Ohio Section
American Institute of Professional Geologists

Chartered 1965 November 2024 Newsletter

AIPG Ohio Section Annual Meeting

Phosphorus transport across the groundwater-surface water interface in intensively managed agricultural streams and relevance to Great Lakes water quality

Presenter: **Dr. Audrey Sawyer, Professor of Earth Sciences at The Ohio State University**

Date: Thursday, November 21, 2024

Location: The Boat House at Confluence Park
679 W. Spring Street
Columbus, OH 43215

Schedule: Social hour begins at 5:00 pm followed by Dinner at 6:00 and Presentation at 7:00

Event Registration Payment: https://aipg-ohio.org/meetinginfo.php
See Page 13 for event details

Also In This Issue:

Message from the President

Mike Friedhoff, CPG - 11093

Greetings Fellow AIPG Ohio Section Members,

As the holiday season quickly approaches, I find myself reflecting on a fulfilling year and writing my final message as the 2024 President of the AIPG Ohio Section. It's been a year packed with meaningful professional growth, collaborative events, and remarkable contributions from our members.

Looking ahead, we are thrilled to host our annual meeting on November 21st, featuring an insightful presentation by Dr. Audrey Sawyer, Professor of Earth Sciences at The Ohio State University. Her talk, *"Phosphorus Transport across the Groundwater-Surface Water Interface in Intensively Managed Agricultural Streams and Relevance to Great Lakes Water Quality,"* will delve into critical issues affecting both our region and the environment at large. Dr. Sawyer's expertise promises to bring a fresh perspective to our ongoing discussions on water quality and environmental stewardship.

We also had the opportunity to have our Fall Quarterly Meeting at our new student chapter location at Miami University, where Dr. Claire McLeod, Associate Professor at the Department of Geology and Environmental Earth Science, delivered a fascinating presentation titled *"Toward an Understanding of Lunar Geology: Humanity's Role and Ohio's Legacy, Past and Future."* Her talk reminded us of Ohio's proud contributions to space exploration and planetary science, both past and future.

Our Sixth Annual Golf Scramble at Chapel Hill Golf Course in Mt. Vernon, Ohio, once again proved to be a wonderful success, raising over $2,600 this year. This support directly benefits our student chapters, fostering the next generation of geoscientists and advancing our mission in Ohio.

It was an honor to represent the Ohio Section at this year's national AIPG annual meeting in Durango, Colorado, and I look forward to the opportunities next year, where we will continue to connect, share ideas, and make strides for our profession at the national meeting in St. Louis, MO.

Thank you to all who have contributed to this year's success, and to our members, sponsors, and partners for their unwavering support. It has been a privilege to serve as your president, and I am excited for what lies ahead in 2025.

Sincerely,

Michael J. Friedhoff, CPG-11093
2024 AIPG Ohio Section President

SME

AIPG Ohio Section 2024 Schedule

November 2, 2024	National Executive Committee 4th Quarter Hybrid Meeting
November 15, 2024	National Executive Committee Virtual Monthly Check-In Meeting
November 19, 2024	Texas Section Webinar Series: The Geopolitics of Energy Part II
November 20, 2024	International Professional Geology Conference (Spain)
November 21, 2024	Ohio Section 2024 Annual Meeting The Boathouse at Confluence Parkj

We are hoping to announce other events. Please check out our website frequently: aipg-ohio.org

Last Tuesday of every month – AIPG Lunch and Earn @ 1:00 PM Eastern

Have an event you want to add, please send submittals to the editor at pchasco@nrmsolution.com or pdchasco@gmail.com.

AIPG National Meeting 2024 Recap

By: Dave Follett, CPG-12034

This August, I was given the privilege as the 2024 President-Elect of the Executive Committee to represent the Ohio Section at AIPG's 61st Annual National Conference held at Fort Lewis College in Durango, Colorado.

Day One

The Annual National Conference kicked off on the morning of August 10, 2024 which was hosted on the beautiful Fort Lewis College campus situated in the shadows of the La Plata Mountains in Durango Colorado. 2024 Ohio Section President Mike Friedhoff and I attended the National's Executive Committee Meeting led by AIPG's 2024 President Shanna Schmitt. Following the Executive Committee meeting, we were able to attend National's Advisory Board Meeting lead by AIPG's 2024 President-Elect Sara Pearson where state sections reported on their 2024 activities. As the AIPG Ohio Section's 2024 President, Mike Friedhoff reported on the Ohio Section's activities which included an update on the newly established Miami University Student Section. At the conclusion of this meeting, delegates from each section elected four Advisory Board representatives for 2025. I am happy to announce that the Ohio Section's very own Hannah Weaver was elected to National's Executive Committee for Early Career Professionals (ECP) for 2025.

Ohio Section President Mike Friedhoff addressing the AIPG National Advisory Board.

Day Two

The second day of the conference (August 11th) was exciting as I was able to attend The Geologic History of the La Plata Mountains field trip led by Dr. David Gonzales of the Department of Geosciences, Fort Lewis College. That morning, we met in the parking lot of Fort Lewis College and piled into the back of open-air trucks that our tour guide unofficially referred to as "Truck-o-Saurus". As we navigated the highway west of Durango to begin our climb into the La Plata Mountains, the convoy was met with rain and cooling temperatures as we ascended in elevation. After turning off the main highway, our convoy navigated narrow gravel switchbacks and continued the climb.

Dr. David Gonzales discussing the stratigraphy and mineralized zones of the La Plata Mountains

Muldoon Mine, La Plata County, Colorado

Upon reaching our destination, Kennebec Pass elevation 11,640 feet, Dr. Gonzales introduced the regional geology and stratigraphy of the La Plata Mountains. During the introduction, Dr. Gonzales described the area as being dominated by several Late Cretaceous Laramide laccolithic complexes formed by the intrusion of magmas into thick sections of sedimentary rocks that ranged from the Pennsylvanian to the Late Cretaceous. The area is dominated with dikes and sills that led to extensive thermal metamorphism and hydrothermal alteration of the sedimentary country rocks. After finishing the introduction, Dr. Gonzales led the group along a section of the Colorado Trail towards the inactive Muldoon Silver Mine located on the east side of Cumberland Mountain.

Quick Stop-off at the Columbus Basin, La Plata County Colorado

Upon arriving at the Mine, the group was given an opportunity to examine the old mine works that included an abandoned living quarter, workshop and an old outhouse perched precariously on the edge of the mountain. Dr. Gonzales described one of the results of the Laramide igneous activity in the La Plata Mountains as creating hydrothermal mineralization producing brecciated and altered intrusive rocks with low grade gold, silver and copper deposits. The group was also able to examine the mine's tailings pile that included skarn deposits. After visiting the Muldoon Mine, the group had lunch in the field prior to returning to the vehicles to head back down the mountain. The group had a stop at the Columbus Basin to discuss the Upper Paleozoic to Mesozoic sedimentary and intrusive rocks along with some of the landscape features, and mining history. There were several additional stop-offs to discuss thermal metamorphism and mineral exploration prior to returning to the Fort Lewis College campus.

Day Three

Plenary Session during the AIPG Annual National Conference

Day three (August 12th) of the conference began by attending the Section Delegate Meeting, the Plenary Session that included the Keynote Mathew Morgan, the State Geologist and Director of the Colorado Geological Survey. Following the Session, I was able to attend the day's technical sessions. During the sessions, I attended several different presentations ranging from topics such as water supply management for the Orange County California Water District, water quality of recharged groundwater, abandoned mine reclamation, remediation of unplanned mine water releases, windblown sands, and analytical methods for PFAS analysis to meet newly

established regulations. One of my favorite presentations of the day was put on by Ohio Section member Brent Huntsman (CPG-04620) who presented on remediation of oil-field brine contamination utilizing in-situ technology involving electrokinetic desalination.

Brent Huntsman presenting on oil-field brine remediation.

The third day was concluded with the Annual Awards Banquet held at the Fort Lewis College campus where AIPG members throughout the nation were recognized for their contribution to AIPG and the geologic profession as a whole. During the award ceremony, the Ohio Section's own Brigitte Petras (ECP - 0851) received the AIPG Presidential Certificate of Merit for her work on the AIPG National's Executive Committee as the Early Career Professional representative. I am also happy to report that I received an AIPG Section Leadership Award for contributions to the Ohio Section.

Day Four

Dr. Chris Heine and Dr. Kim Miskell Gerhardt discussing the Geology of Sand Canyon

The fourth day of the conference (August 13th) was exciting as I was able to attend The Sand Canyon Geology and Archaeology field trip led by Dr. Chris Heine and Dr. Kim Miskell Gerhardt which took us to the far southwest portion of Colorado. This day started early as we piled into a van at 6:15 am since this field trip involved a hike through Canyons of the Ancients National Monument which tends to experience higher temperatures during the later portion of the day. As the van headed west past the entrance of Mesa Verde National Park we pulled over at a rest area for a quick crash course in the regional geology. As the trip continued, we turned off on a road outside of Cortez, Colorado and soon arrived at the trailhead for Canyons of the Ancients National Monument and Sand Canyon. Our enthusiastic trip leaders described the area geology that is dominated by Jurassic eolian outcrops. The paleo environment was arid resulting in the deposition of desert sand seas. Sand Canyon is located just to the north of Sleeping Ute Mountain, which is the result of a Laramide intrusion that structurally influenced the McElmo Dome, where Canyons of the Ancients and Sand Canyon are located on the southern flank of McElmo Dome. The McElmo Dome underwent oil & gas exploration in the 1940s – 1950s; however, the predominant resource that was discovered was CO_2 from the Mississippian Leadville Limestone. To this day, CO_2 from the area is recovered and sent into a 500-mile-long Cortez Pipeline to Texas's Permian Basin for oil field recovery. Locally, CO_2 recovery is utilized in the production of dry ice.

Walking along the base of the Entrada Sandstone, Montezuma County, Colorado

As our hike continued, we traversed the contact of the Entrada and Navajo Sandstone that had experienced extensive faulting. We continued past several ancient pueblo sites dated to A.D. 1230 to A.D. 1300 located on top of the Navajo Sandstone and within the canyon walls of the Entrada Sandstone. Along the hike, we stopped to examine a uranium adit located in a fault contact of a graben. The area around the adit is considered to be a Geiger counter “hot spot”. Dr. Cline explained that Uranium and Vanadium prospecting took place from the 1940s – 1970s within the Cretaceous Karla Kay Conglomerate in the Burro Canyon Formation.
I would like to thank the AIPG Ohio Section for providing me the opportunity to attend the 2024 AIPG National meeting.

Ohio Section 2024 Fall Meeting Recap

Feature Presentation: Toward an Understanding of Lunar Geology: Humanity's Role and Ohio's Legacy, Past and Future

Presented By: Dr. Claire McLeod, Associate Professor in the Department of Geology & Environmental Earth Sciences at Miami University

By Michelle Torres, MEM-2972

Shideler Hall at Miami University.

On October 10, 2024, the Ohio Section held its 2024 Fall Quarterly Meeting in Shideler Hall at Miami University, in Oxford, Ohio. The event was well attended by members, Miami University students, and Miami University professors. The event opened with a social hour, during which time the geology museum on the first floor of Shideler Hall was open to meeting attendees.

The social hour was followed by a buffet style Asian inspired meal, during which attendees continued to mingle, until the meeting moved to a lecture hall for the feature presentation at 7:00.

The presentation opened with a warm welcome to the new Miami University Student Chapter, and recognition of the sponsors by the AIPG Ohio Section President Michael Friedhoff (CPG-11093). The Fall 2024 meeting sponsors included Pace Analytical, ALS Environmental, Buckeye Elm Contracting, K3 Complete, ERIS - Environmental Risk Information Services, Lightbox EDR, White Oak Environmental & Safety, and Ohio Soil Recycling.

Upon conclusion of the opening remarks, AIPG President Mike Friedhoff introduced the evening's speaker, Dr. Claire McLeod. Dr. McLeod is an Associate Professor of Geology & Environmental Sciences at the Miami University, and a graduate of the University of Edinburgh. Her passion for lunar geology shone throughout her presentation titled "Toward an Understanding of Lunar Geology: Humanity's Role and Ohio's Legacy, Past and Future".

Dr. McLeod's presentation ranged from discussions of the significance of Earth's

Karl E. Limper Geology Museum at Miami University

moon to culture, spirituality, and science, to insights on lunar evolution, and to the surprising breadth of Ohio's contribution of lunar exploration.

Social hour before the dinner.

She began with a overview of the moon's role in culture, including in mythology, religion, and folklore, up to modern film repertoire, before delving into why we study the moon. Rock samples from the moon provide insight into planetary evolution. Since there are no plate tectonics on the moon, materials dating back to the moon's formation remain relatively undisturbed compared to the recycling of tectonic plates on Earth. Therefore, scientists can investigate early solar system processes by looking at lunar samples. Additionally, Dr. McLeod touched on the resource potentials and the possibility of future human habitation on the moon.

The moon's interior is not unlike Earth's. The moon has a crust, mantle, and core, with the thickness of the crust varying across the lunar surface. The crust is thinnest at the largest impact crater. This is interpreted from data collected from earthquakes, or rather moonquakes. Moonquakes may occur as a result of meteor impacts during the experiment, or fault activity related the moon cooling.

Moon rock shaped like Ohio.

Dr. McLeod then moved to discussing the surface geology of the moon, of which more is known from samples collected over years of moon missions performed by multiple countries. The dark parts of the moon are dominated by lunar basalts, with the lighter portions dominated by feldspathic minerals.

The presentation moved to discussions of how we gather information on the moon, touching on the difficulties of moon missions, limitations on sample size and distribution associated with space travel, and training of astronauts to collect geologic samples. To date, astronaut Jack Schmidt is the only geologist to have gone to the moon, with other astronauts given a crash course in geology in preparation for their missions. She touched on Ohio's contributions to lunar exploration. Ohio is one of the top astronaut-producing states, coming in fourth place.

Lunar missions are complicated due to the extreme conditions encountered on the moon. Temperatures range from -9 to 19 F, the lack of atmosphere raises the risk of radiation exposure, and the lack of erosion forces on the moon mean moon dust is exceptionally sharp and jagged, sticking to everything and posing an inhalation hazard. Additionally, moon buggies are not available for every mission, representing a lot excess weight on a ship, therefore many missions are restricted to the area astronauts can safely traverse on foot.

Dr. McLeod giving her presentation

Dr. McLeod closed out her presentation looking to the future, discussing avenues of future research. Many of the samples brought back from past missions have not been analyzed, still stored in sealed containers until specific research is approved. The advent of x-ray computed tomography now allows for scientists to scan an undisturbed sample before cutting up a sample into sections, which allows them to be more targeted in sample collection. She also touched on new possible directions of research, including how to make cement out of lunar materials to allow the production of construction materials on the moon as a significantly cheaper alternative to shuttling materials from earth. Dr. McLeod made sure to wrap up her presentation with a final shout out to Ohio with her discussion of the upcoming moon mission. The next lunar mission, planned for the next decade, is called Artemis, and there are 63 different Ohio companies supporting NASA in preparation for it!


Dr. McLeod receiving the plaque with the plaque bearing the Ohio State Fossil.

Upon the conclusion of the evening's presentation, and several rounds of audience questions from both student and professional members, Dr. McLeod invited attendees to come touch a piece of the moon she brought with her, a small pea-sized sample from her research she kept in a clear plastic case.

AIPG President, Mike Friedhoff, presented Dr. McLeod with a plaque of the Ohio State Fossil, the trilobite (*Isotelus Maximus*), as a token of appreciation. Attendees joined in thanking Dr. McLeod with applause and appreciation. And as the closing of the evening, the AIPG Ohio Section presented the Miami University Student Chapter with a $500 for seed money to help with getting their chapter off the ground to a successful start.

Mike Friedhoff presenting $500 check to our newest student chapter at Miami University.

A big thank you to all members that were able to attend the Fall Meeting, and to the 2024 Executive Committee for setting up the event! Lastly, another recognition and thank you to the meeting sponsors: Pace Analytical Services, ALS Environmental, Buckeye Elm Contracting, K3 Complete, ERIS - Environmental Risk Information Services, Lightbox EDR, White Oak Environmental & Safety, and Ohio Soil Recycling.

Ohio Section 2024 Annual Meeting

Feature Presentation:	Phosphorus transport across the groundwater-surface water interface in intensively managed agricultural streams and relevance to Great Lakes water quality
Presented By:	Dr. Audrey Sawyer, Professor in the Department of Earth Sciences at The Ohio State University

The Ohio Section of AIPG is pleased to host Dr. Audrey Sawyer, at the Section's Annual Meeting presentation, which will take place Thursday, November 21, 2024 at the Boathouse at Confluence Park located at 679 W. Spring Street in Columbus. Dr Sawyer will be presenting a talk on the transport of phosphorus across the groundwater-surface water interface. This event is sponsored by ALS Environmental, Buckeye Elm Contracting, CinDrill Inc., Environmental Risk Information Services, K3 Complete, Lightbox, Ohio Soil Recycling, Pace Environmental Services, Terran Corporation, and White Oak Environmental & Safety.

The event begins at 5:00 pm with social hour, followed by dinner at 6:00, and the feature presentation at 7:00. The cost is $35 for members and guests or $15 for students. Please preregister and submit payment for the event via the AIPG Ohio Section website https://aipg-ohio.org/meetinginfo.php.

The featured topic will be: Phosphorus transport across the groundwater-surface water interface in intensively managed agricultural streams and relevance to Great Lakes water quality presented by Dr. Audrey Sawyer

SUMMARY

Please join us for a presentation by Dr. Sawyer on phosphorus transport across the groundwater-surface water interface. In agricultural areas with poorly drained soils, subsurface tile drains are commonly installed to improve drainage but also serve as transport pathways for excess nutrients to enter adjacent streams. In this talk, I quantify the transport of phosphorus (P) across interfaces—from soils to tile drains to streams, and through surface water, aquatic vegetation, and sediments. Our research team added a novel mixture of tracers (including conservative chloride (Cl), potassium phosphate, and fluorescent micrometer-sized particles) to a farm field and sampled their breakthrough at the tile drain outlet to the stream. We also used time-lapse electrical resistivity imaging to monitor saline tracer migration towards the tile drain. A small but sizable fraction of the added tracer arrived almost immediately at the tile drain outlet 30 meters away—the pulse contained 7% of added Cl, 3% of dissolved P, and 2% of fine particles and had a mean arrival time of 21 minutes. ERT images showed fast downward movement of Cl to the tile drain depth but also prolonged retention in the soils after the tracer test. Successive storm events remobilized solutes and particles over days to weeks. Tracer experiments were also conducted in the stream to understand mobility and cycling of dissolved and particulate P. Transient storage was greatest during the spring, when thicker vegetation stands caused more pooling and flow stagnation, and decreased through fall, as vegetation stands thinned. Soluble P uptake lengths were 8.7 times longer in fall than spring, and particle capture lengths were 4.3 times longer. Sediment P extractions performed on core samples over multiple seasons show that aquatic vegetation plays a major role in retaining internal P in streambed sediments. A site with dense aquatic vegetation had chronically greater internal P concentrations by 25−75%. Additionally, mobile P binding fractions nearly doubled in summer, possibly due to accelerated rates of organic matter mineralization or iron reduction beneath suboxic, stagnant surface waters. Preliminary observations across additional sites suggest that woody buffers create the biophysical conditions needed to shade out aquatic vegetation, mitigate internal P concentrations in sediments, and increase oxygen concentrations in surface water. These insights can help manage dissolved P concentrations in agricultural streams in

the Lake Erie Basin (USA and Canada) and other agricultural basins where rising P loads are exacerbating harmful algal blooms.

Bio:

Audrey Sawyer is a Professor of Earth Sciences at The Ohio State University with a courtesy appointment in Civil, Environmental, and Geodetic Engineering. Her research focus is surface water-groundwater interaction in streams and coastal waters. Her overall goal is to understand how fluid flow near the earth's surface influences water quality and ecology. She and her research group pursue this problem through a combination of numerical and physical modeling and field observations. She has authored over fifty papers in leading journals, including Science. She is also the recipient of the Kohout Early Career Award in Hydrogeology from the Geological Society of America. Her recent projects include nitrogen cycling in tidally influenced rivers, phosphorus transport in small agricultural streams, algal toxin fate in shallow lakebed sediments, saltwater intrusion, and submarine groundwater discharge at continental scales. She teaches courses in hydrogeology, water issues, and introductory geology. Audrey received a B.S. in geology and environmental engineering from Rice University in 2004, a M.Sc. in geoscience from the Pennsylvania State University in 2007, and a Ph.D. in geological sciences at the University of Texas-Austin in 2011. She conducted postdoctoral research at the University of Delaware. She has been a visiting scientist at Instituto de Diagnóstico Ambiental y Estudios del Agua (IDAEA-CSIC) in Barcelona, Spain in 2021-2022 and the Department of Civil and Environmental Engineering at the Universitat Politècnica de Catalunya in 2024.

Photograph Submittal Guidelines

The Ohio Section welcomes and encourages members to submit photographs for the newsletter. We are looking for photographs with short captions that you think are interesting or showcase geology and geologists at work. Topics of interest include scenery, geologic disasters, interesting or historical geologic events, interesting work sites, and similar topics. Contributing photographers are requested to abide by the following guidelines to ensure civility and professionalism.

1. Submissions should include your name and membership number.

2. Title of the photograph and year the photograph was taken.

3. A brief description of the photograph.

4. Names of any identifiable persons in the image and permission to publish their photo. No minors please.

5. Please do not submit photographs with confidential or proprietary information.

6. The Ohio Section also welcomes and will consider relevant photographs from non-members, provided contributions abide by the above stated guidelines.

Contributions to the Ohio Section newsletter do not necessarily reflect the opinion of the Ohio Section or the editor. We reserve the right to choose photographs published for space considerations.
Please send submittals to the editor at pchasco@nrmsolution.com or pdchasco@gmail.com.

Photograph submitted by Paul Chasco, CPG 12024. Photograph taken in May 1993. Mold of Nascoceras birchbyi (ammonite) in Colorado.

Photograph submitted by Paul Chasco, CPG 12024. Photograph taken in May 1993. Cretaceous-Tertiary (K-T) boundary (brown layer below coal seam) in Colorado.

Photograph submitted by Paul Chasco, CPG 12024. Photograph taken in May 1995. Flaming fountain located on the state capitol grounds in Pierre, South Dakota. This well, drilled in 1910 to a depth of 1,280 feet, releases connate water trapped under artesian pressure. Natural gas is trapped in the water and was formerly used as a source of heat for the capitol building. Unfortunately, this fountain no longer burns continuously due to depletion of the methane.

Photograph submitted by Paul Chasco, CPG 12024. Photograph taken in March 1994. Bad Water at Death Valley National Park, the lowest point in North America with an elevation of 282 feet below sea level.

Letters to the Editor and Editorial Submittal Guidelines

The Ohio Section welcomes and encourages membership discourse via the Section newsletter on relevant geopolitical and geological topics, in accordance with our chartered purpose. Contributing authors are requested to abide by the following guidelines to ensure civility and professionalism.

1. Scientific interpretations should include accurate and effective references.

2. Opinion pieces should be presented with reasoning. Fellow members may choose to comment or challenge a submittal with their own contribution.

Authors must abide by the AIPG Code of Ethics. Any author who violates this code will not be published. Authors must be respectful to fellow members, all political parties, officials and candidates.

3. Letters to the Editor should be under one page in 12 pt. Arial font.

4. Member authors should provide their name and certification number.

5. The Ohio Section also welcomes and will consider relevant articles from non-members, provided contributions abide by the above stated guidelines.

Contributions to the Ohio Section newsletter do not necessarily reflect the opinion of the Ohio Section or the editor. We reserve the right to edit for clarity and space considerations.

Please send submittals to the editor at pchasco@nrmsolution.com or pdchasco@gmail.com.

I'm not just looking for letters to the editor, I'm also looking for your articles. As the Ohio Section Newsletter Editor, I am working to engage our members and looking for content that you think our members would enjoy. I cannot do this by myself and I am asking for your submissions. I am looking for student papers, abstracts, ongoing research, technical articles, case studies, guides. and, of course, letters to the Editor. While I am limiting the space for letters to the editor, articles can be longer.

The guidelines are pretty simple (see above). All submissions must be professional and must not violate the AIPG code of ethics. Submissions must not be copy right protected or previously submitted for publication elsewhere. We will not publish articles that are clearly marketing for a product or company.

Articles submitted from January 1 to March 15 will be published in the spring newsletter. Articles submitted from March 16 to July 31 will be published in the Summer newsletter. Articles submitted from August 1 to October 15 will be published in the fall newsletter. Finally, articles submitted on or after October 16 will be published in the winter newsletter. I look forward to reading and publishing your articles.

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