”

Maureen Long, Department of Terrestrial Magnetism, “Mantle Flow in Subduction Zones from Seismic Anisotropy”

Jeffrey Park, Yale University, “Perche Apennino? Mantle Flow and Orogeny in Central Italy” and “Shear and Dehydration within Subduction Zones: The View from P-to-S Converted Waves”

Randall Parrish, British Geological Survey, “Environmental Consequences of Depleted Uranium (DU) Munitions in War and Industry and its Relation to Environmental Health: Testing Political Agendas with Mass Spectrometry”

Mike Peacock, AAPG Distinguished Lecturer, Imperial Oil, Calgary, Canada, “Athabasca Oil Sands: Understanding the Oil Sands from the Regional Scale to the Project Scale, Kearl - A Case History”

Jeffrey Rahl, Washington and Lee University, “The Tectonic Evolution of the Hellenic Subduction Wedge, Greece”

Fred Read, Virginia Tech Geosciences, “Carbonate Platforms as Records of Global Climate Change”

Robert Riding, Cardiff University, “An Atmospheric Trigger for Mississippian Carbonate Mud Mounds?”

Don Rimstidt, Virginia Tech, “How do Silicate Minerals Dissolve?”

Steven (Duffy) Russell, Saudi Aramco, Dhahran, Saudi Arabia, “Resolving Carbonate Heterogeneity and its Impact on Production in Two Giant Middle East Oil and Gas Fields

Michael P. Ryan, U.S. Geological Survey, Reston, “Solitary Waves, Magma Migration, and Dome-Building Eruptions at Mt. St. Helens”

Matthew Saltzman, Ohio State University, “A Pulse of Atmospheric Oxygen During the Late Cambrian”

Bridget Scanlon, University of Texas-Austin, Birdsall-Dreiss Distinguished Lecturer, “Impacts of Changing Land Use and Land Cover on Subsurface Water Resources”

William E. Seyfried, Jr., University of Minnesota, “Probing the *In-Situ* Chemistry of Seafloor Hydrothermal Vent Fluids at Mid-Ocean Ridges”

Arthur Snoke, Professor Emeritus of Geophysics, Virginia Tech, “Keeping Pace with the Growth of the Number of Stations in Seismic Arrays from Single Digit to Hundreds”

Tom Watters, Smithsonian National Air and Space Museum, “A New View of the Tectonics of Mercury from MESSENGER’s First Flyby”

Outreach: Geosciences Outreach is committed to helping meet Pre-School - 12th grade (PK-12) needs in geosciences education. Both in-class and on-site programs are offered for school groups and daycare groups. These programs provide opportunities for VT Geosciences students to practice teaching skills. Virginia’s Standards of Learning are integrated into programs and materials to ensure their value for teachers and students. Sarah Windes, a longtime museum tour guide, is involved in engaging all age levels. Over 3,000 K-12 students per year are reached directly through outreach programs, and in particular through Museum of Geosciences school group visits.

The Geosciences Outreach Program has a strong role in K-12 Teacher Professional Development, offering workshops at conferences and in partnership with school divisions and other agencies. Approximately 60 teachers per year participate in workshops sponsored or cosponsored by Geosciences Outreach.

Llyn Sharp has developed a community of K-12 Earth Science teachers in the region who look to the Department for assistance and professional development. To encourage their work with geosciences, they are provided with AGI’s Earth Science Week kits every year. At present, 17 teachers are in this group. K-12 Teachers and other educators borrow hands-on kits of materials

to assist them in their teaching. These SOL-referenced kits are developed through grant-funded projects and student service-learning, housed in an Education Resource Center (ERC) and are circulated locally free of charge. The ERC has an agreement with the local school system to be a stop for their “pony express” driver who can then deliver or return kits for teachers. Loans of kit materials reached an additional 4100 K-12 students and their teachers during AY08.

Shuhai Xiao is a PI on a NASA-funded (\$44,998, 2006-08) Education and Public Outreach project entitled "*Virginia Fossils, Paleontology, and Exobiology: a 4-H STEM project and kit*". Together with outreach specialist Llyn Sharp, he has developed various brochures, booklets, and podcasts for distribution to regional school teachers.

Outside funding to the Department in support of the Geosciences Outreach Program activities in AY08 was approximately \$42,000, indicating impacts at the local, regional, and national levels.

On the national/international level, the Museum of Geosciences is an invited exhibitor at two or three major mineral shows each year: Tucson, Denver, and Detroit. These shows bring in thousands of enthusiasts from all over the nation and the world. It is prestigious to be invited as a participant in the exhibit halls. The Museum of Geosciences is recognized for the educational value of its exhibits, as well as for showcasing state-of-the-art geoscience research programs at Virginia Tech. Public attendance at each of these shows is >15,000 each year.

At the local and regional level, the Museum of Geosciences is a well-loved attraction, providing a place for families and community members to visit and learn about rocks, minerals, and fossils. Non-school group visitations are estimated at 2,000 people annually. Hallway exhibits were viewed by another 3,000 people a year.

Other programs such as the Alumni and Geology Club mineral show and sale highlight the Museum and encourage community interest in rocks and minerals. In 2007, the mineral show was held in conjunction with the Departmental 100 year celebration, and was attended by well over 300 people.

Bill Henika provides field mapping and other geologic expertise to statewide efforts such as the Virginia Field Conference, attended by over 100 people, and the Virginia Master Naturalists Program, with 30 people in class each year.

Industry Recruiting: Oil and gas as well as precious and base metal companies continue to recruit in the Department of Geosciences. Ten companies visited the department in Fall, 2007: Exxon Mobil, BP, Cabot Oil and Gas, Chevron, Conoco Phillips, Hess, Stillwater Mining, Riotinto Mining, Baker Hughes, and Schlumberger.

International Education/Research: The following will highlight faculty involvement with various international programs in research and education.

- **Ross Angel** was invited to present *Phase Transitions in Perovskites under High Pressure*, Graduate College of University of Hamburg Sept 25th and *Phase Transitions in Perovskites: new*

insights from single-crystal diffraction, 1st Berichtskolloquium of Schwerpunktprogram 1236, Huenfeld, Germany 2 October.

Additionally, he hosted visits to VT by:

- Entire worldwide management group of Oxford Diffraction, January
- Prof. Boriana Mihailova (Hamburg) 3 week research visit, Jan-Feb
- Prof. C. Shaw (New Brunswick), seminar speaker, March
- Dr. T. Boffa-Ballaran (Bayreuth). 1 week research visit, April.
- Ms. Polina Gavrilenko (Bayreuth) 3 month research visit, April-June.
- Dr. Elinor Spencer (Durham) 4 month research visit, Jan-May

Additional contributions include:

- Associate Editor, European Journal of Mineralogy.
 - Convenor (with Prof. R. Martin and Prof I. Parsons) of session “Feldspars 2007: in memory of J.V. Smith”, Frontiers in Mineral Sciences Meeting, Cambridge England, June.
 - Guest editor, Canadian Mineralogist memorial issue for Prof. JV Smith
- **Robert Bodnar** was invited to present the following talk: “Identification, interpretation and significance of fluid inclusions trapped in immiscible fluid systems” at the 17th V.M. Goldschmidt Conference in Cologne, Germany, August 23, 2007.
 - **John Chermak** went to Guyana with the Tropical Forest Foundation (TFF) to evaluate the potential for Sustainable mining in both the aluminum and gold mining industries. He is active with expanding the relationship of VT and TFF along with the VT Conservation Management Institute.
 - **Kenneth Eriksson** gave an invited key-note talk entitled “Physical Processes in the Early Oceans: Constraints from the 3.35-3.25 Ga Moodies and Fig Tree Groups, Barberton Greenstone Belt, South Africa” at “Workshop on the Archean Environment: the Habitat of Early Life”: Huelva, Spain.

He was invited to attend the following seminars at:

- Hong Kong University
- Curtin University, Western Australia
- Australian National University

Additional initiatives include:

- Collaborative research with Axel Hoffman (University of Kwa Zulu, South Africa): Sedimentological analysis of the oldest known eolianites in the 3.2 Ga Moodies Group, South Africa. Fieldwork will commence during Summer, 2008.
- External Assessor, Department of Earth Sciences, Sultan Qaboos University, Oman. He spent 2 weeks in Oman during May and June evaluating the undergraduate and graduate programs in the department and making specific recommendations for improvement.

- Taught a 15-hour short course at Hong Kong University on “Sedimentary Basin Analysis.”
- Presented a talk to a delegation of executive oil-industry trainees from Deemed University, India through the Pamplin College of Business.
- **Michael Hochella** was invited to lecture at:
 - Goldschmidt Conference, Cologne, Germany
 - Laurentian University, Dept. of Geology and Mining, Sudbury, Canada
 - University of Vienna, Center for Earth Sciences, Vienna, Austria
- **Scott King** was invited to present the following: “*Convection in Mercury’s mantle: linear upwellings not plumes,*” at 10th International workshop on modeling of mantle convection and lithospheric dynamics, Carry-le-Rouet, France, September 2-7, 2007.
- **Erin Kraal** was invited to present the following: “*Martian stepped fans record rapid water release,*” Mars Express and ExoMars, ESTEC Conference, Noodwijk, the Netherlands. And “*Experimental formation of stepped fan deposits on Mars,*” EGU 2007, Vienna Austria.
- **Rick Law** was invited to present the following: “*Strain, influence of dynamic recrystallization on quartz crystal fabric development, and estimates of flow vorticity in mylonites at the Stack of Glencoul, Northwest Scotland.*” Joint meeting of the Geological Society of London and Geological Society of America to celebrate the centenary of the Peach and Horne 1907 memoir on “*The Geological Structure of the Northwest Highlands of Scotland*”, Ullapool, Scotland. 12-19 May 2007.

Additional international contributions include laboratory work with Drs, Mike Searle and Dave Waters at Oxford University, UK, regarding on-going NSF-funded research on the Mount Everest region.

- **Robert Tracy** attended the Geological Association of Canada Spring Meeting, St. John’s Newfoundland and delivered the Keynote Address.

Scholarly Articles:

- Angel, R.J.,** Bujak, M., Zhao, J., Gatta, G.D., Jacobsen, S.D. (2007) Effective hydrostatic limits of pressure media for high-pressure crystallographic studies. *Journal of Applied Crystallography* 40:26-32.
- Angel, R.J.,** Zhao, J., Ross, N.L., Jakeways, C.V., Redfern, S.A.T., Berkowski, M. (2007) High-pressure structural evolution of a perovskite solid solution (La_{1-x}Nd_x)GaO₃. *Journal of Solid State Chemistry* 180:3408-3424.
- Bujak, M., **Angel, R.J.** (2007) Low-temperature single crystal X-ray diffraction and high-pressure Raman studies on [(CH₃)₂NH₂]₂[SbCl₅]. *Journal of Solid State Chemistry* 180:3026-3034.

- Gatta, G.D., **Angel, R.J.** (2007) Elastic behavior and pressure-induced structural evolution of nepheline: implications for the nature of the modulated superstructure. *American Mineralogist* 92:1446-1455.
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<http://dx.doi.org/10.1016/j.lithos.2006.08.005>.
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- Sachan, H.K., Mukherjee, B.K. & **Bodnar, R.J.** Preservation of methane generated during serpentinization of upper mantle rocks: Evidence from fluid inclusions in the Nidar ophiolite, Indus Suture Zone, Ladakh (India). *Earth and Planetary Science Letters*, 257, 47-59. <http://dx.doi.org/10.1016/j.epsl.2007.02.023>.
- Lin, F., **Bodnar, R.J.**, & Becker, S.P., Experimental determination of the Raman CH₄ v₁ band position from 1-650 bars and 0.3-22°C. *Geochimica et Cosmochimica Acta*, 71(15), 3746-3756. <http://dx.doi.org/10.1016/j.gca.2007.05.016>.
- Schiffbauer, J.D., Yin, L., **Bodnar, R.J.**, Kaufman, A.J., Meng, F., Hu, J., Shen, B., Xunlai, Y., Bao, H. & Xiao, S. (2007) Ultrastructural and geochemical characterization of Archean–Paleoproterozoic graphite particles: Implications for recognizing traces of life in highly metamorphosed rocks. *Astrobiology*, 7, no. 4, 684-704.
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Special Publications:

- Bekken, B.** and Marie, J., (2007), Making self-authorship a goal of core curricula: The earth sustainability pilot project, *in* Meszaros, P, ed., Self Authorship: Advancing Student's Intellectual Growth. *AERA New Directions for Teaching and Learning Monograph Series* No. 109, 53-68.
- Dove, P.M.** and Han, N., (2007), Kinetics of Mineral Dissolution and Growth as Reciprocal Microscopic Surface Processes Across Chemical Driving Force. In: *Perspectives on Inorganic, Organic and Biological Crystal Growth: From Fundamentals to Applications Directions*, Eds: Skowronski, M., DeYoreo, J.J. and Wang, C., Am. Inst. Physics Conference Series Vol. 916, p. 215-234.
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Diversity

The Department of Geosciences has been active in improving diversity within our student and faculty populations. At the end of the reporting period (spring 2008), we had four female tenured/tenure track faculty (2 Full Professors, 1 Associate Professor and 1 Assistant Professor out of 20 tenure-track faculty) and two non-tenure track female faculty members. As of spring 2008, our graduate population was over one-third female (19 out of 52 students).

Although we are closing the gender gap in Geosciences, we have yet to significantly improve the participation of ethnic minorities in our field. As this is a national trend, our struggles are not unusual, but we hope to increase minority students in our field in the coming years through more active recruiting of graduate students in HBCUs and other minority institutions. Our 2007 diversity activities for the reporting period include the following:

Educational Programs and Workshops: Faculty member Madeline Schreiber, outreach coordinator Llyn Sharp, and graduate student Kristyn DeMarco developed and delivered modules on “Energy Resources, Scarcity, and Our Changing World” for the 2007 summer program VT-STARs (Summer Training Academy for Rising Students). VT-STARs recruits low income and under-represented youth from Virginia. Faculty member Ross Angel with Chemistry colleague Carla Slebodnick taught a week-long Crystallography Workshop for undergraduate and high school students, of which 1/3 were females.

Teaching and Mentoring: Faculty member Madeline Schreiber, with History colleague Marian Mollin coordinated and led a Peer Mentoring Workshop for tenure track female faculty in 2007. The objectives of the workshop were to demonstrate the benefits of peer mentoring for reaching professional goals needed to earn promotion and tenure and to help junior faculty set up peer mentoring groups based on their respective disciplines. Faculty member Barbara Bekken uses diverse texts in her Earth Sustainability (ES) courses, and discusses the importance of diversity in class discussions. The ES courses targets “best practices” for improving STEM-literacy among non-science majors and under-represented groups. The Women in Geosciences (WIGs) Group, which includes both female faculty and graduate student members, meets monthly to discuss issues pertinent to female geoscientists. Topics discussed in 2007 include mentoring, financial management, and conflict resolution. The group plans to invite undergraduate students to group meetings starting in Fall 2008. Faculty member Erin Kraal mentored high school students interested in the geoscience of Mars. As part of this mentoring, she advised the development of scientific experiments that the students could set up in their high schools.

Recruiting and Retention: Many of our faculty members have actively recruited underrepresented students for our graduate program. For example, Mike Hochella, as part of the EIGER IGERT program, has actively recruited at two Historically Black Colleges/Universities (HBCU), Norfolk State and Howard Universities, as well as at Virginia Tech. Out of 21 EIGER fellows, 13 are female, and 1 is a minority. As a member of the COS Diversity Committee, faculty member Madeline Schreiber has been involved in developing programs to enhance diversity of undergraduate, graduate and faculty in COS. In 2007, the committee gave several \$1000 awards to minority COS undergraduates, implemented the VT-STARs workshops (see above), and have discussed organizing recruiting trips to HBCUs in Virginia for all COS departments.

Goals for 2008-09

The new leadership in the Department of Geosciences will focus on uniting the faculty (and staff) behind a common set of goals and, in the process, develop a spirit of cooperation. Towards this end and in preparation for a retreat which was held on May 3, 2008, faculty in the Department of Geosciences agreed that we need to develop a collective vision and to identify goals to realize that vision. The retreat, facilitated by Amy Hogan, was the first step in developing the vision and goals, and attention will be given to this matter in 2008-2009. Within the context of the vision and goals, the department will develop a strategic hiring plan for the next 5 years.

Other goals for 2008-2009 are curriculum revision (as motivated by the external review committee), to put a mentoring committee in place for all Associate and Assistant Professors, to continue to actively encourage companies (oil and minerals) to interview in this department, to continue to actively recruit top-quality graduate students at professional meetings and via personal contacts. In addition, the department will pursue some immediate development goals to enhance the department's endowment situation. The department head will work closely in this endeavor with Jenny Orzolek in the college development office.

Most important, the department will continue planning for the new building and Jim Spotila and Nancy Ross will be the point people for the department and college, respectively. Successful completion of this major undertaking will require the cooperation of multiple parties across campus and beyond. The department head and associate head will meet with the major donor as early as possible. As noted by the external review committee, an advisory board for the Discovery Center must be appointed as soon as possible to guide the center through its formative period.

Statistical Information

Academics:

Present Enrollment:	Undergraduate majors	87
	Graduate majors	52
No. of Courses:	Undergraduate	41 (145 sections)
	Graduate	29 (29 sections)
Student Credit Hours:	Undergraduate	17,632
	Graduate	5,026
Degrees:	B.S.	26
	M.S.	6
	Ph.D.	9

Full-time Faculty and Staff:

Professors (includes 2 University Distinguished Professors)	12
Associate Professors	6
Assistant Professors	3
Research Professor	2
Research Assistant Professors	1
Research Scientist	1
Instructor	1
Classified Staff	14

Other Affiliates:

Emeritus Faculty	14
Research Associates/Postdoctoral Associates	8
Adjunct and Cooperating Faculty	3

Retiring Faculty: 1

Publications:

Newsletters	1
Research Papers/Special Publications	84
Abstracts	143

Grants:

Externally funded	\$12,443,448.00
Proposals pending	\$7,642,921.00

Gifts:

Industry support	\$54,500.00
Scholarships and Endowments	\$87,027.00

Note, all numerical entries are based on statistics as of May 31, 2008.

Current Faculty and Staff:

Professors:

Robert Bodnar (UDP), Patricia Dove, Kenneth Eriksson, Michael F. Hochella, Jr. (UDP),
Scott King, Michal Kowalewski, Richard Law, J. Fred Read, J. Donald Rimstidt,
Nancy Ross, A. Krishna Sinha (retired June 2008), Robert Tracy

Associate Professors:

Thomas Burbey, John Hole, Madeline Schreiber, James Spotila, Chester Weiss,
Shuhai Xiao

Assistant Professors:

Barbara Bekken, Jacob Sewall, Ying Zhou

Research Professor:

Ross Angel, Robert Lowell

Research Assistant Professor:

Martin Chapman

Research Scientist:

Erin Kraal

Instructor:

John Chermak

Research Associates/Postdoctoral Associates:

Deborah Aruguete, Jens Engel, Luca Fedele, Nizhou Han, John Huntley,
Bojeong Kim, Elinor Spencer, Jing Zhao

Adjunct/Cooperating Faculty:

James Beard, John Chermak, Benedetto De Vivo, Alton Dooley, Nicholas Fraser,
William Henika, Richard Koepnick, James Martin, Matthew Mikulich, Stephen Scheckler,
Csaba Szabo, Lauck Ward, Chester Watts

Classified Staff:

Linda Bland, Phillip Burcham, Charles Farley, Mark Fortney, Miles Gentry, Richard
Godbee, James Langridge, Mark Lemon, Connie Lowe, Ellen Mathena, Mary McMurray,
S. Llyn Sharp, Daniel Smith, Carolyn Williams

Emeritus Faculty:

Richard Bambach, Donald Bloss, Gil Bollinger, Cahit Çoruh, John Costain,
James Craig, Gerald Gibbs, David Hewitt, Gordon Grender, Wallace Lowry,
Dewey McLean, Edwin Robinson, Paul Ribbe, J. Arthur Snoke