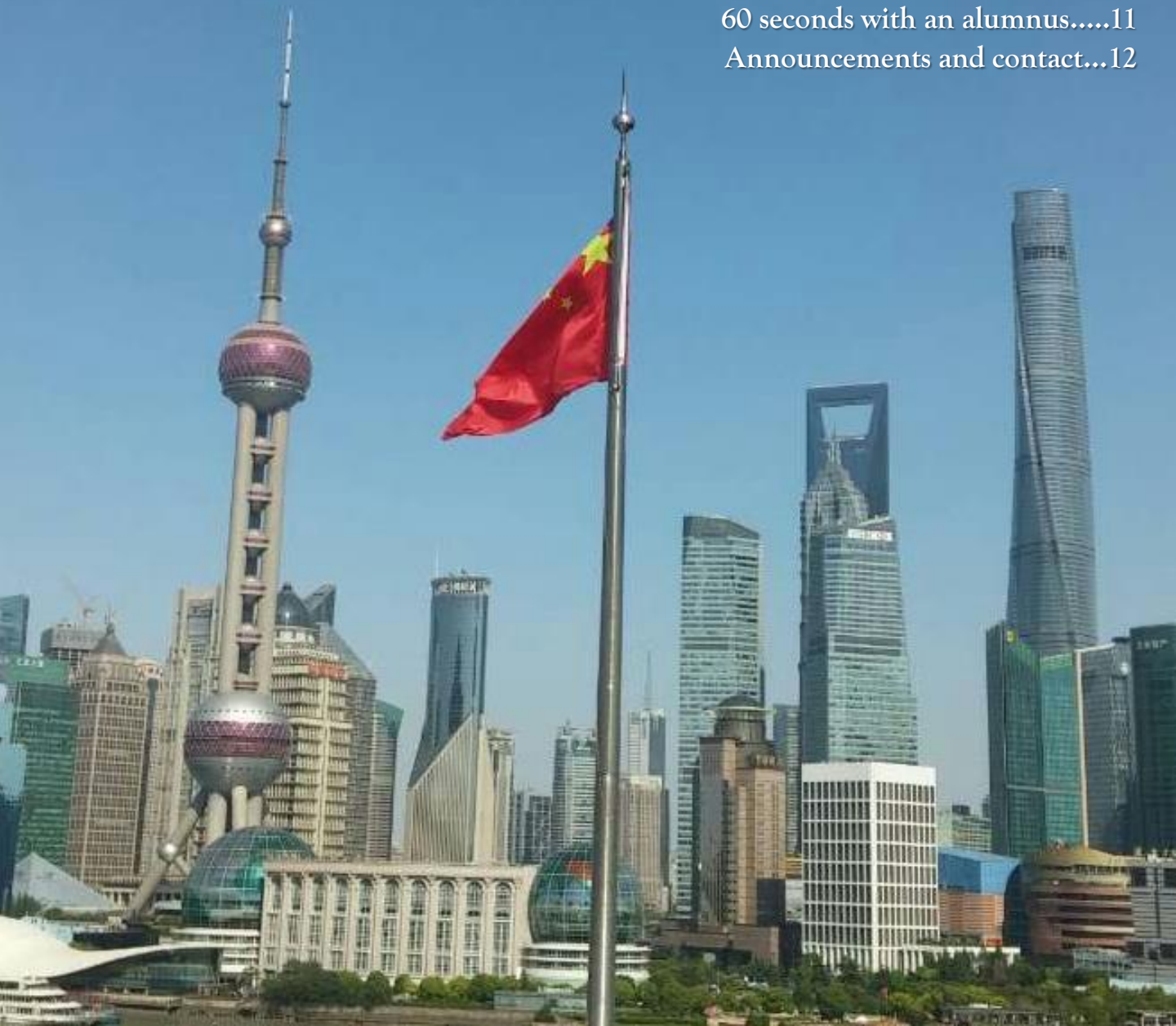
Earth Matters

vol.1, issue 2

Newsletter of the Department of Geography and Earth Sciences, University of North Carolina at Charlotte



Message from the chair...

Dear Friends and Colleagues,

Welcome to our second issue of "Earth Matters". It has been an exciting beginning to the new school year. Over the summer Drs. Qingfang Wang and Wei-Ning Xiang along with Dr. Lin Lin of East China Normal University led a group of UNC Charlotte students in a highly successful study abroad course to Shanghai, China. By all accounts the course surpassed expectations, and students and faculty were thrilled with the experience. We look forward to offering a second faculty lead study abroad experience in Shanghai for May 2016.

This semester we welcomed Dr. Isabelle Nilsson to the Department. Dr. Nilsson joins us after recently completing her graduate studies at the University of Toledo. An article featuring Dr. Nilsson appears later in the newsletter. We also wish all the best for Dr. Qingfang Wang and her family who has left the Department to pursue her career at The University of California Riverside. She will be greatly missed by our students and her colleagues.

The Department kicked off the year with a well attended pot luck at the Allans' place in Denver, N.C. Great food and a good time was had by all.

Enrollment at UNC Charlotte surpassed 28,000 students and with that growth and the approaching light rail line, many areas of the campus and its surrounds are under active construction. Our home, the venerable McEniry building, is also about to undergo a long overdue facelift.

Over the past six months the architectural firm C *Design* has been working with faculty and students to plan a significant redesign of the interior of our building, from the basement through the fourth floor. If all goes to plan construction will begin on the remodeling of the first floor classrooms in summer 2016.

We are at the approximate halfway point of the fall 2015 semester and many of our faculty and students are actively preparing research presentations for several upcoming meetings including

- the Geological Society of America Annual Meeting in Baltimore MD, Nov. 1-4,
- the annual meeting of the Southeastern Division of the American Association of Geographers in Pensacola FL, Nov. 22-24
- the American Geophysical Union's Annual Meeting in San Francisco CA, December 14-18.

In addition to these professional meetings our faculty and students have been actively engaged in several notable community outreach activities. These include presentations by Drs. Magi, Hippensteel and yours truly in support of The College of Liberal Arts & Sciences salon series hosted at the Aldersgate Retirement Community, presentations to local public schools by several faculty and doctoral student Brisa Urquieta de Hernandez's participating in a panel discussion as part of the Levine Museum of the New South new bilingual and interactive exhibit ¡NUEVOlution! Latinos and the New South.

I hope that you enjoy our second edition of Earth Matters. If you have comments or suggestions about the Newsletter please contact me at cjallan@uncc.edu .
Craig J. Allan, Department Chair

Cover Photo, The Bund, Shanghai, P.R.C., by Danny Yonto

Students' forum: summer research

When I was an undergraduate student, I was fortunate to have a research opportunity working on field campaigns related to satellite sensor calibration. This experience changed my entire undergraduate experience. However, these opportunities only arise by the combination of efforts from our faculty, the student, and good timing. Students must leap when the moment arises. Here are a few of the many students who grabbed this chance over the summer, and who we should all congratulate.

Charlotte Research Scholars
(by Dr. Brian Magi)

Every year, hundreds of UNC Charlotte students apply for the Charlotte Research Scholars (CRS) program, and only about 50 are accepted. Those that are accepted receive $4000 for two months of directed research under the mentorship of a faculty member. This past summer, Marilyn Brown (Geography), Monjã Johnson (Environmental Studies), Kim Litfin (Geography), Devin Martin (Geography), and William Ruble (Earth Sciences) were a part of CRS. They worked with Professors Gang Chen, Sara Gagné, Sandra Clinton, Janni Sorensen, and Brian Magi, respectively. One of our recent PhDs, Tara Bengle, also advised on Devin Martin's project. The students worked hard on a variety of projects that helped them gain the invaluable out-of-classroom research experience. They finished the CRS program by presenting a research poster at the CRS Summer Symposium. Find more about CRS at http://bit.ly/crs2015uncc and see the Abstracts for the symposium at http://bit.ly/crs2015abstracts.

Please congratulate Marilyn, Monja, Kim, Devin, and William, and ask them about their research when you see them!

Students' forum: summer research

Nkosi Muse (Meteorology Senior)

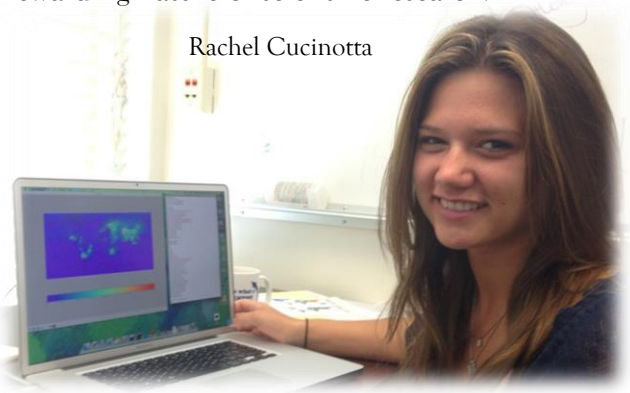
This summer, I was a part of the Significant Opportunities in Atmospheric Research and Science (SOARS) program in Boulder, Colorado (https://www.soars.ucar.edu/). I worked on research and software engineering under some of the best atmospheric scientists in the field at the NOAA Earth Systems Research Laboratory where I carried out my project in the Global Systems Division. I worked in a branch of the National Weather Service (NWS) called Hazard Services, which is responsible for maintaining and developing new software to make the forecasters job easier and more efficient. My project was to develop a program to ingest geospatial data into a database so that forecasters could have quick access to it when they need to issue a weather alert through the Advanced Weather Interactive Processing System (AWIPS). Working with shapefiles that outline an area such as a river, dam, or burn scar from a wildfire, I created the program to operate for flood alerts. The NWS is now putting this code into use as they update their software.

Nkosi Muse, second from the right

The internship gave me as a rising meteorologist, all the resources needed to successfully make my way into this small but competitive field. On top of gaining valuable programming skills, I was able to practice science communication and increase my growing network of professionals.

Rachel Cucinotta (Meteorology Senior)

This summer I did research in the Department of Atmospheric Sciences at Colorado State University through the Center of Multiscale Modeling of Atmospheric Processes (CMMAP, http://www.cmmap.org/). The opportunity was funded by the National Science Foundation so undergraduates could have the chance to gain research experience and to get a feel of what graduate school is really like. I learned about the professionalism in academia, and the gradual but rewarding nature of scientific research.



Rachel Cucinotta

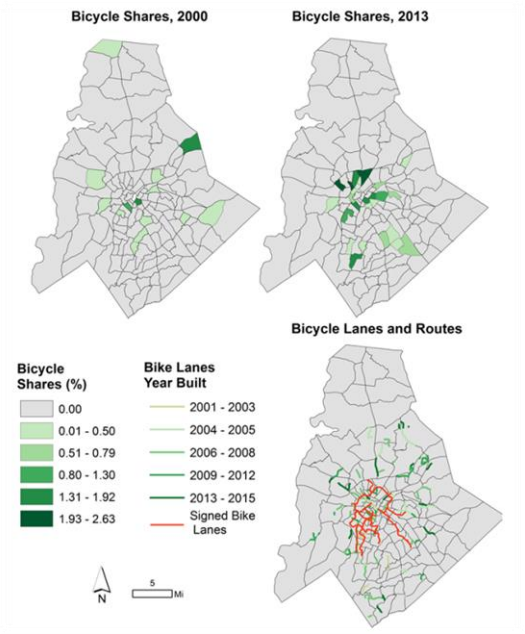
My research focused on inadequate waste collection practices in the developing world. Due to the lack of options, people burn their waste, which emits black carbon and organic carbon aerosols into the air and has destructive effects on both climate and human health. I used output from a chemical transport model called GEOS-Chem-TOMAS and compared it to observations provided from AERONET and SPARTAN Networks. I used the model to show how much Aerosol Optical Depth (AOD), which determines the intensity of light that makes it to the surface, and PM2.5 (particles that are less than 2.5 microns in diameter) were changing due to domestic waste burning emissions. Most trash burning locations saw a 5-6% increase in AOD from trash burning alone!

Nkosi Muse and Rachel Cucinotta

Students' forum: summer research

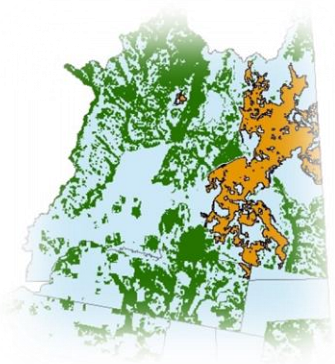
Samuel Senter
(B.S. student in Geography)

My summer research was a longitudinal study on the relationship between bicycle infrastructure investments and changes in bicycle commuters throughout Mecklenburg County. The research is a collaboration with John Cock from Alta Planning and Design in Davidson, NC. This Fall semester, I am enrolled in an independent study with Dr. Elizabeth Delmelle and have been reviewing the relevant literature on bicycling and infrastructure. I have been collecting and processing data for the project. The later steps will involve creating a model that explains changes in shares of bicycle commuters at the Census Tract level as a function of changes in bicycle infrastructure in those neighborhoods, controlling for other variables associated with higher levels of bicycle commuters. The maps below shown here depict initial data collection efforts. They portray an increase and shift in the percentage of people who commute to work primarily by bicycle in the years 2000 to 2013, as reported by the US Census Bureau and the American Community Survey data. The bicycle lanes and routes map shows what year bicycle friendly roads/lanes/paths were created.

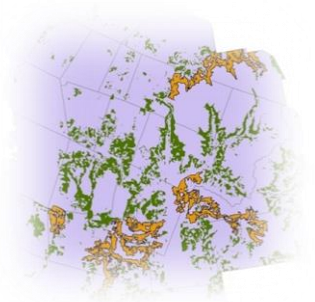


Michael Desjardins
(M.A. student in Geography)

For my current research, I am collaborating with Dr. Eric Delmelle and Jing Deng (PhD student) on a paper that will ultimately grow into my master's thesis. We are designing an optimization model that will select nature reserves to maximize the probability of long-term biodiversity. In essence, we are identify parcels that will maximize compactness (an example on a few parcels in New Hampshire is given below). We are testing our model's practicality on New Hampshire habitats and utilize a genetic algorithm to reduce computation time.



Parcels highlighted in orange are set aside for conservation



This summer I conducted a thorough literature review on the topic of spatial optimization for biological conservation.

I have been passionate about applying GIScience approaches to facilitate conservation-planning since my tenure as an undergraduate student at Keene State College. I was motivated to learn about more advanced techniques in graduate school and Dr. Delmelle's Spatial Optimization course exposed me to the capabilities and value of nature reserve design models. Taking Spatial Optimization has opened many doors for my master's research.

Students' forum: summer research

Coline Dony (Ph.D. student in Geography) | Internship at Girls Who Code

Today, only 18% of computer science graduates are women. In 1984, they represented 37%. This summer, I helped debug the gender gap in Science, Technology, Engineering and Math (STEM) fields by teaching 20 high school girls how to code. I got a position as a lead teacher in computer science at Girls Who Code, a non-profit that is trying to close the gender gap in computer science and engineering. By providing an intense 7-week summer program that teaches girls computer science concepts and coding languages such as HTML, CSS, JavaScript and Python, I educated and equipped girls with computing skills for the 21st century. Next to learning how to code, they got exposed to jobs in this industry. For example, Joanne Garlow, lead developer of the NPR One mobile app, visited our classroom (see picture) to tell us what it is like to be a developer and described her day-to-day on the job.

Geographic Information Science and Cartography is also considered a STEM field. In our department too, a gender gap is clearly visible. I would like to see more women enrolling in our GIS courses. By 2020, there will be 1.4 million computer specialist job openings. On top of that, they will be the highest paying jobs on the market. Women in our geography program should be encouraged to take GIS classes so that they can have access to these jobs too.

Adam Griffith
(Ph.D. student in Geography)

This summer, I was fortunate to work with the **National Park Service** as a Young Leader in Climate Change intern at Indiana Dunes National Lakeshore.

Working closely with USGS ecologists, I developed a pixel-based method of ecosystem resilience to climate change using NASA remote sensed data combined with climate variables.

The summer culminated in a two day conference in Washington DC with potential future federal employers and a visit with Secretary of the Interior Sally Jewell.

Students' forum: Shanghai 2015

Jennifer Jensen (B.A. student in Geography)

This summer I traveled to Shanghai with the department of Geography and Earth Sciences to study the economic development and urban transition of the city.

I absolutely loved Shanghai because it was vibrant. Everywhere you looked something different was happening, whether it was vendors selling food, tour groups weaving through the streets, or construction, there was always something going on.

My favorite part of the trip was our weekend excursion to Zhujiajiao, a famous water town outside of Shanghai. The town was beautiful with winding streets and canals lined by shops of all sorts. We had an amazing meal on a boat in the canal and made traditional holiday dumplings.

I don't think I've ever seen so much food in my life! Shanghai was so different from anything I had experienced before, but I hope I get the opportunity to go back!

Rhonda French (M.A. student in Geography)

Upon arrival at Pudong International Airport, the differences between Charlotte and Shanghai hit me like the humidity hanging in the air. After clearing security and collecting my bag I was free to go outside and just like that, I was in Shanghai. As our class proceeded with fieldtrips I noticed functional similarities with a foreign twist. For example, food service sanitation grading. Here in the U.S. we recognize the restaurant grade prominently displayed with a numerical grade.

In Shanghai it's the same except their grade is either a smiley face, a so-so face or a frowning face.

Recycling is conducted by folks on bicycles, who ride by and pick up whatever is on the curb to be recycled.

In the evenings we would venture out to "food street" which is what my roommate, Jenny, called the busy street right outside the East China Normal University campus gates. It was fantastic! There were vendors selling fresh savory foods that you can't get here. It was different from our hotdogs and pretzels but the idea of great food at inexpensive prices was the same.

Until May 9th, 2015, I had only seen pictures of this iconic landscape. On May 8th, 2015 I boarded a plane in Charlotte, North Carolina with an ultimate goal of landing in Shanghai to take part in a University of North Carolina - Charlotte study abroad course in urban development in a global city. What an experience!

Faculty spotlight: Dr. Isabelle Nilsson

Daniel Yonto
Eric Delmelle

What is your hometown?

- Gällivare, Sweden

It's a beautiful town with a population around 10,000 people above the artic circle.
(No polar bears though)

What degrees do you hold?

- BS in Economics and Business at Luleå University of Technology in Sweden
- Master of Science in Economics from University of Toledo
- PhD in Spatially Integrated Social Science (SISS) at University of Toledo

What are you currently teaching?
This semester I am teaching RED (Regional Economic Development) at the graduate student level. The students make this class a joy to teach, and **I'm so pleased at the work they have done so far.** However, sometimes I do forget to give a break during the three hour class, but I promise if that happens I make it up to the students. Next semester I will be teaching Applied Regional Analysis and Retail Location. Very fun!

Why UNC Charlotte?
Toledo was my home in the US for 5 years, however, when I went to the Regional Science meeting in 2014, I heard about the position at UNC Charlotte. The position here was very much in line with my research and teaching interests. Even though it was one of my most nervous interviews, I was able to get the job and head down south to start my new position.

Describe your first few weeks?
In a word, chaotic. Class preparation is keeping me very busy, along with workshops on applying for grants. Also, the department is much bigger that Toledo's, so I have to cover a lot more ground! In the summer time, that made things a bit difficult because it was quite hot. Apart from that, the one noticeable thing is that is seems no one is truly from Charlotte. It seems everyone falls into that transplant category, which is very interesting indeed!

Research
Did you ever wonder why two competing chain store locate near each other? If you take a look around Charlotte, you can see plenty of examples of this phenomena occurring. Walgreens and CVS, McDonalds and Burger King, these are just a few examples of companies that place their business right next to each other. The question I ask is Why? Does it really make sense? The basic idea of my research is to look at the spatial interaction/location patters between business chains. I want to see how this process plays out across space. The interesting point about how the businesses locate comes down to companies practicing head-on competition strategies. Think of it this way, its better to be closer to your competitor than further away. Currently, I am trying to quantify this theoretical framework at the city and urban levels.

What do you miss from home?
There are a few things that I miss about Sweden. The first, of course, is family and friends. But there is also a concept about open space in Sweden that allows public access on any land. The beauty of the right to public access in Sweden is that it promotes walking, hiking, skiing and being outdoors without having to worry about trespassing on someone's property.

Fast Facts

- Enjoys walking her 2 dogs
- Volunteers with CMPD's Animal Care & Control Center
- Eats mostly Vegetarian
- Speaks Swedish, English, and German
- Goes to Ikea for the food, not furniture (VEGAN MEATBALLS!)

Missy Eppes' Research is Cracking Up!

Don't worry, it's not what you think. Dr. Martha Cary Eppes, known as Missy by most, has spent the last decade or more delving into an area of research that has rarely been tackled by other soil scientists or geomorphologists, namely the mechanical weathering of rocks. The most obvious manifestation of such weathering is, of course, cracks, and that is where her obsession began. It all started with a simple hypothesis: the sun can crack rocks, a hypothesis that had been discounted by geologists for almost a century because it was presumed that thermal stresses caused by the sun would be extremely low.

Well, Dr. Eppes and her students set out to test this hypothesis by measuring the orientation of cracks in boulder fields throughout the desert Southwest, periglacial boulder fields of Pennsylvania and Virginia, and even here in Charlotte at Crowder's Mountain. She guessed that since the sun is a heating source that moves from east to west, then the orientation of cracks, if they were caused by the sun, should also have some type of directionality.

Lo and behold, and time after time, her hypothesis has been proven true: if you randomly measure crack orientations in rocks from all of these places, the majority of them inevitably point in the Northeast-Southwest direction. This work has appeared in the GSA *Bulletin* and *Geomorphology*, and a third publication, co-authored by students from her Landscape Assessment class

of 2010 (Jennifer Aldred, Alea Tuttle, Rebecca Deal, Suraj Swami, Jacob Garbini, Kim Aquino and George Xanthos) for *Earth Surface Processes and Landforms.*

Meanwhile, back in the office, Dr. Eppes was not satisfied with merely measuring cracks in the field here on earth. She and Dr. Andrew Willis, a professor in Electrical and Computing Engineering, designed software that would take advantage of the hundreds of thousands of photos and 3-D data available from the Mars Spirit Rover expedition. With the help of G&ES Alum, Stephen Abernathy, Eppes proceeded to do "fieldwork" in a field site that is on average 140 million miles away, measuring cracks on the Martian surface. Lo and behold again, a majority of those cracks also point to the northeast, providing the first direct evidence from Martian rocks that the sun plays a significant role in how they break down over time. This work was published this year in the journal *Nature Communications*.

What next? Dr. Eppes has expanded her research toolbox. She has been measuring cracking directly as it happens using acoustic emission sensors, and has also been making hypothetical cracks "grow" mathematically using equations derived from mechanical engineering principles. For the former, Dr. Eppes literally sat boulders on the ground in the middle of a cow pasture and the desert and waited for them to crack. For the latter, Dr. Eppes has discovered cracks can grow, albeit extremely slowly, at stresses much lower than a material's laboratory-measured strength would imply. Missy is developing numerical models to test these hypotheses.

The results of these new lines of research? Well, let's just say so far, they crack her up!

From left to right: Kim Aquino, Beca Deal, Jenn Aldred, Suraj Swami, George Xanthos, Jacob Garbini, Alea Tuttle and Missy Eppes

In memoriam: Dr. Alfred (Al) Wright Stuart

Longtime UNC Charlotte colleague and Professor Emeritus Alfred (Al) Wright Stuart passed away on Sunday, Nov. 1, 2015 after a brief illness. He was a retired member of the faculty of the Department of Geography and Earth Sciences.

Stuart was a native of Roanoke, Virginia who was instrumental in shaping and leading the Department of Geography and Earth Sciences and served on the faculty at UNC Charlotte for 30 years. He earned his bachelor's degree in geology from the University of South Carolina and a master's degree in geology from Emory University.

Stuart served in the United States Army in Greenland with a civilian research team. In 1958, Stuart served for 15 months on an international team of researchers commissioned by the National Science Foundation for its US Antarctic Research Program, then underway as part of the International Geophysical Year. This work is detailed in two books and many articles, including in National Geographic magazine, and commemorated by a mountain named in Stuart's honor and the awarding of a U.S. Polar Medal.

This life-shaping experience served him and many generations of his students well in his course titled "Geography of the Polar Regions."

Stuart subsequently continued his formal studies, earning a doctoral degree in geography from The Ohio State University and began his teaching career at the University of Tennessee-Knoxville. He was later recruited and in 1969 joined as an associate professor what was then called the Department of Geography and Geology in 1969 at UNC Charlotte.

He immediately was named the acting chair and went on to serve as department chair for 18 years. He and professor colleagues Jim Clay and Doug Orr were instrumental in helping shape the applied nature of the department's early geography program, focusing on the display and analysis of social, economic and environmental patterns, both spatial and temporal, for decision-makers and the general public. Under his direction, the department educated students who went on to guide growth and development of cities and towns nationwide.

During his distinguished career, Stuart served as a community planner in Roanoke, Virginia; wrote or co-edited 21 books; penned numerous articles; and garnered $1.5 million in research grants and contracts.

His work on local and statewide atlas projects are of particular note and were a defining passion. He also served as research director for the Institute for Organizational Management for the US Chamber of Commerce. He and his colleagues pioneered new ways of making highly complex information accessible and compelling and described himself as an "academic journalist."

Stuart concluded his work with the publication of The North Carolina Atlas: Portrait for a New Century (2000), originally published in 1974, and led the effort to produce the subsequent online versions.

Stuart retired from UNC Charlotte in 1999, but as emeritus professor he was a constant presence in the department, updating the atlas project and publishing his work from his time in Antarctica.

Al Stuart is a person who touched many lives and is greatly missed.

60 seconds with an alumnus

by Daniel Yonto and Eric Delmelle

Derek Marsh

What is your hometown?
Knoxville, Tennessee

What degrees do you hold?
- Bachelor of Arts in Geography from the University of Tennessee
- Master of Arts in Geography from UNC Charlotte.

What is your current job description?
I am a GIS Applications Developer for AGL Resources, a natural gas distribution company. I support anything relating to our GIS data. That primarily includes all the components of our core GIS software (ESRI ArcGIS) as well as the applications that supply or use our data. It is a combination of maintaining servers and databases, responding to software issues, and continually building better applications. We have hundreds of users everyday, from field crews maintaining existing pipelines to engineers designing new sections. All of these people have different needs and different levels of experience. I try to make GIS effortless for these users.

Why UNC Charlotte?
I had visited the city of Charlotte long before I decided to apply to the university and had great memories of the area. As I was finishing my bachelors and began looking for a graduate school, it was a location I thought had potential. There was a strong Earth Science and Geography department producing interesting research in a university that was growing and thriving.

When I reached out to UNC Charlotte, faculty in the department as well as the graduate school staff were always helpful and approachable.

Knowing I could get a great education while working closely with faculty that valued their students made it an easy choice.

Research
I worked with Dr. Eric Delmelle measuring the uncertainty in online driving direction results. After calculating hundreds of thousands of routes using mapping websites like Google Maps, OpenStreetMap, and ESRI ArcGIS Online, it was possible to see patterns in road selection, distance driven, and the time it took to get where you are trying to go.

Most valuable skills that you learned at UNC Charlotte?
As a GIS developer, my industry is changing rapidly. UNC Charlotte gave me a wide breadth of knowledge so I can stay ahead of the learning curve.

I was fortunate to extend myself beyond this into programming, databases and web GIS. Even gaining just a familiarity with some of these technologies is invaluable.

I can speak more intelligently to our GIS system as a whole, where it's heading in the future and technologies we can leverage to build a better application. And if I don't yet know an answer, I have a good idea where to start looking to find it.

Fondest memories?
If you spend so much of your time in the McEniry building, it becomes a second home and it took on that role so effortlessly. I spent hours in a small office with like-minded fellow students and they began to feel like family. All my professors' doors were always open, for guidance or just conversation.

Words of wisdom?
You have plenty of opportunities beyond the classroom; it's how you use those opportunities that sets you apart. Showing willingness and initiative could connect you to a great internship or even a great career.

Favorite food
- Passage to India (*).
  (*): adviser approved

Favorite sport: Tennis

Announcements and contacts

Project Mosaic Collaboration and Consulting

Did you know that Project Mosaic now offers collaboration and consulting services for graduate students and faculty on research methods and analytics? As many of you might already know, we are housed in McEniry. Therefore, geographers have priority access by default!

As part of this fledgling initiative, we provide advice and direction to dissertations and theses, focusing on data analyses. We also actively engage with faculty and academic units on their research projects. For more details, check out projectmosaic.uncc.edu. We see consulting as a natural extension to our current workshop program. While workshops bring researchers from various disciplines to a common forum, we have now extended our engagement with the campus through 1-on-1 collaboration on projects requiring quantitative analysis / statistical modeling. Our consultants are advanced graduate students and represent expertise in all major statistical software and several techniques. We have an online appointment system where you can browse and select one of us who would best suit your needs, and set up a meeting. If you are unsure about who to meet with, just send an email to kvenkita@uncc.edu

We would like to see the campus community buzzing with data-intensive social science research that transcend disciplinary boundaries. We welcome you to be a part of it.

Kailas Venkat (Project Mosaic)

New Advisory Council for The Location Analysis Track

The Location Analysis Track in the MA program has appointed a new Advisory Council for 2015-2018. The Advisory Council is a formal network of alumni whose role is to keep the Location Analysis curriculum relevant to the contemporary workplace. The Advisory Council also forms the foundation of our job placement network. The current council has more than 80 years of cumulative experience in subfields of the industry which include banking, big-box retail, restaurants, electronic product provision, real estate, small box retail and data provision.

For 2015-2018 the Advisory Council consists of:
Alan Black: Senior Vice President, Wells Fargo Corp.
Evan Byers: Market Analyst, Target Corp.
John Crouse: Director, Real Estate Services, Wendy's
John Gargiulo: Market Information Manager, Bank of America
Ken McWilliams: Director of Strategy, Crescent Communities
Jon Middleton: Founding Partner, GeoScouts, LLC.
Christopher Moore: Manager - Market Strategy, Family Dollar

Earth Matters Editors:
Dr. Eric Delmelle (eric.delmelle@uncc.edu)
Daniel Yonto (dyonto@uncc.edu)
Dr. Craig Allan (cjallan@uncc.edu)

Program coordinators:
Dr. Janni Sorensen: Geography PhD Program Coordinator (jsorens2@uncc.edu)
Dr. Eric Delmelle: Geography M.A. Program Coordinator (eric.delmelle@uncc.edu)
Dr. Scott Hippensteel: Earth Sciences Graduate Program Coordinator (shippens@uncc.edu)
Jamie Strickland: Geography Undergraduate Program Coordinator (jstrickl@uncc.edu)
Jake Armour: Earth Sciences Undergraduate Program Coordinator (jarmour@uncc.edu)
Terry Shirley: Meteorology Undergraduate Program Coordinator (trshirle@uncc.edu)

For any other information about our department, contact Teena Power at ges@uncc.edu

Follow our department on facebook:
www.facebook.com/UNCCharlotteGeoEarth