

ANNUAL REPORT 2008-2009

Department of Geosciences

Virginia Polytechnic Institute and State University

Annual Report Executive Summary, 2008-09

Department of Geosciences

Learning: Undergraduate

During the 2008-09 academic year, the Department had 83 undergraduate majors; 18 graduated with degrees in one of four degree options (Geology, Geochemistry, Geophysics, Earth Science Education). Twenty-six students participated in research activities with faculty members through undergraduate research.

The Department **awarded \$9,500 in undergraduate** academic and research **scholarships** and excellence awards during the 2008-09 academic year.

GEOS **Learning Outcomes** were **established** for students pursuing a B.S. in Geosciences (see p. 4).

Prompted by the report of the Five-Year External Review Committee, the Curriculum Committee (CC), headed by Rick Law, did a detailed analysis of the **Undergraduate** (and Graduate) **Curriculum**. The CC determined that more specific information about course content and skill development throughout the curriculum was needed in order to evaluate which areas might benefit from revision.

Barbara Bekken was recognized by the College of Science for Outstanding teaching skills and methods and is a 2009 teaching award recipient.

Alice Lee, a dual option major, with a 3.6 QCA was the recipient of the Geosciences Outstanding Senior Award.

Learning: Graduate

The Department of Geosciences maintains a **strong graduate program** with a large number of students given the size of the faculty.

Sixty graduate students were enrolled full-time in the Department this past academic year; 9 M.S. candidates received degrees and 5 doctoral candidates completed degree requirements.

One-hundred percent of our PhD students were supported on either teaching or research fellowships. Foundation funds in the amount of \$52,500 were used to provide tuition and stipends for at least one semester for 5 graduate students. Research funds in the amount of \$13,000 were awarded to 17 students; \$38,535 was given as summer stipends support to 12 students.

As of fall 2008, GEOS had 22 female graduate students (out of 60), and is diligently working to improve recruitment of ethnic minorities in Geosciences.

Geosciences **graduate students received honorable awards** within and outside of the university. Of note, Theresa Detrie received the COS Outstanding M.S. Student Award for 2008, Nicole West was awarded the 2008 Preston Award for Best M.S. Thesis in Science and Engineering, and Laura Hamm received an NSF Graduate Fellowship Award.

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

Discovery

The 23 full-time tenure-track and research faculty members in Geosciences have been awarded **16 new research grants** to go along with 37 continuing research grants totaling \$13,407,920, which comes out to approximately \$582,953 per faculty member. Total research expenditures for fiscal year 2008-09 are \$2.5 million.

Ninety-three peer-reviewed research papers and 139 abstracts were published by the Department's faculty this past year.

Six post-doctoral associates worked in the Department during the academic year along with 4 research associates and a host of visiting scholars.

During 2008, Bob Bodnar presented international short courses (each 4 or 5 days long) in Brazil, Mexico, Turkey and Italy (see photos at end). Additionally, he was appointed Adjunct Professor in the Department of Earth Sciences, Memorial University, St. John's, Newfoundland, Canada and the Department of Chemistry at Virginia Tech.

Kenneth Eriksson was inducted as Fellow of the Geological Society of America and received an Honorary Doctorate from the University of Pretoria in South Africa.

Mike Hochella was awarded the Distinguished Service Medal of the Geochemical Society, 2008.

Fred Read is the 2009 recipient of the Grover Murray Outstanding Educator Award from the American Association of Petroleum Geologists.

Nancy Ross was elected President of the Mineralogical Society of America, additionally she was appointed to the Board of Reviewing Editors of *Science*.

Engagement

The Department of Geosciences has a **commitment to outreach** by increasing public understanding of the value and relevance of geosciences through publications, presentations, exhibits, and formal and informal science education programs.

In addition to engagement of faculty as part of their professional activities, the Department of Geosciences demonstrates its commitment to outreach through a staffed program that includes support for K-12 field science studies and in-class experiences. Under the guidance of Llyn Sharp, Outreach Program Director, the program offers service learning via Education Resource Center (ERC) kits and material loans, earth and environmental education training workshops and teacher institutes (see photos at end). In addition to tours, the Museum of Geosciences provides special programs and exhibits to public school children, community organizations and the general public. Sarah Windes, who heads up tours, is the recipient of the 2009 Digma Award from the Eastern Section of the National Association of Geoscience Teachers for her excellence in presenting geosciences information to the public.

Weekly **seminars** were presented each Friday during academic year 2008-2009. Twenty six seminars in all were hosted by the department; 22 of those were by external speakers from 21 different institutions, including three distinguished speakers. In addition, four on-site (Virginia Tech) speakers presented seminars, including three presenters from our own department and one guest speaker from ICTAS.

The annual **alumni/faculty dinner** was held on November 8, 2008 and attended by approximately 80 people. The program after dinner honored emeritus geophysicists Gil Bollinger and Ed

Robinson. The fall dinner provides an excellent opportunity for former graduates of the department to converse with faculty and learn how the department is progressing.

Approximately 1,400 issues of the **2008 Geosciences Magazine** were mailed to our alumni base. The cover story featured Ross Angel and the VT Crystallography Lab.

The Geosciences **Spring Banquet** was held in late April. This annual event is held each year to honor our graduating seniors and completing graduate students. Professor Fred Read was the guest speaker. This event also serves as an opportunity to emphasize the importance of “giving back” to higher education when careers are established.

With Bob Bodnar as chair, a formal **mentoring committee** has been **established** in Geosciences. This committee met with and evaluated the progress of all junior faculty in the department and made recommendations to the Department Chair concerning junior faculty progress and readiness for promotion and tenure or promotion to full professor. Additionally, the committee worked to develop a set of criteria for P&T within the department.

Diversity

The Department of Geosciences has been **active in improving diversity** within our student and faculty populations. We currently have 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 fall 2008, we had 22 female graduate students (out of 60).

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. Additionally, Patricia Dove is a member of the AdvanceVT Advisory Committee.

Goals for 2009-10

The department will continue the work of developing a **strategic plan for the next five years**. This plan will include an analysis of our current strengths with a view to identifying future hiring directions in light of the resignations of Jake Sewall and Erin Kraal and the upcoming retirements of Don Rimstidt and Fred Read. This planning will be carried out within the framework of existing and new clusters and, in particular, the ISES cluster.

An important goal for this academic year will be to examine the findings of the analysis of the undergraduate and graduate curricula to determine whether curriculum restructuring is needed. Other goals for 2009-2010 are to continue to actively encourage companies (oil and minerals) to interview in this department, to **recruit top-quality undergraduate students**, and to **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 leading this initiative.

Discussions will commence on developing an administrative structure for the department in view of the anticipated retirement of three administrative staff within the next few years. We will also commence discussions related to technical support for the ICP-MS, Microprobe and SEM.

Undergraduate Learning

Geosciences has approximately 83 undergraduate majors distributed over four options—geology, geophysics, geochemistry and earth science education.

Undergraduate Courses			
Courses	No. Sections	No. Students	Credit Hours
1 st Summer 2008	3	35	89
2 nd Summer 2008	1	8	24
Fall 2008	69	3049	7687
Spring 2009	73	3110	7994

GEOS Undergraduate Mission Statement: 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 summarized below:

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 updated during 2008/09 that will be assessed annually:

GEOS Undergraduate Learning Outcomes: Upon completion of a Bachelor's Degree, graduates from the Department of Geosciences should be able to:

- (1) 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 data, and describe findings according to the conventions appropriate to the problem.
- (2) Use the conventions for communication and information-seeking common to the geosciences to: search for and evaluate geoscientific and related information, write a geoscientific proposal and report, write a geoscientific abstract and give a companion oral presentation, and design a geoscientific poster.
- (3) Use appropriate tools to identify geological materials and features, describe their properties and characteristics, and record information about them using conventions common to the geosciences.
- (4) 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.
- (5) 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.

Academic Assessment Plan: Evaluation of student learning according to these five criteria is based on three performance-based measures of student learning: 1) written materials produced by students in four required courses (Geoscience Fundamentals, Structural Geology, Sedimentology/Stratigraphy, and Senior Seminar), 2) a repeated ‘methods of science’ questionnaire, and 3) a professional geosciences exit exam. The first two measures will assess the first two outcomes listed above, while the exit exam will assess the last three outcomes. The Geosciences exit exam will be written during the 2009/10 academic year and will be based on those used professionally for the title of “Professional Geologist.”

ViEWS: The ViEWS assessment has been embedded into the Learning Outcomes Assessment that is now reported using WEAVE ONLINE. Learning Outcomes #1 and #2 directly evaluate the departments’ ViEWS program.

Learning Outcomes Assessment for 2008/09: For the upcoming SACS reaccreditation process, all departments were required to assess two of their five learning objectives. Geosciences chose to assess objectives 1 and 2 above. The written reports and oral presentations in writing and research intensive courses demonstrate students’ ability to pursue scientific inquiry (objective #1) and communicate that inquiry according to the conventions of the geosciences (objective #2).

- In Geoscience Fundamentals (GEOS 1005, Fall, 2008), students’ performance on their written research projects averaged 90%. Oral projects averaged 92%. The high scores on the written project are due in part to the opportunity for students to continuously revise their work until the end of the term.
- In Structure (GEOS 3014, Fall 2008), students’ performance on stratigraphic columns, cross-sections, and field maps averaged 76%, 81%, and 84%. Having been introduced to field methods previously, this is the first course students take in which they are required to rigorously describe field findings visually using maps and cross-sections. Again of note, those students who had not taken Geoscience Fundamentals underperformed in comparison to their peers on the written portion of the Structural Geology report.
- In Sedimentology/Stratigraphy (GEOS 3204, Fall, 2008), students averaged 88% and 82% on the first and second writing assignments with weaknesses noted in development and organization. Of note, the three lowest students had not taken Geoscience Fundamentals and thus lacked background on scientific methods and reasoning as well as development and organization of written scientific work.
- In the Senior Seminar, class averages on final written proposals were 85% and final oral presentations were 89%. Again, students honed their written proposals and oral presentations repeatedly throughout the term; thus, revising and rethinking one’s rationale were major parts of the learning process.

Overall, student performance on visual, written, and speaking (ViEWS) assessments was very strong with scores on final projects and reports averaging well above a mid C (75%).

Educational Research: In Fall 2009, Barbara Bekken together with a team of ten diverse faculty and post-docs from four different colleges, expanded the experimental Earth Sustainability (ES) integrated Liberal Education project with a third cohort of 125 students. If these students

successfully complete the ES series, they will receive credit for six of the seven areas of the Curriculum for Liberal Education (CLE).

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.

Curriculum Committee Report: Prompted by the report of the Five-Year External Review Committee, the Curriculum Committee (CC), headed by Rick Law, did a detailed analysis of the **Undergraduate** (and Graduate) **Curriculum**. The CC determined that more specific information about course content and skill development throughout the curriculum was needed in order to evaluate which areas might benefit from revision. The CC will continue to examine these findings before determining whether curriculum restructuring is needed.

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.

Undergraduate Awards per 2009 Graduation Program:

Geosciences Outstanding Senior Award: **Alice Lee**

Geosciences Outstanding Service Recognition Award: **Joan Baker**

Geosciences Endowed Scholarships:

Alumni Scholarship: **Iliya Smithka**

W. D. Lowry Field Camp Scholarships: **Christine Frasca, David Greenawald, Erin MacCord**

E. L. and L. E. Meade, Sr. Scholarships: **Christine Frasca, Joshua Hoover, Rebecca Horne, Matthew Kadilak, William Nachlas**

W. C. and F. J. Presley Scholarships: **Shelbie Bennett, Brandon Phillips**

Geosciences Undergraduate Scholarship: **Iliya Smithka**

Geosciences Undergraduate Research Awards: **Joan Baker, Joshua Hoover, Sally Morgan, William Nachlas**

College and Other Undergraduate Awards:

Sigma Gamma Epsilon W. A. Tarr Award: **Justin Warren**

Dean's Freshman Scholarship: **Stephanie Freund**

Edmond LaClaire Scholarship: **Justin Warren**

Anadarko Petroleum Grant: **Joshua Hoover**

Career Opportunity Scholarship for Military Children: **Brandt Lanzet**

Undergraduate scholarships activity using Foundation endowed accounts for 2008-2009 totaled \$9,500.

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 (M. Schreiber). The department administration is aided by a graduate liaison committee that consists of 5 graduate students, which meets with the Graduate Program Director 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 during the 2008-2009 academic year include an annual orientation and field trip for new students (August, 2008), a faculty introduction seminar and student-faculty reception (September, 2008), the two-day Graduate Student Research Symposium (GSRS) (March, 2009), and several dinners, picnics, and socials throughout the academic year. The new graduate student orientation in August now includes a presentation of 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.)

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 2009, Geosciences will have 12 M.S. and 43 Ph.D. students (55 total). This includes 12 new graduate students (3 M.S. and 9 Ph.D.). The following summarizes graduate applications and admissions for the 2008-2009 academic year:

- Graduate students supported during the 2008-2009 Academic Year: 60
- Graduate students successfully completed in 2008-2009 Academic Year: 9 M.S.,
5 Ph.D.
- New graduate applications: 70
- New graduate applications accepted for admissions: 25
- Graduate students offered support: 25
- New graduate students accepting offer for admission for Fall 2009: 12

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, Southeast Section of Geological Society of America, Society of Exploration Geophysicists and the American Geophysical Union. 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, Graduate Program Director 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 2008-2009. The annual report template was modified to streamline the entry of information. In addition, an evaluation section was added to the report that allows for the advisory committee to rank student progress as excellent, good, fair, and unsatisfactory. 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.

GEOS Graduate Learning Outcomes: The Graduate Committee, headed by Madeline Schreiber, identified the following Outcomes and Objectives for M.S. and Ph.D. candidates.

Goals for M.S. Candidates:

1. Conduct research in the field that is relevant to the thesis topic, including demonstrating fundamental knowledge of relevant areas of geoscience and other fields (physics, chemistry, biology, mathematics), adequate observational or experimental skills (laboratory, field, computational), and ability to organize, analyze, and interpret data.
2. Communicate the research comprehensively in both written and oral formats.
3. Design an investigation of the scientific problem, including development of testable hypotheses, a rigorous experimental approach, and/or a set of descriptive or exploratory observations that bear on the research question.
4. Develop a relevant scientific problem into a research question and thesis topic, based on thorough analysis of appropriate literature and related sources of information.
5. Demonstrate effective participation in broader areas of geoscience, including science education, professional development, understanding of ethical standards, outreach and service, and teamwork.

Goals for Ph.D. Candidates:

1. Demonstrate a comprehensive understanding of their specific discipline, the earth systems as a whole, and other basic sciences as appropriate, all towards the goal of being an independent, creative scholar.

2. Engage in the relevant scientific community via presentations at professional meetings, publishing research results in relevant journals, obtaining funding for projects, and developing connections to scientists beyond the home research program.
3. Effectively teach and mentor both undergraduate and graduate students in the classroom and in a research environment (i.e. become self-replicating).
4. Demonstrate effective participation in broader areas of geoscience, including professional development, understanding of ethical standards, outreach and service, and teamwork.
5. Independently develop relevant research projects, based on the current state of knowledge and need for discovery in a specific discipline.
6. Effectively conduct meaningful investigations of relevant geoscience problems, including developing testable hypotheses and experimental approaches, obtaining the necessary expertise to conduct research, and carrying out the research to production of meaningful, publishable results.

Industry Recruiting: The Department continues to maintain **strong ties with industry** as nine companies visited and conducted interviews with our students. As a result of these interviews approximately eight students were offered internships and/or employment.

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:

Sharmin Shamsalsadati - J. Costain Fellowship
 Kathleen Craft – M.J. Mikulich and J. Costain Geophysics Scholarship
 Carrier Tyler, Kai Wang, Kathleen McFadden - Conoco-Phillips Corporation Fellowships
 Liang Han- Chevron Corporation Geophysics Fellowship
 Kai Wang – Chinese Scholar Graduate Fellowship

In Spring 2009, 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 40 proposals were received and evaluated. Awards for research funding, summer stipends (for Summer 2009), and one RA (Fall 2009) were awarded as follows:

Research Awards

A.E. Orange Awards: Changyeol Lee, Youyi Ruan
 T.T. Jeffries Award: Majken Schimmel
 W.D. Lowry Awards: Christina Blue, Jonathan Gerst, Lisa Tranel
 C.E. and F.P. Sears Award: Evan Anderson
 C.J. Gose, Jr. Award: Peter Voice
 D.R. Wones Awards: Amy Smith, Summer Brown
 C.G. "Jake" Tillman Award: Carrie Tyler
 Alumni Awards: Martin Hernandez-Marin, Benjamin Roth, Philip Prince, Troy Dexter

Summer Stipend Awards

C.J. Gose, Jr. Scholarships: Troy Dexter, Peter Voice
 Harris Scholarships: Philip Prince, Summer Brown
 W.D. Lowry Scholarship: Summer Brown

A.E. Orange Scholarship: Sharmin Shamsalsadati
T.T. Jeffries Scholarship: Lisa Tranel
J. Costain Scholarship: Kui Liu
C.E. and F.P. Sears Scholarship: Benjamin Roth, William Rouse
C.G. "Jake" Tillman Scholarship: Carrie Tyler
B. Cooper Scholarship: Evan Anderson

Semester RA Award

Kathleen Craft – Geosciences Scholar Award (Fall 09 RA)

The Department also presented several other awards to graduate students, including teaching and service awards:

James Schiffbauer - Outstanding Service Recognition Award
Benjamin Roth - Tillman Teaching Award (introductory)
Christina Blue - Tillman Teaching Award (combined)
Samuel Fortson - Tillman Teaching Award (advanced)
Ryan Grimm - Tillman Teaching Award (advanced)

Additionally, the Department 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 Fall 2008 and \$150 for Spring 2009.

Other university funding sources also supported graduate students in this academic year, including the Graduate School's 2010 program, the Multicultural Academic Opportunities program, the NSF IGERT program, the Cunningham Scholars program, and the ICTAS fellowship program.

Geosciences graduate students also received other important external awards, including within and outside of the university. Of note, Theresa Detrie received the COS Outstanding M.S. Student Award for 2008, Nicole West was awarded the 2008 Preston Award for Best M.S. Thesis in Science and Engineering, and Laura Hamm received an NSF Graduate Fellowship Award. Additionally, Rebecca French, a doctoral candidate, was named graduate student representative by the VT Board of Visitors for the 2009-10 academic year.

See the following page for a listing of degrees completed.

Graduate Degrees Completed (June 2008-May 2009):

Masters

Amanda Michelle Chassot - *The combined role of ENSO-driven sea surface temperature variation and Arctic sea ice extent in defining climate conditions in the southwestern United States*

Kristyn Anne DeMarco - *The effects of structure and lithology on fluvial channel aspect ratio: A field-based quantitative study of the New River in three geologic provinces*

Samuel F. Denning - *Architectural models for lower Pennsylvanian strata in Dickenson/Wise County, Southwest Virginia: A reservoir case study*

Theresa Ann Detrie - *Prehnite at the atomic scale: Al/Si ordering, hydrogen environment, and high-pressure behavior*

John Patrick Gannon - *Determination of fracture flow at the Coles Hill uranium deposit in Pittsylvania County, Virginia, using electrical resistivity and borehole logging methods*

Erik William Haug - *Modeling paleo-flow events on alluvial fans in the Atacama Desert, Chile*

Clayton William Loehn, III - *U-Th-Pb geochronology of the South Madison-North Snowy Block shear zone, southwestern Montana, USA: With implications for Paleoproterozoic thermotectonic evolution of the northern Wyoming Province*

Michael Masao Nakagaki - *Ecology and morphology of early animals: An analysis of the problematic Genus Sphenothallus from the Lower Cambrian Shuijingtuo Formation in southeast China*

William Allan Rouse - *Sequence stratigraphy and architecture of Lower Pennsylvanian strata, southern West Virginia, U.S.A.: Potential for carbon sequestration and enhanced coal-bed methane recovery in the Pocahontas Basin*

Doctorate

Kelly Lee Plathe Haus - *Determining trace metal-nanoparticle associations in contaminated sediment using analytical TEM and FFF coupled to MALLS and HR-ICPMS*

Martin Hernandez-Marin - *Evaluation of deformation patterns in complex hydrogeological settings from numerical models: Analysis of occurrence of fissuring zones*

Allison Elaine Stephenson - *Quantifying effects of environments and biomineralization: Establishing a robust Mg/Ca paleoproxy in calcite*

James Ryan Thigpen - *Vorticity of flow, deformation temperatures, and strain symmetry of the Moine thrust zone, NW Scotland: Constraining the kinematic and thermal evolution of an orogenic system*

Peter James Voice - *Contributions to detrital zircon geochronology*

Discovery

Faculty and Staff Honors and Awards 2008-09:

- *Faculty Promotions:*
Shuhai Xiao promoted to full professor in June 2008
- *Professional:*
Barbara Bekken was one of two 2009 teaching award recipients recognized by the College of Science for outstanding teaching skills and methods.
Bob Bodnar was appointed Adjunct Professor in the Department of Earth Sciences, Memorial University, St. John's, Newfoundland, Canada and the Department of Chemistry at Virginia Tech.
Thomas Burbey gave keynote address at First International Symposium on Watershed Hydrology and Slope Stability, Taipei Taiwan, Nov, 4-5, 2008; was selected to scientific advisory committee for the Eighth International Symposium on Land Subsidence, Mexico City, 2010, UNESCO; co-recipient of the Trainer Award (a team award) as part of the Savannah Harbor Expansion Project. This award is given to the Civil Project Team of the Year.
Kenneth Eriksson was inducted as Fellow of the Geological Society of America and received an Honorary Doctorate from the University of Pretoria in South Africa.
Mike Hochella was awarded the Distinguished Service Medal of the Geochemical Society, 2008.
Fred Read is the 2009 recipient of the Grover Murray Outstanding Educator Award from the American Association of Petroleum Geologists.
Nancy Ross was elected President of the Mineralogical Society of America; appointed to the Board of Reviewing Editors of *Science*; elected member of U.S. Department of State's National Screening Committee for Fulbright International Science and Technology Awards for Outstanding Foreign Students, 2008; elected member of Committee on Seismology and Geodynamics, Board of Earth Sciences and Resources of the National Academies, 2007-2009.
Sarah Windes, the head interpreter for the Museum of Geosciences, received the 2009 Digman Award from the Eastern Section of the National Association of Geoscience Teachers for excellence in informal geosciences education.

Scholarly Articles:

- Angel, R.**, Gatta, G., Boffa-Ballaran, T., and Carpenter, M. (2008) The mechanism of coupling in the modulated structure of nepheline. *Canadian Mineralogist*, 46(6), 1465-1476.
- Nestola, F., Curetti, N., Benna, P., Ivaldi, G., **Angel, R.J.**, and Bruno, E. (2008) Compressibility and high-pressure behaviour of $Ab_{63}Or_{27}An_{10}$ anorthoclase. *Canadian Mineralogist*, 46(6), 1433-1454.
- Nestola, F., Nemeth, P., **Angel, R.**, and Buseck, P. (2008) Equation of state and crystal structure of the new germanate post-titanite phase. *American Mineralogist*, 93, 1424-1428.
- Vanpeteghem, C., **Angel, R.**, **Zhao, J.**, **Ross, N.**, Redhammer, G., and Seifert, F. (2008) The effect of oxygen vacancies and aluminium substitution on the high pressure properties of brownmillerite-structured $Ca_2Fe_{2-x}Al_xO_5$. *Physics and Chemistry of Minerals* 35(9), 493-504.

- Jani, D., Nagarkatti, R., Beatty, W., **Angel, R.J.**, Slebodnick, C., Anderson, J., Iannaccone, G., Kumar, S., and Rathore, D. (2008) HDP, A novel heme detoxification protein from the malaria parasite. *PLoS Pathogens*, 4, e1000053.
- Slebođnick, C., **Angel, R.**, Hanson, B., Agaskar, P., Soler, T., and Falvello, L. (2008) Disorder and pseudo-symmetry in octakis(trivinylsilyl)octasilicate. *Acta Crystallographica B*, 64, 330-337.
- Mihailova, B., **Angel, R.**, Welsch, A.M., **Zhao, J.**, Engel, J., Paulmann, C., Gospodinov, M., Ashbahs, H., Stosch, R., Guettler, B., and Bismayer, U. (2008) Pressure-induced phase transition in $\text{PbSc}_{0.5}\text{Ta}_{0.5}\text{O}_3$ as a model Pb-based perovskite-type relaxor ferroelectric. *Physical Review Letters*, 101, 017602.
- Yan, J., Adams, P.D., **Angel, R.J.**, **Ross, N.L.**, Rivers, M., Parise, J.B., Clark, S.M. (2008) The development of an automated data analysis system for high-pressure powder diffraction data collected using an area detector. *High Pressure Research* 28:293-298.
- Liu, J., Aruguete, D.M., Jinschek, J.R., **Rimstidt, J.D.**, and **Hochella, M.F., Jr.** (2008) The non-oxidative dissolution of galena nanocrystals: Insights into mineral dissolution rates as a function of grain size, shape, and aggregation state. *Geochimica et Cosmochimica Acta*, 72, 5984-5996.
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Research Grants:

**DEPARTMENTAL ACTIVE RESEARCH GRANTS
2008-2009**

Angel, R	Oxford Diffraction	9/1/02 - 8/31/12	\$50,000.00
Bekken, B	NSF	3/15/05 - 2/29/10	\$115,650.00
Bodnar, R	NSF	12/15/05 - 3/31/09	\$150,000.00
Bodnar, R	PRF	9/1/07 - 8/31/09	\$45,000.00
Bodnar, R	NSF	7/1/07 - 6/30/09	\$238,024.00
Bodnar, R	Virginia Uranium, Inc.	6/1/08 - 9/30/09	\$189,110.00
Bodnar, R	USGS	3/25/09 - 4/1/10	\$60,000.00
Burbey, T	Rockydale Quarries	7/1/06 - 8/31/08	\$38,053.00
Burbey, T	NSF	8/1/07 - 7/31/09	\$98,834.00
Chapman, M	Consol Corporation	7/1/08 - 6/30/11	\$220,124.00
Chapman, M	Univ. of Utah	6/5/08 - 9/4/09	\$12,500.00
Chapman, M	US/NRC	9/29/08 - 10/1/09	\$60,000.00
Dove, P	DOE	8/10/00 - 10/31/09	\$1,549,821.00
Dove, P	NSF	8/1/05 - 4/30/09	\$379,989.00
Dove, P	NSF	9/15/06 - 8/31/09	\$219,767.00
Dove, P	NSF	2/1/08 - 1/31/10	\$188,878.00
Eriksson, K.	VDMR	1/16/09 - 6/30/09	\$18,285.00
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	Duke University	10/1/08 - 9/30/09	\$350,000.00
Hole, J	NSF	8/1/03 - 8/31/10	\$511,126.00
Hole, J	NSF	5/15/08 - 5/14/13	\$842,235.00
King, S	NASA	11/9/07 - 11/8/09	\$161,833.00
King, S	NSF	7/1/07 - 7/31/09	\$127,626.00
King, S	NSF	1/1/09 - 12/31/10	\$161,897.00
Kowalewski, M	NSF	5/1/06 - 6/30/10	\$219,290.00
Law, R	NSF	1/1/06 - 12/31/09	\$229,996.00
Law, R	NSF	8/15/07 - 7/31/09	\$223,335.00
Lowell, R	NSF	22/1/08 - 10/31/11	\$165,515.00
Read, J	NSF	4/1/07 - 3/31/10	\$182,139.00
Ross, N	DOE	5/15/05 - 5/14/09	\$299,000.00

Ross, N	NSF	7/1/06 - 6/30/09	\$245,832.00
Ross, N	NSF	1/1/08 - 12/31/09	\$283,505.00
Schreiber, M	NSF	9/1/07 - 8/31/09	\$126,479.00
Schreiber, M	DEQ	6/11/07 - 2/28/10	\$2,550.00
Schreiber, M	Cave Conservancy of VA	11/1/07 - 10/31/09	\$13,386.00
Schreiber, M	Montgomery Co. Schools	8/10/08 - 7/1/09	\$2,564.00
Sinha, A	NSF	9/6/02 - 9/30/08	\$967,316.00
Sinha, A	NCAR	6/1/06 - 4/30/09	\$139,997.00
Sinha, A	NSF	4/15/07 - 1/31/09	\$20,000.00
Spotila, J	NSF	9/15/04 - 8/31/09	\$164,727.00
Weiss, S.	BP America	1/1/08 - 8/18/08	\$24,774.00
Xiao, S	NASA	9/15/05 - 9/14/09	\$209,720.00
Xiao, S	PRF	9/1/05 - 8/31/08	\$80,000.00
Xiao, S	NSF	8/1/08 - 7/31/09	\$60,000.00
Xiao, S	NSF	3/5/09 - 5/31/10	\$46,006.00
Zhou, Y	NSF	7/1/08 - 6/30/11	\$179,999.00
	TOTAL		\$13,407,920.00

Engagement

Outreach: The Department of Geosciences has a commitment to outreach: increasing public understanding of the value and relevance of the geosciences through publications, presentations, exhibits, and formal and informal science education programs.

In addition to engagement of faculty as part of their professional activities, the Department of Geosciences demonstrates its commitment to outreach through a staffed program that includes support for K-12 field science studies and in-class experiences, mentoring students in projects and service-learning, Education Resource Center (ERC) kit and material loans, earth and environmental education training workshops and teacher institutes, facilitation of community partnerships, and by housing the Museum of Geosciences programs, tours, exhibits, and collections.

The professional development of students in the Department includes encouragement to practice communicating with a variety of audiences on geoscience content and the value of geosciences to society. The skills they gain will serve them well throughout their careers. Service Learning, volunteer, assistantship, intern, and student wage opportunities are provided. Students may lead museum tours, manage outreach projects, visit K-12 classes with hands-on programs, build exhibits, make hands-on teaching kits, create inquiry-based programs for K-12 youth, assist with field experiences, develop informational materials for the web and other media, work in research projects (including REU), work with community projects, or participate in conferences and events. Interdisciplinary, collaborative teamwork is encouraged in these activities.

Llyn Sharp serves as the Department's outreach coordinator. She has broad experience with informal science programs, community groups, K-12 education, and field activities. She is available to help integrate outreach into research programs so that innovative products and activities increase the impact of the Department's research agenda.

Llyn is also serving as one of the coordinators for VT STEM, the University's K-12 Outreach Initiative in Science, Technology, Engineering, and Math. Sponsored by the Division of Outreach and International Affairs through the School of Education, this is a group of over 40 programs seeking to promote excellence in STEM K-12 education in Virginia through links between schools, teachers, and VT projects. [www.stem.vt.edu]

Sarah Windes, the head interpreter for the Museum of Geosciences, received the 2009 Digman Award from the Eastern Section of the National Association of Geoscience Teachers for excellence in informal geosciences education. Approximately 6700 visitors toured the Museum of Geosciences during the 08-09 academic year. Visitors include individuals and families, K-12 school tours, youth groups, VT course uses, teacher workshops, meetings, and receptions for various events. Group visit scheduling has been streamlined and is now coordinated by Sarah, with assistance from Carolyn Williams.

The Geosciences Outreach website has been revamped and is now more useful to teachers and the public. [www.outreach.geos.vt.edu]

Departmental Seminars: Throughout the 2008-09 academic year, the departmental seminar series followed the procedural format used by our department in previous years. Weekly seminars were presented each Friday during both the fall and spring semesters, speakers were selected by the seminar committee based on nominations solicited from the faculty, and nominating faculty members acted as hosts. Internal speakers were hosted by the department chair.

Twenty-seven departmental seminars were presented (see the list attached below). The speakers represented a broad spectrum of disciplines, as attested by diverse topics of presentation and the fact that numerous faculty members from our department, representing multiple disciplines of geosciences, participated as hosts. The department hosts continued the successful tradition of organizing intense and highly interactive schedules for all external speakers. The seminar committee included Mike Kowalewski (chair), Jake Sewall, and Ellen Mathena. In addition, the department chair, Ken Eriksson, served in an advisory capacity and Carolyn Williams provided assistance with some logistic issues.

DEPARTMENTAL SEMINAR LIST – Fall 2008/Spring 2009

Note: Speakers listed in alphabetical order;

*- a departmental speaker;

** - a VT speaker from other units on campus;

*** - a distinguished speaker supported, partly or entirely, by a professional society.

*Tom Burbey, Virginia Tech Geosciences, “Non-traditional Techniques for Characterizing Aquifer Systems”

*Martin Chapman, Virginia Tech Geosciences, “Faulting, Site Response and Attenuation near Charleston, South Carolina”

***Peter Cook, Darcy Distinguished Lecturer, CSIRO Land and Water, “Environmental Tracers in Modern Hydrogeology: Reducing Uncertainty in Ground Water Flow Estimation”

Bob Craddock, National Air and Space Museum, Smithsonian Institution, “Rivers on the Red Planet: Valley Networks and the History of Mars”

Peter Dahl, Kent State University, “Geology and Geochronology of the Nemo Area, Black Hills, South Dakota: Implications for Precambrian Continental Reconstructions”

***Gerald Dickens, Rice University, American Association of Petroleum Geologists Distinguished Lecturer, “The Global Carbon Cycle with Seafloor Methane”

Rosa Domanec, University of Barcelona, "The Harsh Life on the Rocky Shores: Holes that Tell Stories"

Lucy Flesch, Purdue University, “Comparison of Surface and Mantle Deformation in Tibet Inferred from Shear-Wave Splitting and GPS Data”

Kurt Frankel, Georgia Tech, “Fault Slip Rates, Constancy of Seismic Strain Release, and Landscape Evolution in the Eastern California Shear Zone”

Jeffrey Freymueller, University of Alaska, Fairbanks, “Spatial Variations in Plate Coupling, Seismic Slip, and Slow Slip in the Alaska-Aleutian Subduction Zone”

Grant Garven, Tufts University, “The Geohydrology of Faults in Southern California”

Laura Hebert, University of Maryland, “A Coupled Geochemical and Geodynamic Approach to Subduction Zone Modeling”

*John Hole, Virginia Tech Geosciences, “Site Characterization Studies for Deep Drilling of the San Andreas Fault”

Adam Kent, Oregon State University, “Exploring Oceanic Magmatism through the Study of Silicate Melt Inclusions”

Richard Koepnick, Koepnick Geological Consulting, "Variation in the Strontium Isotope Ratio of Phanerozoic Seawater: The Mobil R&D Perspective"

Tim Lowenstein, SUNY Binghamton, "How Do Prokaryotes Survive in Fluid Inclusions for 30,000 Years?"

Jordi Martinell, University of Barcelona, "Taphonomy and Bioerosion Versus Bioerosion and Taphonomy"

***Edmund Medley, Geosyntec, Jahns Distinguished Lecturer in Engineering Geology Series, "Of Elephants, Earthquakes, Caves and Hot Rock - Recent Geological Engineering Adventures"

Nora Noffke, Old Dominion University, "Turbulent Lifestyle: Cyanobacteria on Earth's Sandy Beaches Today and 3 Billion Years Ago"

Toby Rivers, Memorial University of Newfoundland, "The Grenville Province as a Large Hot Long-Duration Orogen"

Kelly Rose, Department of Energy - National Energy Technology Laboratories (DOE-NETL), "Advances in the Exploration for Methane Hydrate Accumulations, a Potential Future Natural Gas Resource - Examples from India and the Alaska North Slope"

**Durelle "Scotty" Scott, Virginia Tech Biological Systems Engineering, "Changing Water and Solute Fluxes into the Gulf of Alaska in Response to Glacier Recession"

Dena Smith, University of Colorado "Fossil Insects: Exceptional Preservation and Incredible Diversification"

Chris Swezey, U.S. Geological Survey, "Mississippian Eolian Strata in the Appalachian Basin"

Steve Vance, Jet Propulsion Laboratory, Planetary Sciences, "Habitability of Icy Worlds"

Renata Wentzcovitch, University of Minnesota, "Spin Transition in Ferropericlase in Earth's Mantle"

***Chunmiao Zheng, Birdsall Dreiss Lecturer, University of Alabama, "Will China Run Out of Water?"

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

Ross Angel was invited to lecture at Gruppo Nazionale di Mineralogia, Mineralogical International School on HP in Bressanone - Brixen, Italy, 11-15 February 2008 and was the keynote lecture at the EUROMINSCI Conference, 31 March – 02 April 2008, Toulon, France.

Angel hosted the following international visitors:

- Mr. B. Maier (Hamburg) 3 month research visit, April-June.
- Dr. D. Pasqual (Padua), 3 month research visit, September-November.
- Dr. Tiziana Boffa-Ballaran, Bayerisches Geoinstitut, Bayreuth, Germany, 5 days, November.

Additional contributions include:

- Member, External 5-year review committee for Department of Geosciences, University of Padua, Italy.
- Associate Editor, European Journal of Mineralogy.
- Guest editor, Canadian Mineralogist memorial issue for Prof. JV Smith (15 manuscripts). Published Dec 2008
- Guest editor, European Journal of Mineralogy special issue from the 2008 Brixen workshop (13 manuscripts) that will be published in 2009.

Robert Bodnar gave an invited seminar entitled "Applications of fluid inclusions in mineral exploration" at the National Autonomous University of Mexico (UNAM), Queretaro, Mexico, July 14, 2008.

- Presented short courses (4-5 days) in Brazil, Mexico, Turkey and Italy. These courses are attended by students and young researchers interested in the role of fluids in the evolution of the earth and the formation of mineral deposits. In Italy the students receive credit towards their PhD for taking the course.
- Organized and chaired session on “The Whole Earth geohydrologic Cycle” at the 18th V.M. Goldschmidt Conference, Vancouver, Canada, July 14, 2008
- Member of International Program Committee, 18th V.M. Goldschmidt Conference, Vancouver, Canada, July 13-18, 2008
- Chair of the Scientific Committee of the Asian Current Research on Fluid Inclusions; Conference, Kharagpur, India
- Appointed founding Editor-in-Chief of the Central European Journal of Geosciences

Thomas Burbey was invited to present the keynote address at First International Symposium on Watershed Hydrology and Slope Stability, Taipei, Taiwan, October 29, 2008. Other invited international seminars include:

- National Central University, Jhongli City, Taiwan and
- Sinotech Eng. Consultants, Inc., Taipei, Taiwan

Burbey was also selected to serve on the scientific advisory committee for the Eighth International Symposium on Land Subsidence, Mexico City, 2010, UNESCO.

Martin Chapman presented two papers at the annual meeting of the Eastern Section of the Seismological Society of America, Kingston, Ontario: Seismological Research Letters, 79, no. 1, pp. 137 and 139.

Kenneth Eriksson was invited to lecture at the European Science Foundation, Vienna. Eriksson also serves as an External Assessor for the Department of Earth Sciences, Sultan Qaboos University, Oman.

Mike Hochella was invited to give the Conference Plenary Lecture at the German Mineralogical Society’s 100th Anniversary celebration. Additionally, he attended and lectured at the Goldschmidt Conference in Vancouver, Canada.

Scott King was invited to lecture at the 33rd International Geological Congress, Oslo, Norway, August 14, 2008.

Michal Kowalewski was invited to lecture at the 2nd International Congress on Ichnology in Cracow, Poland, August 2008.

He was invited to attend the following seminars:

- 06/2008 – Facultat de Geologia, University of Barcelona, Barcelona, SPAIN (Invited Departmental Seminar)
- 06/2008 – ProMare, University of Vienna, Vienna, AUSTRIA (Invited Lecture for a Society of Amateur Marine Biologists)
- 06/2008 – Department of Paleontology, Geocenter, University of Vienna, Vienna, AUSTRIA (Invited Departmental Seminar)
- 06/2008 – Hungarian Academy of Science [HAS], Budapest, HUNGARY (Invited

Lecture in “PaleoPodium” Series)

- 06/2008 – Hungarian Academy of Science, Budapest, HUNGARY (PaleoPodium) (Invited Lecture in “PaleoPodium” Series)

Additional international contributions include:

- Associate Editor, *Palaios*
- Journal Reviews for *Acta Palaeontologica Polonica*, Poland; *Geologica Acta*, Spain; *Journal of Experimental Marine Biology and Ecology*, the Netherlands; *Lethaia*, UK; *Palaeogeogr. Palaeoclim. Palaeoecol.*, the Netherlands; and *Palaeontology*, UK
- Invited Examiner for a Doctoral Dissertation, University of British Columbia

Richard Law was invited to lecture at the European Geosciences Union, General Assembly 2008, Vienna, Austria, 13-18 April 2008.

Additional contributions include:

- Lead Editor for *Continental Tectonics and Mountain Building – The Legacy of Peach and Horne*. Geological Society of London Special Publications.
- Advisory Editor for Geological Society of London Journal.
- Appointed as external reviewer for promotion to personal chair at Oxford University (UK) and Aberdeen University (UK).
- Participated in annual Himalaya - Karakorum - Tibet workshop held in Leh, NW India, August 8-11th; gave one presentation and discussion leader / co-chair for final discussion section of conference/workshop.

Fred Read collaborated with Saudi Arabia Aramco National Oil Company, with regard to developing the first detailed high resolution, sequence framework for the oil fields of Saudi Arabia, which include the largest single field in the world.

Don Rimstidt did manuscript reviews for the following journals: *Geochim. Cosmochim. Acta*, and *Australian Journal of Soil Research*.

Robert Tracy participated in a workshop on inter-laboratory comparison of electron microprobe and other analytical techniques for rock analysis organized by the U.S. Geological Survey and Open University (United Kingdom). He also attended the Goldschmidt Conference, Vancouver, BC, Canada and delivered an oral presentation.

Chester Weiss was invited to present the following: “EMScope – a continental-scale magnetotelluric array experiment” at 19th Workshop on Electromagnetic Induction in the Earth, Beijing, China, 2008.

Shuhai Xiao was an invited speaker:

- Department of Earth Sciences, Uppsala University, Sweden, May 15, 2008
- Tokyo Institute of Technology, Odabai, Tokyo, Japan, September 28, 2008
- China University of Geosciences, June 23-27, 2008

Additional contributions include:

- Co-chair (with Malgorzata Moczydlowska-Vidal and Kath Grey), Swedish Workshop on Ediacaran Acritarch Taxonomy (SWEATSHOP), August 2008
- Co-chair (with James Gehling, and Graham Shields), 33rd IGC symposium “HPS-09 Stratigraphic correlation of Neoproterozoic strata,” August 4-14, Oslo, Norway
- Associate Editor, *Palaios*
- Associate Editor, *Frontier of Earth Science in China*
- Manuscript Reviews for the following: *Geobios*, *Journal of the Geological Society of London*, *Palaios*, and *Chinese Science Bulletin*
- Attended IUGS field trip in northern Namibia (June 2008), and IGCP field trip in southern Namibia (June 2008)
- Attended IGC field trip in southern Norway (July 2008)

Ying Zhou was invited to lectures at:

- Chinese Academy of Sciences, Beijing, China, 2008
- University of Sciences and Technology of China, He Fei, China, 2008

Alumni Interaction: The annual alumni/faculty dinner held on November 8, 2008 was attended by approximately 80 people. The program after dinner honored emeritus geophysicists Gil Bollinger and Ed Robinson. The fall dinner provides an excellent opportunity for former graduates of the department to converse with faculty and learn how the department is progressing.

The 2008 **Geosciences Magazine** came out in early 2009. Approximately 1,400 were mailed to our alumni base. The cover story featured Ross Angel and the VT Crystallography Lab. Other features of this full color, 20-page issue included the 2008 spring graduation, a description of a number of faculty and alumni honors and awards, and the alumni dinner in November.

The Geosciences Spring Banquet was held in late April. This annual event is held each year to honor our graduating seniors and completing graduate students. Professor Fred Read was the guest speaker. This event also serves as an opportunity to emphasize the importance of “giving back” to higher education when careers are established.

Mentoring Committee: With Bob Bodnar as chair, a formal **mentoring committee** has been **established** in Geosciences. This committee met with and evaluated the progress of all junior faculty in the department and made recommendations to the Department Chair concerning junior faculty progress and readiness for promotion and tenure or promotion to full professor. Additionally, the committee worked to develop a set of criteria for P&T within the department.

Diversity

The Department of Geosciences has been active in improving diversity within our student and faculty populations. We currently have 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 fall 2008, we had 22 female graduate students (out of 60).

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 2008 diversity activities for the reporting period include the following:

Educational Programs and Workshops: Ross Angel with Chemistry colleague Carla Slebodnick taught a week-long Crystallography Workshop for undergraduate and high school students. Over the 6-year period of the workshop, approximately 45% of the attendees have been women. Several of our faculty have attended AdvanceVT workshops, including Ken Eriksson, Madeline Schreiber, and Ying Zhou. Erin Kraal participated in an NSF Advance/Forward workshop to prepare women scientists for faculty careers.

Teaching and Mentoring: Barbara Bekken worked with Dr. Shelli Fowler to design and incorporate a progressive diversity awareness curriculum into the Earth Sustainability series. The Women in Geosciences (WIGs) Group, which includes both female faculty and graduate student members, focuses on issues pertinent to women geoscientists.

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 2008, the committee gave awards to minority COS undergraduates, and have discussed organizing fall recruiting trips to HBCUs in Virginia for all COS departments.

Leadership: Patricia Dove is on the AdvanceVT advisory committee. Madeline Schreiber is on the COS Diversity Committee.

Goals for 2008-09

The department will continue the work of developing a **strategic plan for the next five years**. This plan will include an analysis of our current strengths with a view to identifying future hiring directions in light of the resignations of Jake Sewall and Erin Kraal and the upcoming retirements of Don Rimstidt and Fred Read. This planning will be carried out within the framework of existing and new clusters and, in particular, the ISES cluster.

An important goal for this academic year will be to examine the findings of the analysis of the undergraduate and graduate curricula to determine whether curriculum restructuring is needed. Other goals for 2009-2010 are to continue to actively encourage companies (oil and minerals) to interview in this department, to **recruit top-quality undergraduate students**, and to **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 leading this initiative.

Discussions will commence on developing an administrative structure for the department in view of the anticipated retirement of three administrative staff within the next few years. We will also commence discussions related to technical support for the ICP-MS, Microprobe and SEM.

Statistical Information

Academics:

Present Enrollment:	Undergraduate majors	83
	Graduate majors	60
No. of Courses:	Undergraduate	46 (115 sections)
	Graduate	27 (27 sections)
Student Credit Hours:	Undergraduate	16,726
	Graduate	5,339
Degrees:	B.S.	18
	M.S.	9
	Ph.D.	5

Full-time Faculty and Staff:

Professors (includes 2 University Distinguished Professors)	12
Associate Professors	5
Assistant Professors	3
Research Professor	2
Research Assistant Professors	1
Research Scientist	1
Instructors	3
AP Faculty	2
Classified Staff	12

Other Affiliates:

Emeritus Faculty	15
Research Associates/Postdoctoral Associates	10
Adjunct and Cooperating Faculty	11

Publications:

Newsletters	1
Research Papers/Special Publications	93
Abstracts	139

Grants:

Externally funded	\$13,407,920.00
Proposals pending	\$6,274,013.00

Gifts:

Industry support	\$131,000.00
Scholarships and Endowments	\$83,937.33

Note, all numerical entries are based on statistics as of May 31, 2009.

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, Robert Tracy, Shuhai Xiao

Associate Professors:

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

Assistant Professors:

Barbara Bekken, Jacob Sewall, Ying Zhou

Research Professors:

Ross Angel, Robert Lowell

Research Assistant Professor:

Martin Chapman

Research Scientist:

Erin Kraal

Instructors:

Anna Balog-Szabo, Roy Jameson, Neil Johnson

AP Faculty:

Miles Gentry, Richard Godbee

Research Associates/Postdoctoral Associates:

Deborah Aruguete, Jacob Beale, Luca Fedele, Nizhou Han, John Huntley,
Bojeong Kim, Elinor Spencer, Yonggang Yu, Adam Wallace, Jing Zhao

Adjunct/Cooperating Faculty:

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

Classified Staff:

Linda Bland, Phillip Burcham, Charles Farley, Mark Fortney, 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, A. Krishna Sinha, J. Arthur Snoke

Presented 5-day short course entitled “Fluid inclusions in mineral exploration” to 31 geologists from Companhia Vale do Rio Doce (CVRD, Brazilian mining company) in Belo Horizonte, Brazil, January 23-27, 2008



Students in the short course in Belo Horizonte, Brazil, January 23-27, 2008

Presented 4-day short course entitled “Inclusiones Fluidas en Yacimientos Minerales” (Fluid inclusions in mineral deposits) to 24 geoscientists from industry and academia at the Guanajuato School of Mines (Mexico), May 19-22, 2008



Students in the short course in Guanajuato, Mexico, May 19-22, 2008

Presented 4-day short course entitled “Fluids in the Earth” to 38 geoscientists from industry and academia at Muğla University, Muğla, Turkey, June 16-19, 2008



Students in the short course in Muğla, Turkey, June 16-19, 2008

Presented 5-day short course entitled “Fluids in the Earth” to 15 students at Dipartimento di Scienze della Terra, Università di Napoli Federico II, Naples, Italy, October 20-24, 2008. Students attended from universities in Italy, Switzerland, Poland and Sweden.



Students in the short course in Naples, Italy, October 20-24, 2008

Geosciences Outreach
www.outreach.geos.vt.edu



Pulaski Museum Fire Recovery Collaborative Effort
for initial stabilization and storage of collections
objects



NASA-funded Education and Public Outreach:
Virginia Fossils and Paleontology Kits



Sarah Windes, 2009 NAGT Digman Award Winner
for excellence in informal geoscience education



Kids Tech University Hands-on Activities
for over 300 kids and parents