

Unit Productivity Award Application For Academic Departments, 2008-2009

**Academic Unit Name: Department of Geography and Geology
Department Head: David J. Keeling (Key Indicators of Productivity for 2008-2009):**

SUMMARY OF APPLICATION:

- ④ **Senator McConnell officially opened the Kentucky Mesonet and recognized the \$2.9 million in funding obtained for the project.**
- ④ **John All received a Fulbright Scholarship to study in Nepal in Fall 2009.**
- ④ **SGA recognized Margaret Crowder as Ogden College Professor of the Year and Greg Goodrich as Advisor of the Year.**
- ④ **Thirtyfive students were actively engaged in applied research with faculty through the ARTP, Gatton Academy, and through externally funded research projects.**
- ④ **Hoffman Institute faculty and staff conducted research in Jamaica and Haiti.**
- ④ **Geology major Seth Cude won a \$40,000 “Go Green” Facebook competition.**
- ④ **Faculty and students were featured over 100 times in media print, in online articles, on WKYUFM radio, and on local television programs.**
- ④ **A GIS student received an ESRI scholarship for the eighth year in a row.**
- ④ **Aaron Celestian was named to the Editorial Board of the *American Mineralogist*.**
- ④ **Geoscience graduate student Ronnie Leeper was recognized as the Ogden College Outstanding Graduate Student for 2008-2009.**
- ④ **The BS in Meteorology degree continues to attract new students, with 42 majors currently active in the program. The first cohort graduates in Spring 2010**
- ④ **The Department exemplifies WKU’s International Reach, with faculty and students at multiple overseas locations for conferences, research, professional development, study-abroad programs, expedition study tours, and collaborative activities, including multiple visits to China and Europe, and visits to Peru, Chile, Samoa, Argentina, PNG, Cambodia, India, UAE, Tanzania, Morocco, Mongolia, and Russia, among other locations**
- ④ **Meteorology students won several competitive and prestigious internships.**
- ④ **William “Joey” Coe awarded prestigious Udall Scholarship for sustainability work.**
- ④ **A new minor program in Sustainability Studies was approved by Board of Regents.**
- ④ **Over 100 students participated in study-abroad programs, field camps, special field projects, and field trips during the year, including programs in Florida (2), the Mojave, the Bahamas, the Appalachians, and around the local region.**
- ④ **Meteorology undergraduate/graduate students established the StormTopper Network.**
- ④ **Thirty-three students presented research at local, regional, and national conferences, as well as in Japan and Slovenia.**
- ④ **Hoffman Institute purchased Cave Springs Cavern with KHLCF conservation fund.**
- ④ **Chris Groves appointed to Board of U.N. Karst Program established by UNESCO.**
- ④ **The Department awarded 24 GIS Certificates this year; and 28 students have completed half of the requirements.**
- ④ **The Department received over \$1.1 million in external and internal research funding.**
- ④ **The Kentucky Geographical Alliance received a \$50,000 grant for the 4th year in a row.**

**Department of Geography and Geology
Unit Productivity Award Application – 2008-2009**

The Department excelled in myriad areas this past academic year, particularly in student learning beyond the classroom, in faculty research, and in peer-reviewed publications. Students and faculty were featured over 100 times in local media outlets, on the WKU public radio and television stations, in the community, and in the national media. The Department is a proven leader on campus in preparing students for success in a global society and has an enviable record in extending WKU's regional and international reach through research, lectureships, and other professional activities.

I. Increasing Student Learning

Last year, the Department proposed a set of general education recitation courses that would complement lecture sections and provide students with a focused, enhanced learning experience. With no financial support available to recruit additional graduate students to take responsibility for these recitation sections, the Department turned to an alternate, less costly approach to improving and assessing general education learning.

- 1. Inquiry and Analysis**
- 2. Critical Thinking**
- 3. Creative Thinking**
- 4. Written Communication**
- 5. Oral Communication**
- 6. Quantitative Literacy**
- 7. Information Literacy**
- 8. Teamwork**
- 9. Problem Solving**
- 10. Civic Knowledge and local-global engagement**
- 11. Intercultural competence**
- 12. Ethical Reasoning**
- 13. Skills for lifelong learning**
- 14. Integrative Learning**

The graphic on the left illustrates a 14-point assessment rubric that is being introduced to provide more meaningful assessment of student learning in general education courses. Each of these 14 assessment points can be applied in a general education course, but all of them might not be applicable in a single course. For example, point 11 – intercultural competence – likely will not be relevant in an Introduction to Physical Geography course. In the assessment process, the instructor will review the strengths and weaknesses of each relevant assessment point, and then provide a strategy for course improvement in that area.

In Category E (Cultural Diversity) World Regional Geography courses this past semester, assessments of rubric #6, quantitative literacy, suggested that many students are ill-prepared to understand basic numerical relationships discussed in class, such as population growth curves, income ratios, percentage changes, and similar quantitative measurements. Additional exercises

that can help students to build quantitative literacy, such as calculating the potential doubling time of a population cluster, could be introduced and examined more regularly. The Department plans to expand the implementation of this 14-point assessment rubric over the coming years.

Another important goal of the Department for the 2008-2009 academic year has been to engage students more effectively in learning beyond the traditional classroom environment. This strategy advances QEP initiative one: to ensure that students can demonstrate their capacity to apply knowledge and training in their discipline to address relevant societal concerns. This goal is reached by focusing on three parallel processes: (1) creating opportunities for independent, supervised research outside the classroom; (2) supporting student attendance at local, regional, national, and international workshops and conferences; and (3) providing field camp and study abroad opportunities that engage students in communities other than their own. A third important

goal focused on the enhancement of programs and courses to support WKU's mission of "preparing students for success in a global society." The Department continued also to focus attention on strategies to: (a) ensure that students can demonstrate an understanding of their opportunities as responsible citizens living and working in a global society (QEP goal 3), and (b) ensure that students can demonstrate an understanding of the diversity of peoples, ideas, and cultures (QEP goal 2).

Throughout the academic year, approximately 35 students were actively engaged in directed research projects and other activities related to the ARTP and Programs of Distinction (Kentucky Climate Center, Kentucky Mesonet, Hoffman Institute, Center for Cave and Karst Studies, and the Water Resources program), and with research projects directed by department faculty in various programs such as the Central Kentucky Cave Survey, GIS Center, Crystal Kinetics Lab, and several geography, geology, meteorology, and geoscience projects. Several examples serve to illustrate the success of the Department's focus on student engagement – undergraduate student William Coe received a Udall Scholarship to support his research on sustainability issues. Geoscience graduate student Ronnie Leeper received recognition as Ogden College's outstanding graduate student for his ongoing work on climate analysis and modeling. Geography major Jeremy Goldsmith and geology major Ronson Elrod worked with Dr. All and Pat Kambesis from the Hoffman Institute and published an article in the journal *Stormwater*, and several meteorology students have research papers in press or under review for publication.

The Department mentors student researchers and encourages both undergraduates and graduates to attend and present their research results at conferences and workshops. More than thirty students gave research presentations during the academic year. A few examples illustrate the success of this mentoring program: geology major Chelsea Brunner presented research on the Allende meteorite in Matsue, Japan; graduate geoscience student Mark Tracy received one of four 2008 national research awards from the Cave Research Foundation; graduate geoscience student S. Matt Brunt received a competitive Environmental Systems Research Institute (ESRI) scholarship to attend the 28th annual international user conference in San Diego, August 2008. Three graduate students working in the Hoffman Institute presented their research in Slovenia at an international karst conference, and many graduate and undergraduate students presented their research at various regional and national geography and geology conferences, regional GIS meetings, and at the annual Posters at the Capitol event. Six undergraduate and three graduate students presented their research at the annual WKU Student Research Conference in March; meteorology student Astrid Gonzalez was recognized for her outstanding poster in the physical sciences, geoscience graduate student Samantha Kramer received the award for outstanding graduate presentation, and geoscience graduate student Ben Miller was recognized for his outstanding poster presentation.

The third pillar in the Department's primary goal of enhancing student learning involves developing more opportunities for experiential learning and project-based learning. The Department constantly reviews its curricula offerings to ensure that all students have the opportunity to study abroad and/or participate in field camp, internship, practicum, or supervised research experiences as part of their major program. Over three hundred students have enrolled in study abroad and field camp programs offered by the department over the past seven years. The Department now offers a regular study abroad curriculum, with programs offered either in Winter and Summer, or occasionally both semesters. In Summer 2008, 10 students participated in the Department's Eastern Mediterranean program, visiting Turkey, Greece, Italy, and Slovenia. Geology faculty have a long tradition of engaging students in field-based experiences,

and field programs are run every Fall and Spring semester as part of the regular curriculum. In addition, geology field camps are offered on a regular basis during the summer. In recent years, students have worked in Utah, Wyoming, and Montana with Drs. Wulff and Siewers, as well as in the Bahamas with Drs. Florea and Siewers and in Alaska and China with Dr. Groves. The Department also offers regular spring or fall break geoscience field programs, with recent programs to South Florida, northern Florida, the Mojave Desert, Death Valley, and other great locations. Over twenty students also participated in internship activities during the year, contributing to research and policy development in such organizations as the National Weather Service, Barren River Area Development District (BRADD), the City and County Planning Agency, and the Kentucky Mesonet, among others.

New programs and courses developed during the academic year also featured prominently in the Department's efforts to enhance the quality of its educational mission, including a new interdisciplinary Minor in Sustainability and new courses in Tourism Geography, Supervised Research for Gatton Academy students, and GIS and Society for general education students. These curriculum changes were introduced to support ongoing research opportunities through the Department's various Program of Distinction centers (Kentucky Climate Center, Mesonet, Hoffman Institute, and Center for Cave and Karst Studies), the Crystal Kinetics Lab, and other research opportunities that require new or enhanced skills for students. Ongoing feedback from employers, business people, and alumni suggests that significant career opportunities continue to present themselves in the areas of GIS applications and analysis, climate-related activities, geophysical techniques, and environmental management and consulting. Students graduating over the next decade will need skills not only to be successful in a global society, but also to help address critical societal challenges related to global climate change, human-earth interaction, natural resource security, and geopolitical threats. The Department continues to see these challenges as wonderful learning opportunities for current and future generations of students.

II. Developing the Student Body

Employment opportunities in GIS, climate change, geophysical techniques, mining and energy, and environmental consulting positions continue to drive enhancements and changes in the Department's program offerings. The new B.S. programs in Meteorology and Geographic Information Science are beginning to attract students to WKU who would otherwise have enrolled at other universities. Over 40 students are now enrolled in the BS Meteorology program, with 20 new students recruited to the program for the 2009-2010 academic year. Department faculty are also involved in SkyTeach, an externally funded initiative to enhance P-12 teacher skills and promote STEM disciplines. The Department also works with KCTCS to promote 2+2 programs in GIS, and the four required courses for the GIS Certificate program are now available online to students throughout the Commonwealth and beyond. The Department developed a new General Education category C (Social Science) course titled *GIS and Society* designed to introduce students to the principles and analytical power of Geographic Information Systems, and GIS courses are now offered at both the Glasgow and Elizabethtown campuses. Since Fall 2002, 148 students have completed the 4-course sequence required to earn the GIS Certificate, and annual enrollments in GIS courses continue to show robust demand, with nearly 1,700 students completing a GIS course since Fall 2001. The Department anticipates significant growth in the GIS Certificate program over the coming years as the online courses gain more students.

STUDENT ENROLLMENT IN GIS COURSES

YEAR	Students	Sections
2001-2	93	6
2002-3	189	11
2003-4	168	11
2004-5	243	16
2005-6	258	18
2006-7	255	22
2007-8	252	24
2008-9	233	23
TOTAL	1,691	131

GIS Certificates	
Year	Total
2002-3	14
2003-4	20
2004-5	15
2005-6	30
2006-7	22
2007-8	23
2008-9	24
Grand Total	148

The Department graduated 36 students during the past year (21 in geography and 15 in geology, with 19 minors completing their programs). Since the 1999-00 academic year, the Department has graduated 405 students, with 105 majoring in meteorology, 89 in environment, 92 in geology, 52 in general or cultural geography, 43 in city and regional planning, 19 in GIS, and the remaining in programs since deleted. The Department has approximately 300 majors and minors enrolled for the Fall 2009 semester.

Enrollment in the Department's programs has stabilized in recent years as the requirements for graduation have been enhanced, although enrollment in the new BS Meteorology program is attracting new students to WKU. All students are required to pass GIS, statistics, field or general research methods, and mathematics courses as part of their major program, which has resulted in a higher dropout or failure rate among sophomores and juniors. Nonetheless, the overall rate of graduation remains acceptable, with approximately 40 students receiving undergraduate geography or geology degrees and seven graduate students receiving the MS Geoscience degree each academic year on average. Until recently, the Meteorology concentration within Geography remained the most popular major for pre-declared freshmen coming to the Department, but it also has the highest non-completion rate, primarily because of the mathematics, physics, and advanced meteorology course requirements. Incoming students to the BS Meteorology program are expected to show a higher retention rate over the coming years as they enter the program much better prepared in Mathematics and basic science. Of the 149 students who have dropped out of the Department's majors over the past seven years, 64 initially enrolled in the meteorology major. Not all of these students have left WKU, however; 51 of these students remained enrolled at WKU in other majors and many have subsequently graduated. Several students left WKU to attend other universities in the region, but the Department has no data on these students. The Department aims to reduce the dropout rate over the coming years, through better advising, an enhanced learning assessment program (see discussion above), and more rigorous recruiting and orientation strategies. The Department has also enhanced its GEOG 175 University Experience course to address many of the issues that contribute to poor academic performance and, ultimately, dropping out from the university (including, study habits, attendance, learning techniques, reading for the discipline, and critical thinking skills).

The Geography, Geology, Meteorology, and Geoscience clubs play important roles in the recruitment, retention, and development of students. These student-led organizations provide mentoring, peer support, research opportunities, seminars, and field-trip experiences for

members. For example, Geology Club students raised money and fostered interest in their activities through rock and gem sales, seminars, and tee-shirt sales, and regularly attended annual regional and national geology meetings and conferences. Additionally, this year both undergraduate and graduate geography students helped to run the state-wide National Geographic Bee for grades 4-8 (organized by the Kentucky Geographical Alliance), with faculty and students involved in administering the event. The Bee was held for the sixth consecutive year at WKU, with 100 students and about 150 parents and teachers in attendance. Faculty are also active in the Kentucky Society of Professional Geologists, developing statewide initiatives to introduce students to the geological sciences. Four faculty are engaged in the Kentucky Geographical Alliance (which received a fourth year of NGS funding for \$50,000), the Science Alliance, and SkyTeach respectively; these initiatives are designed to help improve the content knowledge of K-12 teachers and to improve the geoscience knowledge base of students preparing to attend Kentucky universities. The Department remains hopeful that initiatives such as these will help to attract more students to the geosciences in the future. Finally, the Department continues to offer non-traditional courses in partnership with other programs to appeal to a wider cross-section of the campus community. The Center for Cave and Karst Studies summer program (now in its 31st year) offered 9 different courses centered on Mammoth Cave

III. Assuring High-Quality Faculty and Staff

Geology instructor Margaret Crowder received recognition as the Student Government Association's Ogden College Professor of the Year, and Dr. Gregory Goodrich was recognized by the SGA as Ogden's Advisor of the Year. Following successful national searches, three Ph.D. faculty have been appointed for the coming academic year. Dr. Jason Polk is a Summer 2009 graduate from the Department of Geography at the University of South Florida and brings expertise to the Department in geomorphology, analytical techniques, and environmental science. Dr. Margaret "Peggy" Gripshover comes to WKU from the University of Tennessee, Knoxville, where she earned her Ph.D. in geography. Peggy is a cultural geographer and she will work closely with Dr. Katie Algeo to strengthen and expand the department's offerings in the cultural area, including tourism and regional courses. After earning his Ph.D. in Atmospheric Sciences at Lanzhou University, China, Dr. Xingang Fan spent several years in post-doctoral research positions, most recently at the University of Mississippi. He joins the meteorology team in the department and will contribute to the ongoing expansion of the B.S. Meteorology program and research into regional and global climate studies. During the recruitment process, the Department search committees *addressed diversity and gender goals*, contacting qualified individuals through listservs, conferences, and special mailings, and ultimately recommended the most qualified individual for the position. The Department has every expectation that the new generation of faculty will continue to strengthen the Department's accomplishments in teaching excellence, scholarship, creative activities, and externally-sponsored research and grants.

The Department mourned the loss this past May of James Bingham, who succumbed to illness after several months in the hospital. Jim had been teaching two courses each semester as part of WKU's transitional retirement program. The Department has reappointed M.S. Geoscience graduate Daniel Reader for another year in a temporary full-time position to teach environmental and general education courses.

Departmental faculty registered significant research accomplishments during the academic year. Two major funded research projects continued to grow this past year. Drs. Stuart Foster and Rezaul Mahmood continued to invest significant energy and resources in the

Kentucky Mesonet project, with over twenty-five data-collection sites around the state active or scheduled for imminent installation. Their partnerships with local governments and other constituencies have received widespread praise and support around the state over the past year, with several media outlets regularly featuring Mesonet successes. Dr. Groves recorded many successes directing the China Environmental Health Project, with several international conferences, publications, and research visits to various locations in China. External funds generated by the Hoffman Institute, Water Resources Program, Kentucky Climate Center, the Center for Cave and Karst Studies, and individual faculty from agencies such as the USDA, Foreign Military Studies Office (FMSO), the American Geographical Society, Mammoth Cave, NSF, NASA, the Commonwealth of Kentucky, and other sources continue to help support graduate students, student-centered research, provide new equipment, and facilitate the development of research exchange programs in Argentina, China, Puerto Rico, Chile, Colombia, Jamaica, Nepal, Southern Africa, and within the Commonwealth and wider region.

Faculty and students also gave nearly 100 academic and community talks during the academic year, including presentations at universities, workshops, and conferences across the United States, in Latin America, China, and Europe. In addition, faculty visited more than 30 overseas locations for research, professional development, study abroad programs, professional study tours, meetings, and collaborative activities with other institutions (including Australia, Bahamas, Botswana, Cambodia, Chile, China, Colombia, England, France, Greece, India, Italy, Mongolia, Morocco, Nicaragua, Norway, Papua New Guinea, Peru, Russia, Samoa, Slovenia, Tanzania, Turkey, and the United Arab Emirates). Faculty led a department study abroad program to the eastern Mediterranean (Summer 2008), and led numerous regional and local field trips during the academic year, including to the Mojave, South Florida, Central Florida, the Bahamas, and the Appalachian foothills. The Department Head served as a Study Tour Lecturer on two educational programs co-sponsored by the American Geographical Society, one across Russia on the Trans-Siberian Railroad and the other around the world by expedition jet. Indeed, the Department has led the university in departmental Study Abroad program development and participation over the past decade, with ten faculty leading over 200 students to more than a dozen destinations around the planet, and it has the most globally focused faculty in the Commonwealth; they have visited over 130 countries on research, expedition, and lecture trips in recent years! This Department personifies WKU's aspirations for international reach.

IV. Enhancing Responsiveness to Constituents

A major focus of the Department this past year continues to be a focus on issues that are relevant to society generally and to our communities specifically. The Department's long-term goal is to develop meaningful partnerships that provide opportunities for students, faculty, and community members to address issues and problems that can help to improve quality of life. Several geology faculty are involved with a geology outreach group for the Commonwealth, establishing a 'speakers bureau' to better serve the public. There are many issues from land-use management and fossil fuel resources to hazardous site mitigation that benefit from a geological perspective. Geography, geology, meteorology, and GIS faculty are helping to bridge the gap between civic groups, schools, clubs, and their respective professions. The Department also has expanded course offerings at WKU's satellite campuses (Glasgow, Owensboro, Elizabethtown/Ft. Knox) to meet the growing demand for skill-based courses, especially by non-traditional students looking to retrain or enhance their skills.

Public service, as exemplified by the Kentucky Climate Center and the Mesonet project, continued to be a central pillar of the Department's contributions to the community, with activities in 2008-2009 reaffirming the faculty's commitment to productive engagement with a wide variety of constituents. The Department, through the Mesonet project and other initiatives, is pioneering interactive and demonstrative student and public learning activities as part of its long-term goal to develop more productive community partnerships. Faculty continued to devote thousands of hours to the educational, social, cultural, and economic development needs of the city, county, region, state, and other countries. Faculty are involved in numerous community and regional activities, from historic preservation in Scottsville and GIS support for various community projects (the Warren County Blueways Project, for example), to local planning and economic development issues around Mammoth Cave National Park, Kyrock, and other locales. During the summer, the Center for Cave and Karst Studies offers several cave-based courses for continuing education credit, aimed at professionals across the region and nation.

Alumni development continues to be an important source of funding for the Department and it also provides employment opportunities for future students. Many alumni in positions of leadership frequently contact the Department with information about job opportunities for graduating seniors. The Department circulates its annual GEOGRAM newsletter to approximately 1,400 alumni, it hosts alumni and current students at the annual Homecoming alumni reception, and it offers continuing education training in a variety of fields (Hazmat, Stormwater Mitigation, GIS, Karst Management, etc.). The Department again received record unrestricted contributions from alumni and faculty (over \$25,000) this past year, and it hopes to break that record again this coming academic year. Earnings from endowments support student enrollment in field camps, help faculty and students attend more conferences and workshops, and provide significant support to the Department's programs overall.

V. Improving Institutional Effectiveness

The Department continues to run efficiently and effectively. Improvements to classrooms and laboratories continued throughout the year, supported by funding from Academic Affairs, the Ogden College Dean's office, faculty research grants, and departmental funds. Renovations were completed in EST 356 with a new remote-sensing laboratory, and funds were allocated for the development of a state-of-the art meteorology learning laboratory in EST 425. Each of the Department's five primary teaching rooms are now configured with rolling chairs and tables to facilitate better use of teaching materials, with white boards, projectors, and computer equipment. The Department completed the third year of its second five-year strategic plan (2006-2011) and is on schedule with a number of programs and projects. The strategic plan forms the basis for the Department's ongoing expansion in a number of important areas, including research, extramural funding, student engagement, and alumni relations. The Department seeks to double the level of financial support received from alumni over the coming years. The Department continues to participate proactively in all aspects of the institutional planning process, in the implementation of QEP strategies, and in promoting programs that help prepare students for success in a global society. Finally, the Department has an active program to promote and advertise the many successes of its faculty and students, with over 100 media stories published during the academic year. Faculty regularly appear in print, on the radio, and on local television stations discussing teaching and research. The Department continues to build its reputation as a leading Department at WKU and one of the best combined human-earth programs in the state and across the region.