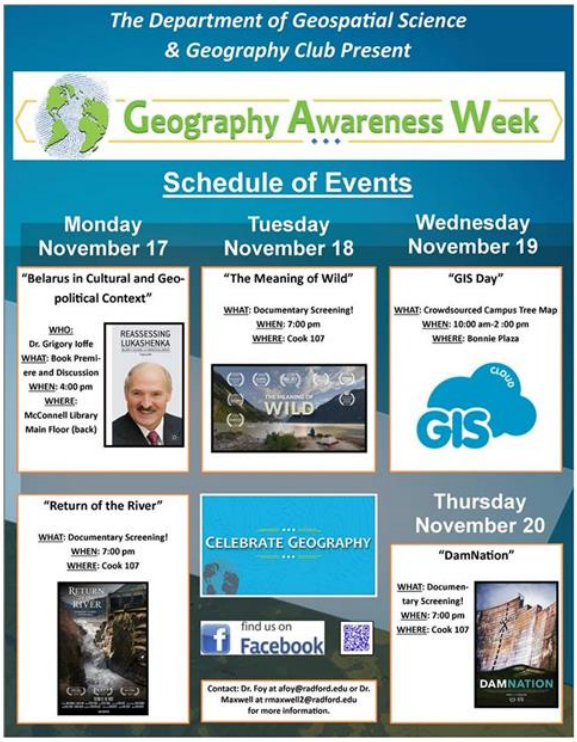
FROM THE DEAN'S DESK – December 5, 2014

THE RADFORD UNIVERSITY COLLEGE OF SCIENCE AND TECHNOLOGY NEWSLETTER

Students and faculty gather together at the Hurlburt Student Center to participate in GIS Day as a part of RU Geography Awareness Week on November 19, 2014.

GEOGRAPHY AWARENESS WEEK NOVEMBER 17 – 20 HOSTED BY THE RU DEPARTMENT OF GEOSPATIAL SCIENCE AND THE GEOGRAPHY CLUB



To help spread awareness of the world of geography and areas studied within Geospatial Science, the first Geography Awareness Week was held at RU during the week of November 17-20. The week began with a book premiere from Dr. Grigory Ioffe in McConnell Library featuring his new publication "Reassessing Lukashenka: Belarus in Cultural and Geopolitical Context," about Alexander Lukashenka, the controversial four-term Belarusian national leader, and the Eastern European country that is near the conflict between Ukraine and Russia.

"Belarus is an intermediate country straddling East and West with a lot of blurred cultural borders," Dr. Ioffe said. "It is a nitty-gritty reality."

Several movies were screened as a part of the celebration including the documentaries "The Meaning of Wild" where we travel cinematically with filmmaker Ben Hamilton to Tongass National Forest of Southeast Alaska as he discovered true wilderness and what it means to be a ecological advocate; "Return of the River," a film about the largest dam removal project in the history of the US; and "Dam Nation" another film about the history and controversy of dam removal projects.

Geography professor Dr. Andrew Foy works with John DeGrout and Matthew Bango as they check the location indicator on one of the cellphones they used to map locations of various trees around campus

A major highlight of the week was Geographic Information Systems (GIS) Day on Wednesday, November 19. More than 50 students and faculty braved unusually cold temperatures to participate in creating a crowd sourced campus

tree map. Contributors downloaded a GIS program to smart mobile devices and went across campus taking measurements and notes about the conditions and locations of the many different varieties of trees found at RU. The data entered was compiled into a single map that can be used to help monitor the health of the campus tree forest and to assist in the intentional preservation and propagation of trees over the next few years.

Volunteers took measurements and made additional notes about campus trees as a part of the GIS day activity.

"Trees make the campus and give it a quaint character," said Donald Stewart, a freshman geospatial science major from Waynesboro on the frigid morning. "It is nice to know when spring is coming when they turn green."

Teams of volunteers uploaded coordinates of over 100 points to a map hosted online in less than an hour. In total, the volunteers entered data points – type, coordinates and diameter – marking the approximately 70 species of trees that adorn the campus. The map enhances a paper map developed by Biology Instructor John Kell, who described the campus as "essentially an arboretum." Daniel Honeycutt, a senior geospatial science major and president of the Geography Club, appreciated the impact made by the volunteers. "They really help speed up the data collection process. They have done in one hour what would take a single person three or four weeks to do," Daniel said. Dr. Andrew Foy, assistant professor of geospatial science and director of the RU GIS center, described the process of GIS mapping for the day as collecting, sharing and publishing data by way of the cloud or web to leverage computing power, access and storage.

Volunteers utilized several pieces of equipment as well as mobile smart devices during the event.

"This is citizen involvement helping people," he said. "The best way to get stuff people like and need on our maps is to send them out to do it. It is empowering."

Dr. Stockton Maxwell, assistant professor of geospatial science, saw the event as an important opportunity to develop an understanding of the geospatial science field. "It seems that people can be naïve about what geospatial sciences is," he said. "It is explaining spatial phenomena and relationships. This has been a fun, interactive way to engage new technology to explain our work and how it can collaborate with other disciplines." GIS Day is an annual global event for users of GIS technology to educate their communities about how geography makes a difference and to demonstrate the technology. GIS technology represents computer software, data and solutions that are used for capturing, analyzing and displaying geographically referenced information.

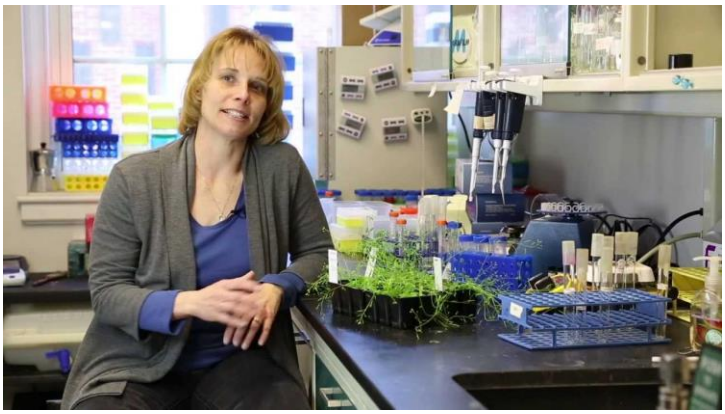
Matthew Bango and Jesse Daniels work with geography faculty to double check the geographical locators in their cellphones as they prepare to map the locations of various trees around campus.

To learn more about the activities related to Geography at RU, please visit http://www.radford.edu/content/csat/home/geospatial-science.htm

Don Bowman contributed to this story.

RU FACULTY MEMBER RECEIVES NATIONAL MASTER EDUCATOR PROGRAM GRANT AWARD

Dr. Tara Phelps-Durr, Associate Professor of Biology has been awarded the Master Educator Program (MEP) grant from the American Society of Plant Biologists (ASPB). She was one of two awardees in the country and was recognized for her project that uses a software package, ICM pro, to help model proteins and analyze plant genotypes/phenotypes. ICM pro empowers a biologist or chemist by providing a high quality protein structure analysis, modeling, and docking desktop software environment. The results of this work are expected to be used by Dr. Phelps –Durr for a publication she will present at the 2016 Plant Biology meeting.



QUBES PROJECT PROGRESSES

RU Biology faculty members Dr. Bob Sheehy and Dr. Jeremy Wojdak are part of a team working to enhance mathematics and computational skills among biology majors. Since these quantitative skills are essential for career success in biology, one would think that they already have an important place in all bioscience curricula. However, the incorporation of quantitative biology (or QB) into classrooms has been slow, hampered by poor communication among QB educators and an academic reward system that often overlooks pedagogy development and research. To help provide a remedy to this problem, the Quantitative Undergraduate Biology Education and Synthesis (QUBES) project was formed and has been awarded nearly 3 million dollars in grants from the National Science Foundation.

The QUBES team, made up of faculty from Unity College, University of Pittsburgh, University of Wisconsin – Madison, BioQUEST Curriculum Consortium, College of William and Mary, Purdue University, Roanoke College in addition to Drs. Sheehy and Wojdak, focuses efforts in five distinct, but interdependent, initiatives:

1. Coordinate the efforts and resources of disparate communities invested in promoting quantitative biology education.

2. Support faculty understanding and implementation of specific quantitative biology concepts and teaching approaches.

3. Increase the visibility, utility, and adoption of existing quantitative biology materials and the capacity for peer interactions to support innovation.

4. Describe and track faculty contributions to quantitative biology education scholarship.

5. Study and disseminate the features of this system that influence implementation success.

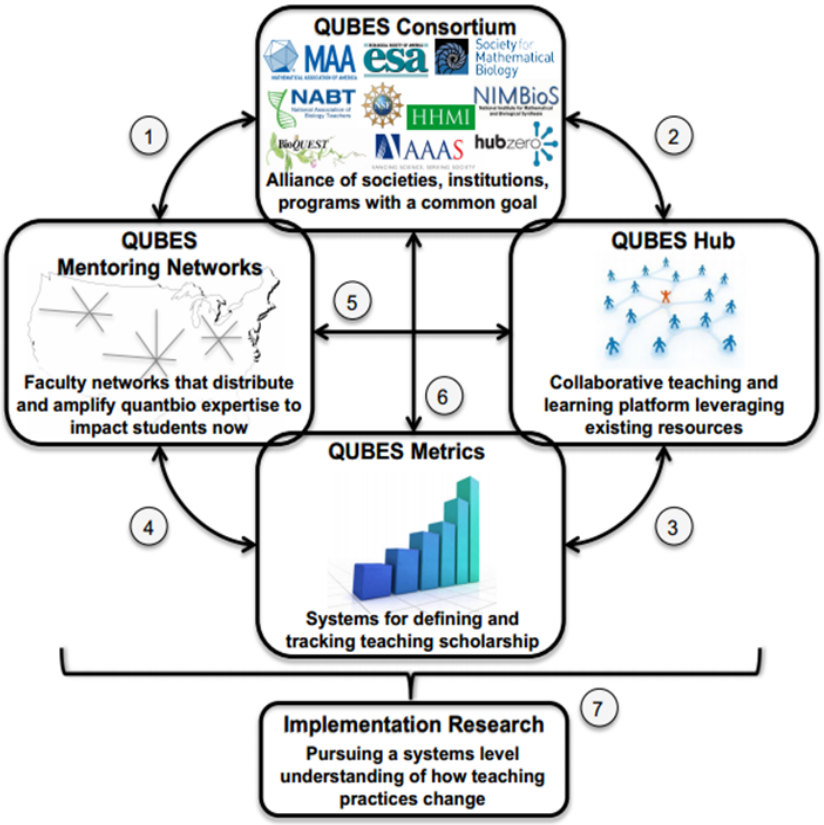
These faculty have been able to recruit a number of organizations to join a consortium to help support the efforts of the QUBES project. Members include:

AAAS - American Association for the Advancement of Science
HHMI - Howard Hughes Medical Institute
NIMBioS - National Institute for Mathematical and Biological Synthesis

SMB - Society for Mathematical Biology
BIO SIGMAA - a special interest group of the Mathematical Association of America
BEER/LiB - International Symposium of Biomathematics and Ecology Education and Research and Letters in Biomathematics
MBI - Mathematical Biosciences Institute
MCRN - Mathematics and Climate Research Network
BioQUEST Curriculum Consortium
ABLE - Association of Biological Laboratory Educators
NABT - National Association of Biology Teachers
SUMS4Bio - Strengthening Undergraduate Mathematics and Statistics Education for Biologists
ESA - Ecological Society of America
SSE - Society for the Study of Evolution

The project is a five year effort and has been making progress in 2014. "Currently we are developing the web site and hope to go live in mid to late December" said Dr. Sheehy. "RU is in the process of hiring a post doc whose job will be to serve as a liaison and facilitator for the faculty mentoring groups and work is underway to recruit the first cohort of faculty for these groups. Drew LaMar from William and Mary and I are also in the process of recruiting computer science students to help in the development of simulations which will demonstrate biological principles."

To learn more, please visit the QUBES project homepage at http://www.qubeshub.org/.



A graphical representation of the QUBES project

RU RESEARCHING: MATTI HAMED

Senior biology major Matti Hamed has a passion for science education. Over the past year, she has been a "Highlander in Action Scholar" sponsored by the RU Scholar Citizen Initiative and has shared her passion for science with many people throughout the region while helping to remove some myths about reptiles and amphibians. "As I chose this project I was unsure of what capacity an undergraduate student could be involved in research" recalls Matti. "Needless to say, I was delighted to find out that Radford University is unique in its support of undergraduate research." She adds "When I heard about Dr. Matt Close working with snakes I got excited. Reptiles are very diverse, interesting creatures and I've always liked them. "

Matti's project centered on setting up a long-term herpetofaunal study at Selu Conservancy, examining the reptiles native to the region. "Selu Conservancy is my favorite part of Radford University and it is an invaluable educational resource" said Matti. "I first recognized its value when I first visited Selu during an Ecology lab and I remember thinking, 'I want to work here, so how do I make that happen?' My research project turned that desire into a reality. "

Matti with one of the funnel traps she constructed to help corral some of the wildlife at Selu for further study.

The experience with reptiles and amphibians at Selu has been more than she imagined. "I love the animals that I got to work with and I was deeply moved by how nature has created such beautiful and diverse creatures" stated Matti. "For example, wood frogs are not only beautiful but they can withstand being 60% frozen. Nature had cryonics before humans did. I have come to understand that my view of the world was limited to how I experience it as a human. Nature has exquisite intricacies that consistently surprise and delight me."

An image of a baby box turtle from Matti's work.

Bringing her experiences to the world has been a big part of Matti's project. "Along with the animals, my favorite part of research has been sharing it" she said. "I have a blog, though underdeveloped, that I have enjoyed writing and I have shared what I do via poster presentation in several different venues." Nothing beats the personal touch though. "My all-time favorite way of sharing my experience has been having people come out to Selu with me and see first-hand the animals I get to work with" stated Matti.

While many people would look at Matti's success as the result of a long-term set of calculated decisions going back to her childhood involving a dream of working with reptiles and amphibians, they would be surprised to learn that her path has been a bit of a "sidewinder."

"The truth is I went for a long time not being sure of what I wanted to do. I had plenty of ideas, but nothing motivated me" Matti said. "I started school at a private college and hated it. I actually really liked the academics, but it was a tiny school and it wasn't a good fit." She adds "I went to community college and I took classes in the social sciences because I had this long held dream of being an anthropologist that would travel the world. That dream never solidified so I took a year and went to school to become a massage therapist where I really fell in love with anatomy and physiology."

It was during her work as a massage therapist while attending community college, that her focus changed. "I started taking more science courses and it turns out science is really fun for me" she said emphatically. "I am a kinesthetic learner and science is hands-on. "

A hog nosed snake photo from the Virginia Herpetological Survey in James River State Park in May

Matti decided to pursue a degree in Biology and applied to RU and, at the time, never thought she would have a strict focus on wildlife biology. "I have considered many different careers including becoming a medical doctor, a physical therapist, a nurse, or a medical examiner but I've decided to become a high school biology teacher which I get endless criticism for" she says. "I've chosen to become an educator because I was lost in school and that isn't how it should be. Education has the potential to be so much more than a standardized test. Science is incredibly fun, and I believe that I can use it as a tool to inspire students to enjoy learning. "

Matti plans to continue her research into the spring of 2015 before heading to graduate school for the fall of 2015 where she will pursue a degree in curriculum education.

PANEL HIGHLIGHTS RICH UNDERGRADUATE RESEARCH EXPERIENCES

After the Summer Opportunities Student Panel on Nov. 6 in Heth Hall, the panelists (front row, from left: Dan Metz, Melissa Brett, Jordan Eagle; back row: Debra Lustig, Joe Ashley, Cassie Bonavita) relax in a lighthearted moment.

Six RU undergraduate students who did research projects during Summer '14 shared their experiences at the Summer Opportunities Student Panel on Nov. 6 in Heth Hall.

To cap the event, sponsored by the Honors Academy and the Office of Undergraduate Research and Scholarship (OURS), moderator Joe Wirgau asked the panelists to share advice in less than 10 words with the more than 50 future student researchers at the event.

"Start early," said Joe Ashley, a senior physics student from Purcellville, who spent the summer at the National Institute of Standards and Technology interning on a research project making solar cells cheaper and exploring other applications for them.

"You are more awesome than you think," said Melissa Brett, a senior geology and physics major from San Diego, whose summer fellowship included service on a research team studying the health of the Juneau Icefields in Alaska and Canada.

"Do your best and be enthusiastic," said Jordan Eagle, a junior from Hampton, who spent the summer at the National Radio Astronomy Observatory as an Educational Outreach Program in Radio Astronomy (ERIRA) scholarship recipient. Eagle worked with 20-meter and 40-foot radio telescopes to weigh the Milky Way galaxy using the Doppler Effect, calculated Saturn's parallax angle to determine its distance from Earth, measured the heat flux of Jupiter and observed rotational frequencies of pulsars.

"You have to take the first step," said Debra Lustig, an art major from Roanoke, whose summer included three months in Europe learning German and hunting down visual remnants of Charlemagne for research on the many ways Europe's first great conqueror is presented artistically through history.

"Get involved and be awesome," said Cassie Bonavita, a senior biology major from Yorktown, who collected mosquitoes in Costa Rica as she looks for a link between the microbial combinations found in mosquito intestines and the presence or absence of the dengue fever virus.

"Show up," said Dan Metz, a biology major from Snowville and the Ecological Society of America's SEEDS Research Fellowship recipient for 2014-2015, who studied an unknown parasite in shore crabs while at University of California at Santa Barbara.

Dan said his career was boosted when he told a faculty member, "I'm bored," and how the admission led to being part of several research projects and the experience and confidence to develop his own research agenda. Lustig recounted how critical to her career the encouragement of her faculty mentor, Associate Professor of Art Carlee Bradbury, had been. Cassie also talked about how her faculty mentor, Associate Professor of Biology Justin Anderson, had been instrumental in developing the plan, personal statement and budget that led to her receiving funding for her research proposal.

"I got my foundation as a researcher on four projects I sought out at RU," said Cassie and she urged the audience to "realize that you are building your reputation every day."

The panel was unanimous in saying that their experience at RU prepared them to succeed. The panelists recounted the application process for grants, fellowships and internships and RU's resources for beginning a career as a researcher or scholar in the sciences or humanities.

"The impact and significance of doing undergraduate research cannot be overestimated," said Dr. Wirgau, director of the Office of Undergraduate Research and Scholarship. "Undergraduate scholarship or research with a faculty mentor opens doors a student cannot imagine."

Dr. Wirgau encouraged all students who are interested in enhancing their academic experience with a summer internship, research or scholarship experience to reach out to a faculty mentor. He said other resources are available at the OURS office.

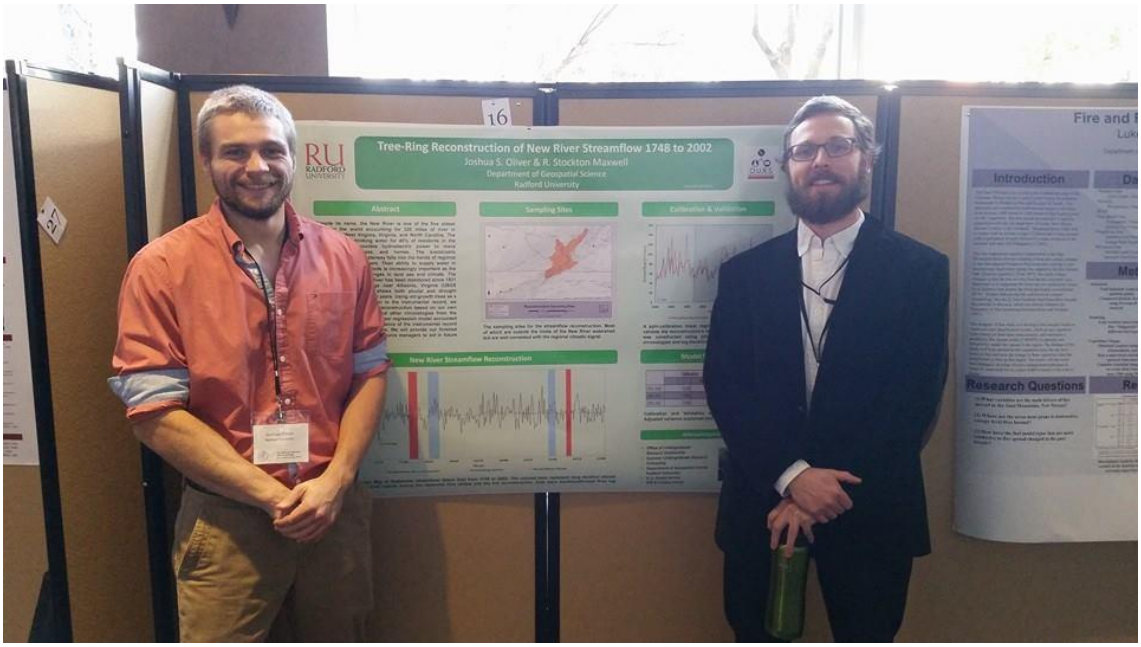
RU FACULTY AND STUDENT WORK TO BE FEATURED IN THE JOURNAL OF COMPUTATIONAL CHEMISTRY

Dr. Tim Fuhrer and his student researcher, Angel Lambert, have had a paper accepted by the Journal of Computational Chemistry with the title “Isolated Pentagon Rule Violating Endohedral Metallofullerenes Explained Using the Huckel Rule: A Statistical Mechanical Study of the C84 Isomeric Set.”
It is available online now at http://onlinelibrary.wiley.com/doi/10.1002/jcc.23774/pdf and will be printed in a forthcoming issue.

RU Chemistry Major Angel Lambert

Dr. Tim Fuhrer

STUDENTS AND FACULTY PRESENT WORK AT CONFERENCES



Geospatial Science student Josh Oliver presented his undergraduate research along with Dr. Stockton Maxwell at the South Eastern Division of the American Association of Geographers (SEDAAG) annual meeting held at the University of Georgia November 23-25, 2014.

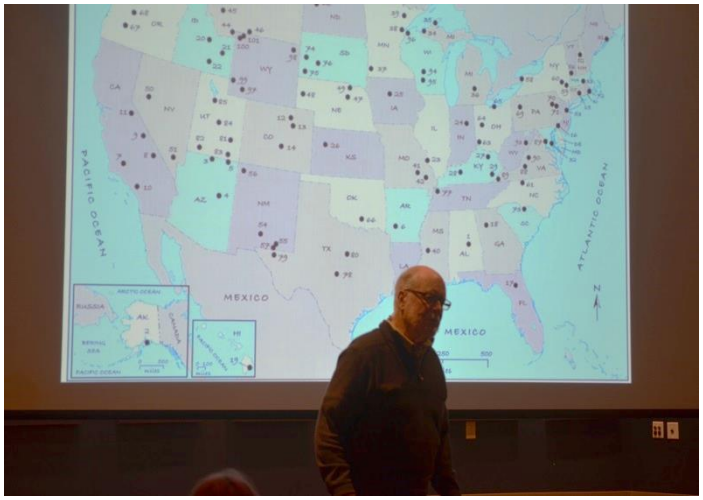
James Walker, a senior biology major who has worked with Dr. Justin Anderson in the RU Arbovirus and Medical Entomology Lab, presented his research at the Virginia Branch meeting of the American Society for Microbiology on November 7-8 at James Madison University. James tied for second place in the poster presentation competition, outplacing a number of graduate student posters. His award is a free student membership in the ASM.

RU CYBER DEFENSE TEAM PLACES AMONG TOP SCHOOLS AT UCONN CYBERSEED COMPETITION

Members of the RU Cyber Defense Club placed 6th among 43 schools in the CyberSEED CTF challenge held at the University of Connecticut in October. Lloyd Jones, Chris Huntington, Bobby Russ, and Justin Arnold learned this week of their official ranking topping teams from Syracuse, Penn State, and Brown University among many others.

UNUSUAL GEOLOGIC SITES IN AND AROUND VIRGINIA FEATURED AS A PART OF THE MUSEUM OF THE EARTH SCIENCE LECTURE SERIES

Geologic wonders from across the Old Dominion and neighboring states were on display in the Bonnie Hurlburt Hall auditorium on Tuesday, December 2. Dr. Albert Dickas, author of the book "101 American Geo-Sites You've Gotta See" presented a lecture about unique points of interest and the geology behind them in our region.



Dr. Albert Dickas with a graphic representation of all the places he visited to research information for his book.

Dr. Dickas retired after a long career working in industry and education, but found he was missing something. "I was losing my knowledge of these amazing geologic spaces while in retirement, so I decided to write a book" he recalls. "Working with the publisher, I found interesting spaces in each state where I could explain the geologic forces that created them."

In Virginia, Dr. Dickas discussed the great falls near Washington D.C. "35,000 years ago these falls would have been right about the location of Roosevelt Island between the District and Virginia" he said. "They have been progressing upstream at a rate of about 2 feet per year and are now 15 miles to the west. " Over time, they will continue their slow westward trek until they reach the Blue Ridge mountains where they will become massive mountain-sized waterfalls."

The presentation also showcased Natural Bridge near Lexington, Pilot Mountain in North Carolina, not far from the border of Virginia, and the Seneca rocks in West Virginia.

The lecture series will continue in the spring semester and is sponsored by the Museum of the Earth Sciences and the RU Chapter of Sigma Gamma Epsilon.

ARTIS LAB HOSTS WOMEN IN TECHNOLOGY SPEAKER SERIES

After a grand debut at Homecoming in October, the ARTIS Lab in Davis Hall has been busy with activity serving as the perfect space for group discussion and collaborative education. On November 12, Gina Gallagher met with students in an event sponsored by the Women in Computing Club and Upsilon Pi Epsilon honor fraternity. A member of the RU Class of 1985 and Vice President of Systems Made Simple - a leading provider of health information technology solutions to the U.S. federal government – Ms. Gallagher has had an extensive career in technology based businesses and was able to share her experiences with the students gathered together about balancing work and personal life, and challenges for women in the workplace. The event was the third such program in the five weeks since the lab opened.

Gina Gallagher speaks with students in the ARTIS Lab.

MATH STUDENTS CREATE UNIQUE DEMONSTRATIONS FOR GEOMETRY CLASS

Dr. Agida Manizade's Math 135: Fundamentals of Geometry course has been helping students learn to share their work in original and interesting ways. On Tuesday, December 2 students were presenting their projects on Non-Euclidian Geometry topics which included Elliptic Geometry, Absolute Geometry, Taxicab Geometry, and Hyperbolic Geometry. These demonstrations are another way that the Department of Mathematics and Statistics is exploring unusual methods for helping students learn mathematical concepts.