Greetings from the New Chair

Hello from the CMU campus in beautiful Mt. Pleasant. As I write these words, the leaves outside my window are a vibrant yellow, courageously hanging on in the face of the inescapable transition from fall to winter. Earth and Atmospheric Sciences faculty and students have settled into a steady rhythm, moving forward past midterm exams toward the inevitable end-of-semester crunch. From my perspective as the incoming EAS chair, we have much to be enthusiastic about. Our department is growing and we are delighted to share some of the most exciting new developments with you in this newsletter.

First and foremost, seven new faculty members with expertise in hydrogeology, climatology, mesoscale meteorology, geomorphology, geobiology, molecular geochemistry, and environmental modeling have joined EAS in the last five years (check out their profiles on pages 2 to 4). I am personally grateful for the leadership Marty Baxter provided as interim chair and the considerable effort put forth by the search committees responsible for successfully hiring four new full time faculty last year alone. Remarkably, we are now searching for an Applied Geophysicist to add to our team! This level of growth represents a tangible commitment from the College of Science and Engineering, with particularly strong support for our newly launched Bachelor’s degree program in Environmental Science. Together with Geology and Meteorology, Environmental Science gives our students a full range of degree opportunities in Earth and Atmospheric Sciences. Moreover, our current cadre of professors represents one of the strongest combinations of research and instructional expertise on the CMU campus!

In the midst of significant change, some very important things remain constant. Chief among these is the dedication to our students that our exceptional faculty share. Long time faculty members Neil Mower, Sven Morgan, Mona Sirbescu, Marty Baxter, Martin Steinbis, and Mercedes Gonzales continue to help move our department forward. Another constant is our commitment to provide a rich constellation of relevant experiences for our students. These include field trips, internships, practicums, career counseling, undergraduate research, opportunities to create weather forecasts, and travel to attend professional meetings. Alumni support plays a substantial role helping us offer these opportunities to EAS students, and for that we are enormously grateful – thank you!

Finally, as the new chair, one of my priorities is to build and maintain strong connections with our alumni. Therefore, I would like to extend a warm invitation to all alumni to stop in and visit our department the next time you find yourself on campus. If you can’t manage a visit in person, then please drop us a line to let us know how you’re doing. I look forward to getting to know you in the years to come…

Cheers!

Larry Lemke
Professor and Chair
Department of Earth and Atmospheric Sciences

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John Allen

What do you get when you blend a mesoscale meteorologist, a synoptician and a climatologist? The answer is someone who is interested in looking at how the climate system in terms of variability or change can influence the occurrence of severe thunderstorms and the risk posed by these events. I address problems like this from a range of perspectives, including statistical analysis, large model or reanalysis datasets, understanding severe storm dynamics, sensitivity based atmospheric modelling and leveraging environmental conditions favorable to storm development to proxy the occurrence of events such as tornadoes and hail. Really though, my interests stretch to much of the field of severe storms, from observational fieldwork through to understanding the theory behind physical processes.

I recently joined the department here at CMU following a postdoc and period as a research scientist at the International Research Institute for Climate and Society, Columbia University, New York, NY. I received my PhD in Earth Sciences (Meteorology) at The University of Melbourne, Australia, where I established the implications for a warming and variable climate on severe thunderstorms in Australia.

In addition to my research, I’ve also chased storms and tornadoes for the past 14 years, and seen tornadoes in both continents, and currently do field work with support from National Geographic. I’m looking forward to working with students in the meteorology program, and hopefully applications of hail climatology to agriculture losses with environmental science students.

Lawrence Lemke

I am a geologist and environmental scientist with deep ties to the State of Michigan. I came to CMU from Detroit, where I was the Director of the Environmental Science Program at Wayne State University. I hold a B.S. in Geology from Michigan State, an M.S. in Geosciences from the University of Arizona, an M.B.A. from the University of Denver, and a Ph.D. in Environmental Engineering from the University of Michigan.

Prior to leaving industry to earn my doctorate, I spent 12 years working for Exxon and its subsidiaries exploring for oil and gas in the Rocky Mountains, Gulf of Mexico, North Sea, and the Peoples’ Republic of China. Now, I investigate the fate and transport of contaminants in groundwater, air, and soil, with particular emphasis on human health and exposure risks in urban environments. I am particularly excited about continuing my research with EAS undergrads and Earth and Ecosystems Science doctoral students at CMU!
Anthony Chappaz

My research identifies and characterizes reactions involving trace metals in order to decipher processes that govern the fate and transport of trace elements in both modern and ancient aquatic ecosystems. More specifically, I explore molecular processes involved in biogeochemical cycles of trace metals through experimental geochemistry, analysis of diverse natural materials, and transport-reaction modeling. By using these integrative approaches, I aim to improve our understanding of the paleo-environmental implications of trace-element behavior, such as their potential to illuminate how the chemistry of Earth’s surface has changed through geologic time, as well as the implications for modern societies—including environmental chemistry and identification of pollution sources.

I was trained as an analytical chemist but gradually shifted toward geochemistry through my education. After my B.Sc. in Chemistry conducted at the University of Grenoble (French Alps), I went to the Atlantic Coast and received my M.Sc. in Chemistry and Microbiology of Water from the Universities of Pau and Poitiers. Then, I jumped across the Atlantic Ocean and obtained a Ph.D. in Water Sciences (Aquatic Geochemistry) from the National Scientific Research Institute – Water, Earth and Environment Center (University of Quebec, Quebec City). Following my Ph.D. graduation, I continued my westward scientific journey and did a postdoc at the University of California, Riverside within the department of Earth Sciences.

Since joining CMU, I have established a state of the art research facility unique in North America: the STARLAB. This acronym stands for Speciation Traces Analysis Radioisotopes. As the director of the STARLAB, I have been engaging many undergraduate students, Ph.D. students and postdoctoral researchers in exciting research projects.

Wendy Robertson

My research program examines aspects of hydrology, ecohydrology, hydrogeology, and biogeochemistry in human-affected systems. I use a combination of environmental tracers, geochemistry, remote sensing, and modeling techniques to elucidate questions about hydrological fluxes, nutrient cycling, water quality, and sustainable management of water resources.

I came to CMU in Fall of 2014 after completing my M.S. in Environmental Sciences from the University of Virginia and my Ph.D. in Geosciences from the University of Texas at Austin.
Nicole West
I am a geoscientist with broad scientific interests in Earth Surface Processes and the evolution of the Critical Zone, which extends from the top of the tree canopy to the deepest penetration of groundwater. I combine geomorphological, geochemical, and geophysical tools to elucidate the physical and chemical processes driving rock weathering, soil formation, and landscape evolution, and how these processes are driven by climate and tectonics.

I recently joined the Earth and Atmospheric Sciences Department at CMU after completing a postdoc at the Georgia Institute for Technology in Atlanta. I received my PhD in Geosciences at Penn State University, where I used cosmogenically-produced radionuclides to measure the rates and magnitudes of soil erosion in upland, forested watersheds.

Before pursuing a career in academia, I worked as a consulting geochemist for Schlumberger Water Services and as a contractor for the USGS. I am excited to be a part of the EAS faculty here at CMU, and I look forward to working with Geology and Environmental Science Students!

Megan Rohrssen
I am a geologist and organic geochemist by training. My primary research uses durable molecules produced by living organisms (organic geochemistry) to track interactions between life and earth systems processes through time (geobiology). These same tools also allow me to look at hydrocarbons in petroleum exploration and some organic environmental pollutants.

I started out with a B.A. in geology from Carleton College, where I did research projects on mineral growth under mantle conditions and identifying signs of life on the early Earth and Mars. My PhD research at the University of California, Riverside focused on the Late Ordovician glacial maximum mass extinction. After my PhD, I went to the University of Bristol, UK, where I worked with a great team on carbon cycling in wetlands, especially during the Paleocene-Eocene Thermal Maximum. Before diving into academia, I spent a little time at the Jet Propulsion Lab, then was a guide at a bald eagle rehabilitation facility in Alaska.

At CMU, I am looking forward to keeping a research foot in the ancient while taking new steps into modern systems. I’m excited to contribute to EAS’s efforts to engage students across the board - in the classroom, lab, and field!
Meteorology program acquires new instrument, high performance computer, and software

The meteorology program received a high ranking in CMU's most recent evaluation of its academic programs. As a result, EAS received funds from the central administration to enhance the meteorology program. With these funds, we purchased a new computer that runs our own custom Weather Research and Forecasting model four times per day, which students can use to assist with Campus Weather Forecast creation. We also refreshed the hardware in the Meteorology Computer Lab and purchased a new data server. This has allowed us to install AWIPS-2, the same software that the National Weather Service uses to analyze data and create forecasts.

AWIPS-2 allows students to more efficiently investigate atmospheric processes in real-time. Finally, we purchased an additional instrument for our Campbell Scientific weather station, a Present Weather Sensor. This sensor can determine the type of precipitation, as well as provide information about the characteristics of the precipitation as it changes throughout a storm. The information provided by the sensor will allow students to learn more about precipitation processes in our Physical Meteorology course. Dr. Baxter and Dr. Kluver have been working with students to install the new instrumentation.

GSA Denver 2016

The Earth and Atmospheric Sciences department was well-represented at the 2016 Geological Society of America National Meeting in Denver by faculty and students alike. Larry Lemke, Megan Rohrssen, and Nicole West presented research at the meeting, and faculty member Wendy Robertson was nominated for the International Service Award from the International Association of Hydrogeologists! Additionally, EAS was able to help four undergraduate students attend the conference and gain educational and networking experience. Megan Miller, Jade Detroyer, Holli Gay, and Sam Cameron were able to take advantage of several student-centered sessions, focusing on pathways to careers in government and industry, contacting graduate schools, and resume preparation.

When asked about her impressions of the conference, Megan Miller replied, “Personally, it was almost overwhelming in the most positive way. There was so much to do, see, and hear that obviously it would be impossible for anyone to do it all. However, we tried to get as much information as possible and I feel like I learned a lot, not just about the research presented but also future career opportunities and advice.”

Jade Detroyer was able to experience first-hand how her training through CMU has expanded her scientific network and prepared her scientifically; “My favorite talk was the very last one I went to. It was about geomorphological and geophysical evaluation in the Wind River Range in Wyoming. I attended field camp there and so did the speaker, who I was also very good friends with. It was unbelievable to me, that as an undergrad I was able to understand such in depth data and conclusions which were found and presented by another undergrad student.” We thank all of our generous donors for supporting EAS programs that provide these experiences for our students!

From left to right: Wendy Robertson, Larry Lemke, Megan Rohrssen, Sam Cameron, Holli Gay, Megan Miller, Jade Detroyer, Nicole West, and Jackson Jakeway (CMU class of 2016).
Geology Field Training

Students enrolled in GEL 290, Geologic Investigation, travelled to West Virginia for four days as their first challenging field experience. The group described and correlated two stratigraphic sections in Pennsylvanian-aged cyclothems and mapped the Burning Springs Anticline. Early exposure to field work using a Brunton compass and learning to make observations and independent interpretation prepares students well for classes to follow. As a result of such field training, CMU students excel at summer geology field camp programs. Students enrolled in Petroleum Geology visited an active Michigan Basin drilling rig (hosted by Biggard Drilling and Jordan Exploration Co.), toured logging and completion technology at Baker Hughes, and spent a day at the MGREE core facility in Kalamazoo. These opportunities prepare interested students to understand and work with subsurface data including cores, drill cuttings, well logs and drilling reports.

Geology Club Field Trip

The Geology Club organized a spring break field trip to southern New Mexico and west with the support of alumni donor contributions and the W.E. Moore field trip travel fund. Fifteen students visited famous localities in southern New Mexico including the Organ Mountain Caldera near Las Cruces, Carlsbad Caverns, the Carrizozo lava flow, White Sands National Monument, and the Tularosa and Mesilla Basins to view classic horst and graben structures and get a first-hand experience of the volcanic and sedimentary history of the southern Rio Grande Rift. In addition, we also spent a full day in the Guadalupe Mountains of west Texas examining El Capitan and a fully-exposed Permian reef structure. The students hiked from the basin floor to the heart of the fore-reef deposit where they could get a first-hand picture of biostratigraphic changes along a stacked reef deposit. This was the first major trip outside of Michigan for many students and it provided an opportunity for students to experience a wide range of geological sites that they would not likely see if not for continued alumni support.

Running with the Dinosaurs

Active learning remains a cornerstone of instruction in EAS classes. In the photos shown here, students in Cory Paliewicz’s GEL 230 (Prehistoric Life) class, prepare to measure the footprint size and stride length captured by synthetic dinosaur tracks. In this exercise, originally developed by Reed Wicander, students analyze their data to estimate relative stride and running speed of the dinosaurs that made these tracks. The analysis is based on a formula developed by R. McNeill Axexander that relates stride length and hip height (estimated based on footprint size) to locomotive velocity.
Faculty Spotlight: Marty Baxter

Marty Baxter completed a one-year term as interim chair, during which he oversaw the hiring of four new EAS faculty and the approval of the environmental science major by various committees. He has continued to teach the Synoptic Meteorology sequence, and has recently developed a new course entitled “Professional Development in the Atmospheric Sciences”. This course provides new students with information about career options, and how they might best use their time at CMU in pursuit of a career in meteorology.

Dr. Baxter was awarded a grant from the National Weather Service to investigate how new, highly detailed computer model forecasts might best be used to predicted snowfall that occurs in narrow bands. He’ll be working with collaborators from North Carolina State University and across the National Weather Service.

During the week of February 15, Dr. Baxter took part in the annual Winter Weather Forecasting Experiment at NOAA’s Center for Climate and Weather Prediction in College Park, Maryland. This month-long experiment pairs forecasters and researchers from around the country with forecasters from the Weather Prediction Center. During the experiment, newly developed computer models and forecast techniques are tested for winter weather events across the U.S.

In addition, Dr. Baxter gave a presentation for NOAA personnel on his research on the “Distribution of Single-Banded Snowfall in Cold-Season Central United States Cyclones” (see picture to the right).

Faculty Spotlight: Daria Kluver

This is my 6th year at CMU. I study the climatology of snowfall and in the last year have published two papers on that topic. The first is a paper on regionalized snowfall trends in the United States, published in the International Journal of Climatology (Kluver and Leathers, 2015). The second paper is about a 1 degree by 1 degree gridded North American snowfall data set in the Journal of Atmospheric and Oceanic Technology (Kluver et al., 2016). The gridded data are archived and available for download at the Rutgers Global Snow Lab.

In addition to conducting snowfall research, I spent time this past summer installing hydro-climate instruments on Beaver Island, Michigan, for a project with fellow EAS faculty, Dr. Wendy Robertson. We are collecting data to measure energy and water fluxes in order to study lake level impacts on inland wetlands. This project involves an undergraduate meteorology major, Cody Converse. Over the past year I have continued to teach meteorology classes. Some highlights were launching a weather balloon in the snow and a field trip to the R.M. Young meteorology instrument manufacturer in Traverse City, Michigan.
Faculty Spotlight: Sven Morgan

I am still heavily involved in my research on magma emplacement and wall rock deformation in Utah and California. I am currently writing an NSF grant proposal with Jim Student to do an ion probe study of quartzites from around a pluton in California to understand how tiny amounts of water affect the strength and recrystallization of the quartzite. We just published our preliminary results in Tectonophysics this past spring. Still taking students to the U.P. every fall and thinking about starting up some research there too!

My research in Utah is ongoing as well. I just submitted a paper to GEOLOGY on how we used magnetic methods (a hand-held susceptibility meter) to define magma sheets in a sill in the Henry Mountains. This paper is co-authored with three CMU geology majors (now alumni); Rebecca Jones (2013’), Jeremy Connor (2012’), and Megan Schaner (2014’), who actually collected most of the data. We also had help from rock climber Joe Mohan (2014’), who taught us how to collect samples along a cliff by rappelling down the face! Mike Gunnels (2015’) and Ethan Earnest (2015’) also worked in the Henrys, but on a magma flow within a dike and the deformation of the surrounding Navajo sandstone and their work is forthcoming.

Faculty Spotlight: Neil Mower

Dr. Mower continues to be a cornerstone of the Meteorology Program. He teaches MET 101 (Our Changing Climate), MET 140 (Severe and Unusual Weather), MET 310 (Atmospheric Thermodynamics and the Boundary Layer), MET 320 (Physical Meteorology), and MET 330 and 335 (Dynamics I & II).

Along with Marty Baxter, Neil represented Central Michigan University at the UCAR (University Corporation for Atmospheric Research) Annual Members Meeting followed by the AMS/AGU Joint Heads and Chairs Meeting in Boulder, Colorado last October.

Faculty Spotlight: Mona Sirbescu

The main courses I teach are Mineralogy, Petrology, and Geomath. They are a continuous source of joy…and a source of gray hair too! Geomath may sound new to many of you. In it, students learn to apply algebra, trigonometry, and calculus to geological problems. For example, Geomath students use handmade structural models to understand the difference between apparent and actual thickness of layers, solve vector problems using computer simulations, and measure the cooling rate of hot potatoes to apply the concept of derivatives. They also take turns presenting solutions to problems and use Excel a lot. This is all toward the noble goals of building confidence in math skills and public speaking.

In Mineralogy we keep updating the itinerary of our (in)famous field trip to the UP. Don’t worry, the crystallographic “blocks of hell” are still the same. This year we
Staff Spotlight: Michelle Nestor

I am the department Executive Secretary. I graduated from CMU with a Bachelor of Science in Psychology and continued my education, recently graduating with a Master of Arts in Professional Counseling.

I have 10 years CMU experience, 6 of those with the EAS department. I have extensive administrative experience supervising support staff, coordinating projects and events, accounting, and general day to day administrative tasks.

I enjoy promoting and supporting our university programs and doing what I can to improve the academic success of our EAS students. The most rewarding part of my job is building relationships with CMU undergraduates and having students contact me (sometimes years) after they graduate. So please keep in touch!

Staff Profile: Benjamin K. Harrison

As a Geobiologist, I endeavor to connect earth and life science disciplines to create a better understanding of the natural environment, particularly how microbes interact with their physical and mineralogical environment, and how such interactions impact diversity and metabolism on a fine spatial scale. My academic background reflects this interdisciplinary approach: I started with a B.A. in Geology from Carleton College with an emphasis on igneous petrology, then completed a PhD in Geochemistry at Caltech focused on interactions between microorganisms and minerals. Most recently, I spent two years at the University of Minnesota as a Postdoctoral Researcher, studying the relationship of microbial diversity to sedimentary structures.

My mission at CMU as an Environmental Science Research Specialist is to help the EAS research community run smoothly, and I'm excited to be part of this evolving department!
Dr. Ashton Peyrefitte Retires

After more than 40 years of teaching meteorology, Dr. Peyrefitte has returned to his native New Orleans to be with family. Dr. Peyrefitte taught at 5 different institutions before joining us in 2000. Countless students learned a variety of subjects from him, including Synoptic Meteorology, Tropical Meteorology, and Climatology. He was very generous to students, devoting countless hours to advising, and donating to support student travel to conferences.

He also made sure everyone was well fed! Ashton’s valuable presence is greatly missed, but he remains active in the field. He has been holding meteorology seminars for senior citizens, and will be presenting at January’s American Meteorological Society meeting.

He can be reached at peyrefittejr@gmail.com. Feel free to view the presentations from the retirement ceremony at https://www.youtube.com/user/CMUmeteorology.

We could not accomplish our goals without the support, involvement, and enthusiasm of our committed supporters.

Thank you to the following donors and organizations who recently contributed to the Earth and Atmospheric Sciences Department.

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