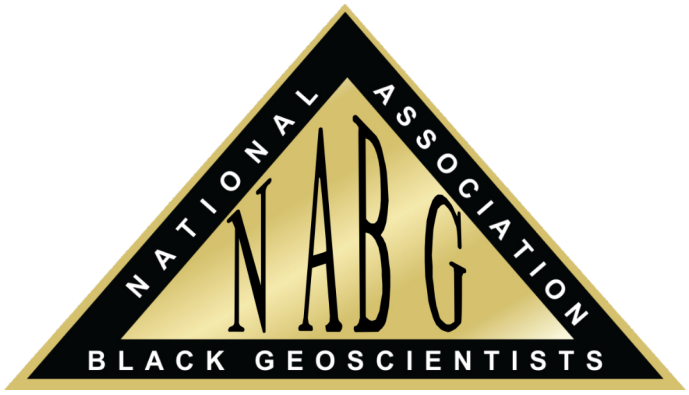
42ND ANNUAL TECHNICAL CONFERENCE

NATIONAL ASSOCIATION BLACK GEOSCIENTISTS NABG

GEOSCIENCE UNITED:

COLLABORATING FOR A SUSTAINABLE AND EQUITABLE FUTURE

September 27th-30th Washington, DC
nabg-us.org


NATIONAL ASSOCIATION
NABG
BLACK GEOSCIENTISTS

EAR-0946527 EAR-1640556

EAR-1146813 EAR-1723859

EAR-1250159 EAR-1836331

EAR-1446451 EAR-1935782

EAR-2146758 EAR-2146758

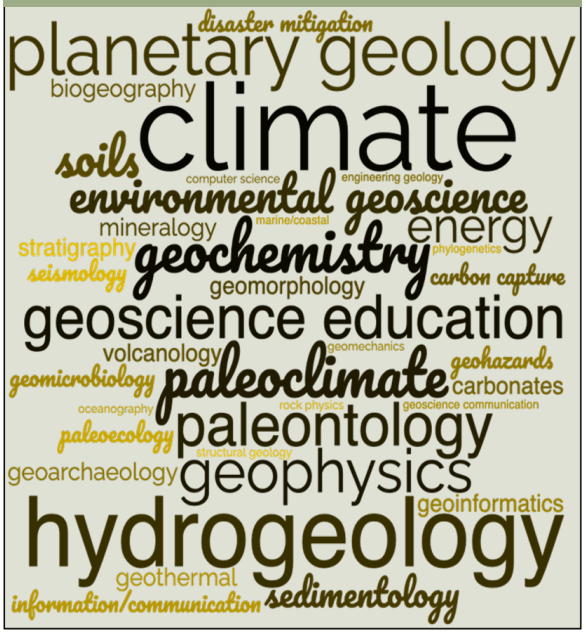
A Look at Our Numbers:

The National Science Foundation awards supported **550 unique student participants** **987 times** since **2009**.

of all participants are employed in the national Geosciences workforce, a sector of critical national need

of participants progressed to advanced academic training in the Geosciences disciplines

2023 Geoscience Disciplines Represented



A record number of students (>100) expressed interest to participate in this hybrid in-person/virtual conference. Student participants to the 42nd Annual Technical Conference of the National Association of Black Geoscientists supported by National Science Foundation (NSF Award #EAR-2334206).

Thank you for supporting our participants!

PLATINUM SPONSORS

ExxonMobil

We extend our heartfelt gratitude to the National Science Foundation (NSF, ExxonMobil, Shell, and for their generous sponsorship of the National Association of Black Geoscientists 42nd Annual Technical Conference.

Their steadfast support not only enhances the conference's impact and reach but also fortifies our collective mission to promote the development of Black geoscientists.

THE CHURCHILL HOTEL

Welcome to the beautiful Churchill Hotel in Washington, DC!

1914 Connecticut Ave NW, Washington, DC 20009
Ph: (202) 797-2000 | **thechurchillhotel.com** |

THE AGU CONFERENCE CENTER

Welcome to AGU's state-of-the-art meeting and conference center!

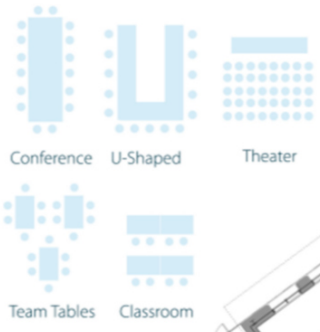
2000 Florida Ave NW #7, Washington, DC 20009

We will have light refreshments available for breakfast outside at the AGU Building's main meeting hall on Thursday and Friday morning.

Lobby Level Conference Rooms

Standing room values below are the maximum capacity for each room. The actual occupancy will change based on the furniture arrangement.

*Room **Configurations**



4. Univ of Texas
5. GSA
6. ExxonMobil
7. GA State Univ
8. Shell
9. Univ of Arkansas
10. US Dept of Energy

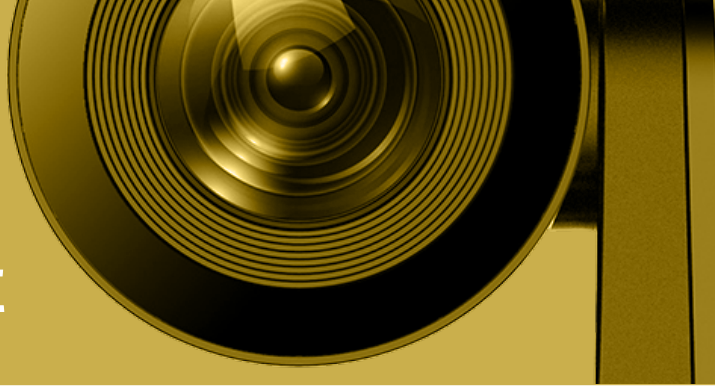
R. Registration

Lower Level Conference Rooms

Standing room values below are the maximum capacity for each room. The actual occupancy will change based on the furniture arrangement.

*Room **Configurations**

Conference U-Shaped Theater



ZOOM MEETING ETIQUETTE

Mute your microphone.
Keep background noise at bay by muting your microphone when not speaking.

Mind background noise.
When your microphone is not muted, avoid activities that could create additional noise, such as shuffling papers.

Position your camera properly.
If you choose to use a web camera, be sure it is in a stable position and focused at eye level, if possible. Proper camera positioning helps create a more direct sense of engagement with other participants.

Limit distractions.
Stay focused by silencing notifications, closing apps, and muting your phone.

Prepare materials in advance.
Have files/links ready if you're sharing content during the meeting.

COVID PROTOCOL

Covid protocol (Adapted From AGU)

AGU is committed to providing a safe and healthy environment for all building visitors, tenants and staff. We continue to monitor health and safety issues, such as the COVID-19 pandemic, and to follow CDC guidelines as they are released. At the AGU building, we maintain cleaning and sanitation practices and monitor the outside air circulation for the building, commensurate with a healthy environment. At this time, AGU is no longer requiring visitors to present proof of vaccination nor requiring signature on the Assumption of Risk & Waiver Form; however, we do strongly encourage all visitors to be up-to-date on all vaccinations and/or to confirm a negative COVID test within 24 hours before arrival to the AGU building. Any guest who is ill or feeling unwell should stay home and refrain from participating in any group functions.
Currently, indoor masking is optional. AGU may update these protocols and procedures at any time in its sole discretion. The NABG stands with AGU and is in full support of their COVID protocol.

Reporting Positive Cases

Attendees who receive a positive test result during the 42nd Annual Technical Conference are not allowed to enter the conference venue and must immediately quarantine. These attendees are encouraged to share positive test results with a **NABG representative:** Nabg.us@hotmail.com.
For contact tracing purposes, a list of close contacts without masking will be requested.
All information will be considered confidential.

Additional Resources

World Health Organization (WHO) COVID-19 Pandemic
who.int/emergencies/diseases/novel-coronavirus-2019

U.S. Centers for Disease Control and Prevention Center (CDC) Travel Guidelines
who.int/emergencies/diseases/novel-coronavirus-2019

CDC COVID Data Tracker
covid.cdc.gov/covid-data-tracker/#datatracker-home

CDC Coronavirus Self-Checker
cdc.gov/coronavirus/2019-ncov/modules/self-checker/self-checker-tool.html


ExxonMobil

Who's going to do it?

In the next few years, the U.S. will need millions of additional engineers and technology workers just to keep pace with demand. Who's going to fill those jobs? Today's students. That's why ExxonMobil invests in math and science-related programs – to ensure our kids have the skills for 21st-century jobs. Because what we invest in our kids today will pay off for the whole nation tomorrow.

ExxonMobil

Energy lives here™

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LETTER FROM THE PRESIDENT

Tramond Baisden | NABG President

As the field of geoscience continues to expand, it has become increasingly clear that addressing the complex environmental challenges facing our planet will require a collaborative and interdisciplinary approach. At the same time, creating equitable solutions that benefit both industry and local communities will necessitate a concerted effort to build strong public-private partnerships.
The National Association of Black Geoscientists recognizes the importance of these issues and is proud to announce our upcoming conference theme: "Geoscience United: Collaborating for a Sustainable and Equitable Future." Through this theme, we aim to explore the ways in which geoscientists from diverse disciplines can come together with industry partners and community stakeholders to tackle some of the most pressing environmental challenges facing our planet.

At this conference, attendees will have the opportunity to engage in a wide range of discussions and workshops, exploring topics such as renewable energy, sustainable resource management, and innovative technologies. Through these sessions, we hope to highlight the diverse perspectives and skills that geoscientists can bring to the table, and to showcase the potential for collaboration across a broad range of sectors.

In addition to exploring the latest research and innovations in the field of geoscience, this conference will also provide a forum for discussing the importance of equity and inclusion in our work. By bringing together industry leaders, community advocates, and geoscientific experts, we hope to foster a deeper understanding of the ways in which we can work together to create a more just and sustainable future for all.

Overall, we believe that this conference theme embodies the spirit of collaboration and partnership that is essential for addressing the complex environmental challenges facing our world today.

We look forward to welcoming geoscientists from all backgrounds to join us in this important discussion.

Tramond Baisden

NABG President

NABG CONFERENCE CHAIR

NABG Conference Chair | Karena Gill

With great pleasure, I extend a warm welcome to all of you to the National Association of Black Geoscientists' 42nd Annual Technical Conference, taking place in the vibrant city of Washington, D.C.

This year's conference revolves around the theme of "Geoscience United: Collaborating for a Sustainable and Equitable Future". Our chosen theme, "Geoscience United," serves as a proactive response to the ever-evolving global landscape of geoscience and our role as geoscientists in addressing the wider spectrum of Earth science opportunities. It is evident that to navigate the emerging challenges of the future successfully, geoscientists must proactively equip themselves through ongoing education, the application of foundational scientific knowledge, and thoughtful career planning. For these reasons and many more, we are collectively embarking on a journey to "Collaborate for a Sustainable and Equitable Future."

We are proud to announce that we have a record number of attendees joining us in-person and virtually, which underscores the growing enthusiasm and dedication within our community. The conference agenda is designed to encompass geoscience disciplines and topics that reflect the depth and breadth of our members. We have curated a program featuring expert panelists, adept student and professional presentations, and esteemed keynote speakers.

We encourage you to seize every opportunity to network with fellow attendees, including students, educators, industry partners, government and non-profit agencies, sponsors, and supporters. Additionally, our field trip, led by Mercer Parker from the USGS, will take us to The Billy Goat Trail at the C&O Canal National Historical Park.

In closing, I extend a hearty welcome to Washington, D.C.! I am genuinely delighted that you have chosen to be part of this year's conference. We welcome all our returning and new attendees and look forward to having you back again next year as we continue our journey toward a more sustainable and equitable future in geoscience.

Karena Gill

NABG 2023 Conference Chair

THE BIRTH OF THE
NATIONAL ASSOCIATION OF BLACK GEOSCIENTISTS

Charter Members in Attendance at the First Annual Technical Conference

NABG 1981

IN 1979, there were rumblings from a number of minority professionals who felt the need to connect, communicate and network with other minority professionals in the geosciences. Their voices became louder as time passed; and, on one given afternoon, there was extensive conversation regarding the possibility of forming an organization that would reach out and let others know there was an opportunity for individuals with an aptitude in Math and Science to become geoscientists.

The people involved in the discussions were Curtis Lucas, Allan Harris, James Briggs, James Davis, and Michael Carroll. Mr. Lucas was a dominant force with a multitude of ideas about what he felt the direction of such an organization should be. In 1980, the group met and compiled a list of geoscientists they knew in the Houston area. This list was generated with the intent of setting up an initial meeting to share ideas and make contact with other minority geoscience professionals. There was communication with Mr. Briggs in Dallas and Mr. Davis in Denver; and, they were charged with establishing similar sessions in their respective cities.

In Houston, the group needed a central location to meet, a willing host, and a figure that everyone knew and respected to get this effort off the ground. They found all of these items at the home of Dr. Mack Gipson, who had been a college professor at Virginia State University. Dr. Gipson was contacted and asked if he would host an Ice Breaker/Planning Session at his home. Informed of the intent, Dr. Gipson indicated there had been a lot of conversation about doing something similar in the past. At that point, he was informed this group was planning to do more than talk about it. Dr. Gipson agreed to host the session. A list of twenty-nine names were split and Mr. Lucas and Mr. Carroll began calling and making an appeal to individuals to attend this session. They received warm responses from the majority of people they talked with and the promise from several to spread the word.

The initial meeting was a success. There was a room full of professionals buzzing with ideas, energy and enthusiasm. Dr. Gipson was a central figure along with Mr. Lucas that evening. It became tremendously obvious that this was at the very least, a meeting that everyone there had been looking forward to for some time. The meetings that followed were held at the homes of some of the charter members. The majority of the meetings were held at the home of Mr. Ken Yarbrough. Mr. Yarbrough was gracious enough to allow the group to meet at his home which quickly became a forum for debate and conjecture on how the organization should be set up, what its objectives should be, who should compose the membership, should the organization incorporate, etc. At times, it seemed as though the discussions were endless.

Other prominent figures arose in these sessions. A fiery, young woman from Sierra Leone, named Rachel Taylor, shared her passion and energy to chair a committee to establish the constitution and bylaws of the organization. Laverne Gentry, John Chance, Millicent McCaskill, Geraldine Grant (Ross), Jennifer Jolivet and Patricia Hall, assisted in establishing a foundation and base on which the organization could stand. Walter Alexander, an established independent at the time, became a strong advocate of the organization. John Leftwich and Reginal Spiller became champions of the ideas to involve and inspire youth to consider careers in the geosciences.

The name that was agreed upon was the National Association of Black Geologists and Geophysicists (NABGG). In an effort to be more inclusive of all aspects of the Geosciences, the organization was renamed the National Association of Black Geoscientists (NABG) in 2014. The NABG's program of scholarship support and local interaction with schools and professional meetings works well to support the enhanced participation of underrepresented minorities in the geosciences. Throughout the years, the NABG has awarded numerous scholarships to hundreds of students for undergraduate and graduate study.

Since 1990, the NABG has become significantly more recognized as a national, professional organization by becoming a member society to the American Geological Institute, the Geological Society of America, and the American Association of Petroleum Geologists. NABG also has member representation on the National Petroleum Council. Established and incorporated in Houston in 1981, the organization has been active nationwide with members in the petroleum industry, academia, government, and student members in colleges and universities.

NABG LEADERSHIP

A Letter from NABG Founder, Mike Carroll

IF you ever question the relevance of the NABG just stand in the ballroom or hall of an annual conference during the poster sessions and listen to the constant roar of geoscience chatter. This is one of my favorite moments during our meetings. During field mapping some scientist will pull out their hammers and hand lenses and rush to an outcrop, while others self-included will tend to climb the opposite ridge and start there for perspective. That is how I view the technical meeting poster sessions.

Personally, I initially enjoy spending a little time standing in the middle of the room scanning the proceedings. Then I smile because I know that things are working. The NABG is an important organization because of a countless number of reasons starting with the creation of a forum for technical sharing. A small group of Earth Scientists found a commonality in their love for research and their will to share their ideas and thoughts along the way. In addition, there was a desire to create a platform for others. Because of the fact that our mission has never faltered, I can only come to the conclusion that the original group must have gotten something right.

The NABG has been a source of light on a sometimes darkened path. I say that because we all have experienced times in our career when we have had to reassess our situations and figure out a path forward. We have always suggested to students that their circumstance does not dictate their level of success - well, that has also applied to the professionals. Truthfully, I have benefited from the NABG for most of my career. It has been a deliberate connection, a vessel through which I have gained professional strength and knowledge.

A little known fact - I was fortunate enough to have given the first technical presentation at an initial monthly meeting in 1981 in Houston, Texas. My topic was “Seismic Models of Porosity Variations in Jurassic Carbonates Florida-Alabama”. That gave me resolve and strengthened my focus. Back then we held monthly meetings and brought in industry partners for presentations. The vision and focus of the organization have always been on facilitating the careers of a new generation and on making sure that the incoming group understood the importance of their taking the baton and continuing to improve the NABG along the way.

Michael Carroll

1ST NABG President

NABG MISSION STATEMENT

The NABG will support students pursuing degrees in Geology, Geophysics, and Earth and Planetary Science.

The membership will inform students of scholarship programs and career opportunities.

The organization shall maintain professional standards and best practices in support of members within their Earth Science Careers and entrepreneurial pursuits.

NATIONAL OFFICERS ADVISORY BOARD & CONFERENCE COMMITTEES

NABG National Officers

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Vice President	Janelle Sherman, ***Eden Geotech***
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Treasurer	Dada Olamide, ***Carbonvert Inc.***
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Member at Large	Student - Dr. Chven Mitchell, ***Sandia National Laboratories***
Immediate Past President	Jerome Murphy, *ExxonMobil*

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Dr. Isaac Crumbly, ***Fort Valley State University***
Dr. David Pagett, ***Tennessee State University***
Reginal Spiller, ***Co-Founder, CEO Azimuth Energy***
Dr. Wesley Ward, Retired, ***USGS, Retired***
Elijah White, ***ExxonMobil, Retired***
Darryl Willis, ***Microsoft***
Ken Yarbrough, ***Co-Founder, Osyka Corp, Retired***
Zelma Jackson-Maine, ***Co-Founder, Washington Dept. of Ecology, Retired***

NABG Conference Committees

ABSTRACT AND PROGRAM			
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QUENTIN	**STUBBS**		NOAA
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QUENTIN	**BURGESS**	CHAIR, STUDENT VOLUNTEER	UNIVERSITY OF NEVADA
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TOBI	**ORE**	STUDENT VOLUNTEER	WEST VIRGINIA UNIVERSITY
LOGISTICS			
CHRISTIANA	**EZISHA**	STUDENT VOLUNTEER	FORT HAYS STATE UNIVERSITY
DAVID	**NWORIE**	STUDENT VOLUNTEER	COLORADO SCHOOL OF MINES
JOSEPH	**NSINGI**	STUDENT VOLUNTEER	MONTCLAIR STATE UNIVERSITY
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KASHAUNA	**MASON**	STUDENT VOLUNTEER	TEXAS A&M
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RICHARD	**ASIRIFI**	STUDENT VOLUNTEER	TEXAS A&M
NEED			
JOHN	**AKUDIKE**	STUDENT VOLUNTEER	TEXAS TECH UNIVERSITY
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SOCIAL MEDIA			
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RILIWAN	**ABIOYE**	STUDENT VOLUNTEER	UNIVERSITY OF SOUTH CAROLINA

Five for 25 Establishing an Endowment for NABG

The "Five for 25" campaign is a new initiative of the National Association of Black Geoscientists to create a $5,000,000 endowment by 2025. In the midst of challenges facing society and our planet, our commitment to inspire new generations of geoscientists to advance civilization toward a sustainable future is stronger than ever. These funds will support NABG to drive progress by strengthening our ability to increase public awareness, engage more members, and collaborate with organizations, private and public, to address representation and retention in the geoscience workforce.

The endowment will provide for continued success of NABG in preparing highly-proficient and community-conscious geoscientists to fill the void created by workforce reductions due to mass retirements, industry cyclicity, and attrition. As these reductions occur, they create opportunities for historically underrepresented groups to enter the workforce in larger numbers. The NABG is an historic leader in promoting geoscience careers to diverse communities and developing their human capital in order to produce a highly-skilled geoscience workforce. The "Five for 25" endowment will ensure long-term financial stability, enabling NABG to serve the geoscience profession in perpetuity.

For over four decades, NABG has done a commendable job in pursuit of its overall goals; however, the multiple 21st-Century challenges of a changing Earth, combined with changing educational and professional arenas, require the NABG to adapt in pursuit of its goals. As the global future looms, it is imperative for the NABG to secure the means to remain effective. NABG remains devoted to hosting its annual conference of professional development workshops, research presentations, and panel discussions on current geoscience trends and issues, and professional networking. In addition, the organization maintains its commitment to the advancement of students towards geoscience careers. The NABG conferences are like many other STEM conferences, but the attention to each and every student, the investment in their well-being, and the camaraderie that develops between mentors and mentees is the hallmark of the NABG that is immeasurable, undeniable, and invaluable.

There is an incalculable impact when an aspiring Black geoscientist can look someone in the eye with similar lived-experiences, who has faced similar challenges, and understand that person has succeeded in spite of their circumstances. The paths that individuals take to become geoscientists are complicated; individuals may need a variety of resources from which to draw in order to make their personal dreams a reality. That is where we all fit in. We welcome your support and generous donations to guarantee an impactful future for the NABG.

Thank You

NABG Board

INVEST IN NABG

5 FOR 25

Endowment Campaign

HELP US RAISE $5 MILLION BY 2025

Your contribution will help NABG, a pioneer in diversity, shape the Geoscience workforce of the future and ensure perpetual progress.

Scan the QR Code at right to stay up to date with campaign news and announcements.

LAUNCHING SOON

2023 SCHOLARSHIP RECIPIENTS

Congratulations to our 2023 National Association of Black Geoscientists Scholarship Recipients!

NABG 2023 SCHOLARSHIP RECIPIENTS		
RECIPIENTS	**NAME OF UNIVERSITY**	**EDUCATION LEVEL**
TOBI ORE	WEST VIRGINIA UNIVERSITY	**DOCTORATE**
ISHEKA ORR	PURDUE UNIVERSITY	**DOCTORATE**
ABDULJELEEL AJIBONA	VIRGINIA TECH UNIVERSITY	**MASTER**
CALEB EMEKA OKPALA	DARTMOUTH COLLEGE	**MASTER**
HASSAN SALEH	UNIVERSITY OF CALIFORNIA - SAN DIEGO	**UNDERGRADUATE**
XOSE VENUS AGBADAN	COLGATE UNIVERSITY	**UNDERGRADUATE**

KEYNOTE

NABG 2023 CONFERENCE OPENING KEYNOTE SPEAKER

Maria Angela Cappelo
President, Red Tree Consulting, LLC

AN inspirational and relentless leader in the energy sector, Maria Angela Capello ("MAC") is a passionate advocate for sustainability and equity. She is the President of Red Tree Consulting LLC, a firm dedicated to ESG and sustainability strategies. She held executive and regional technical roles across Latin America, the Middle East and USA, with Halliburton, Kuwait Oil Company, and PDVSA.

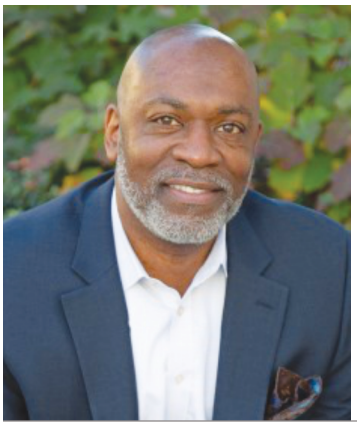
MAC's true passion lies in exploring the juxtaposition of geosciences, sustainability, and the future of the energy sector, actively collaborating with the UNECE and UNESCO, as Co-Chair of "Women in Resource Management" and leader of "Geoscience in Action – Advancing Sustainable Development".

She has published 98 articles in peer-reviewed journals and conferences, 3 books and is a constant invited speaker at engagements globally. MAC was knighted as "Cavaliere" of the Order of the Star of Italy, by the President of Italy.

Her awards include the Honorary Membership of the Society of Petroleum Engineers, and the Presidential Award of the Society of Exploration Geophysicists. She has an MSc in Geophysics from the Colorado School of Mines and is certified in Sustainability by the Judge School of Cambridge University.

WELCOME

NABG 2023 CONFERENCE WELCOME SPEAKER



Brandon Jones

President-Elect, American Geophysical Union

Brandon Jones is the 2023-2024 President-Elect of the American Geophysical Union (AGU). His President-Elect responsibilities include chairing the AGU Council, serving as a Board member, and providing leadership for activities and efforts that promote AGU's strategic plan.

Professionally, Brandon is a Program Director for talent development and broadening participation efforts in the National Science Foundation's Directorate for Geosciences. At NSF, he oversees programs that focus on undergraduate and graduate workforce preparation for the Geosciences and supports initiatives related to increasing diversity and enhancing inclusion and belonging in STEM.

Brandon holds a BA in biology from The Lincoln University (PA) and both graduate degrees in Marine Biology and Biochemistry from the University of Delaware's College of Earth, Ocean and Environment (CEOE). He continues to be a mentor and advocate for early career STEM scholars who are members of historically excluded communities.

KEYNOTE

NABG 2023 CONFERENCE CLOSING KEYNOTE SPEAKER

Dr. Asmeret Asefaw Berhe

Director of the Office of Science, US Dept of Energy

Dr. Asmeret Asefaw Berhe is the Director of the Office of Science for the U.S. Department of Energy. Dr. Berhe is currently on leave from the University of California, Merced where she holds the Ted and Jan Falasco Chair in Earth Sciences and Geology; is a Professor of Soil Biogeochemistry; and previously served as Associate Dean for Graduate Education. Her research focus lies at the intersection of soil science, global change science, and political ecology with an emphasis on how the soil system regulates the earth's climate and the dynamic two-way relationship between the natural environment and human communities.

She previously served as the Chair of the U.S. National Committee on Soil Science and member of the Board of International Scientific Organizations at the National Academies; Leadership board member for the Earth Science Women's Network; and founding a co-principal investigator in the ADVANCEGeo Partnership – a National Science Foundation funded effort to empower scientists to respond to and prevent harassment, discrimination, bullying, and other exclusionary behaviors in research environments.

Her scholarship and efforts to ensure equity and inclusion of people from all walks of life in the scientific enterprise have received numerous awards and honors. Dr. Berhe is a member of the National Academy of Engineering; she is also a Fellow of the American Geophysical Union and the Geological Society of America and a member of the inaugural class of the U.S. National Academies' New Voices in Science, Engineering, and Medicine.

Berhe received a B.Sc. in Soil and Water Conservation from the University of Asmara; an M.Sc. in Political Ecology from Michigan State University; and a Ph.D. in Biogeochemistry from the University of California, Berkeley.

SPEAKER BIOGRAPHIES & SESSION DESCRIPTIONS

WORKSHOP & PANEL DISCUSSIONS

- **Wednesday** — **Pre-Conference Workshops**
- **Thursday & Friday** — **Panel Discussions and Enrichment Sessions**

Wednesday

Economic Valuation Workshop for the Geoscience Student – Dada Olamide

As the field of geoscience continues to evolve, it becomes essential for geoscience students to have a comprehensive understanding of economic valuation principles. Economic valuation plays a crucial role in assessing the economic significance of natural resources, geological processes, and environmental services. Therefore, we will host an intensive economic valuation course tailored specifically for geoscience students. This course aims to equip them with the necessary knowledge and skills to analyze and interpret the economic implications of their work effectively.

Unearthing Excellence:
Pathways to Geoscience Careers - High School Outreach Workshop
National Energy Education Development Program, Shell

The National Energy Education Development Project (NEED) designs and delivers teacher- tested educational materials, evaluation techniques and tools, recognition of student achievement, and professional development for educators. NEED materials and training programs provide comprehensive, objective information about the scientific concepts of energy and the sources of energy – their use and their impact on the environment, the economy and society. Together with Shell, NEED will expose high-school students to the earth sciences, including geology, geophysics, climate science, and sustainability, through hands-on activities with real-world applications.

Sequence Stratigraphy and Low Carbon Solutions Workshop - ExxonMobil

This technical workshop is focused on Sequence Stratigraphy and Low Carbon Solutions, presented by ExxonMobil Geoscientists. The workshop will include hands on exercises that provide practical insights into sequence stratigraphy and how it is applied to discovering and characterizing hydrocarbon deposits. It will also include a lecture on ExxonMobil's new Low Carbon Solutions business unit which studies and executes carbon capture and sequestration. Our speakers will explore advancements, practical applications, and case studies in both topics, fostering a dynamic space for learning, networking, and collaboration. Whether you're an experienced geoscientist or a newcomer to the field, this workshop offers valuable insights and discussions that contribute to your professional growth. The workshop will be held on September 27th from 1-5pm, just before the NABG Annual Technical Conference.

- **Wednesday** — **Pre-Conference Workshops**
- **Thursday & Friday** — **Panel Discussions and Enrichment Sessions**

Thursday & Friday

Empowering Environmental Justice: The Vital Role of Black Geoscientists

HBCU Environmental Justice Technical Team (HEJTT)

Join us for a compelling panel discussion dedicated to exploring the indispensable role of Black geoscientists in the pursuit of environmental justice. Throughout this session, we will delve into the challenges faced by Black geoscientists, including issues of mistrust and cultural misunderstandings that can hinder effective collaboration. Drawing from enlightening real-world case studies, we will emphasize the significance of gaining approval from local leadership and nurturing strong community relationships, while advocating for equitable compensation for our invaluable time and knowledge to serve as an exemplary testament to the powerful impact Black geoscientists have on environmental justice initiatives. With the requirement of highly trained 4-year degree holders, our community is small compared to other physical sciences, making it crucial to advocate for increased representation. We will also discuss the different roles that you can play in this field and the various career paths available.

Dr. David Padgett, Lead - Tennessee State University

Dr. David A. Padgett is an Associate Professor of Geography and Director of the Geographic Information Sciences (GISc) Laboratory at Tennessee State University (TSU). He has been a Global Learning and Observations to Benefit the Environment (GLOBE) Partner and Trainer for TSU since 2001. As the Owner and Chief Consultant of GEO-Mental, an environmental consulting firm, he has worked with diverse clients, including Air Alliance Houston and the Nashville-Davidson County Metropolitan Government. Dr. Padgett's remarkable contributions have been recognized with awards such as the American Association of Geographers Presidential Achievement Award and EthicalGEO Fellowship. In 2020, he received the Youth Environmental Science (YES) Medalist title and a $10,000 "re-grant" for organizations involving youth in environmental science. Dr. Padgett hails from Baltimore, Maryland, and holds degrees from Western Kentucky University and the University of Florida at Gainesville.

Dr. Reginald Archer - Tennessee State University

Dr. Reginald Archer is an associate professor of Applied GIS at Tennessee State University (TSU), specializing in Geographic Information Systems/Science and Remote Sensing. He leads the Geospatial Graduate Certificate Program and Geospatial Research and Analysis Lab at TSU, applying GIS to address environmental change, public health, and climate justice. With extensive industry experience as a GIS consultant, he earned recognition as a Geographic Information Systems Professional (GISP) and was appointed to the EPA Science Advisory Board. Dr. Archer's impactful scholarship extends globally, and he actively promotes diversity in STEM fields. He holds leadership positions in various geoscience organizations, and his educational background includes a Ph.D. in Geography from the University of California, Santa Barbara.

Pamela Bingham - Bingham Consulting Services

Pamela R. Bingham is an accomplished environmental engineer with over 30 years of experience in project management and policy solutions. She serves as the Principal of Bingham Consulting Services and as the Operations Manager at the University of Maryland's Community Engagement, Environmental Justice, and Health center. Her expertise spans STEM, environmental justice, health, GIS, community empowerment, and emergency management, benefiting various organizations and government agencies. Pamela's career includes roles such as Howard HBCU GIS Coordinator, National Medical Association Environmental Health and Bioterrorism Preparedness Manager, and consultant for Booz Allen and Hamilton. She has also contributed to environmental initiatives and recovery efforts, such as Hurricane Katrina, and is actively involved in professional organizations like NSBE and ASCE. Pamela, a former EPA graduate fellow, graduated from the Johns Hopkins University Leadership Development Program and University of Florida with a B.S. in engineering.

Lauren Johnson - Environmental Defense Fund

Lauren Johnson, MPH holds a bachelor's degree in Earth and Planetary Sciences: Geochemistry from Washington University in St. Louis and a Master of Public Health in Environmental Health Science and Policy from The George Washington University Milken Institute School of Public Health. She is a former high school chemistry teacher for Teach For America who published on the health co-benefits of climate mitigation and organized a health and air quality applied sciences team for NASA during graduate school. She founded and presided over George Washington University's first environmental justice student organization and won several accolades for her student leadership, academic excellence, master's thesis and impact, which culminated in receiving the highest award in her department. She began her journey at Environmental Defense Fund (EDF) as an EDF Climate Corps fellow before joining the Justice & Equity team as a subject matter expert working to advance environmental and climate justice. She is also an Adjunct Professor at Vermont Law and Graduate School and is from and resides in Northern Virginia.

HBCU Environmental Justice Technical Team (HEJTT)

The **HBCU Environmental Justice Technical Team (HEJTT)** formed in 2022 under the direction of Dr. Robert Bullard (Texas Southern University), is a collaborative of HBCU-affiliated data science, geoscience, and geographic information systems (GIS) experts. Current projects include the development of a GIS-based version of the Climate and Environmental Justice Screening Tool (CEJST), and a "Justice40 Data Tracking Tool."

The HEJTT's primary goal is to empower EJ stakeholders' research efforts via the CEJST, ArcGIS Online, the Environmental Justice Screening and Mapping Tool (EJ SCREEN), Enviromapper, and others. The HEJTT is providing technical assistance for EJ communities on-the-ground in the form of in-person, hybrid, and virtual workshops. Other panel and team members include: Ms. Pamela Bingham (TSU consultant), Ms. Lauren Johnson (TSU consultant), and Ms. Gabriella Mabayyed (TSU consultant). Dr. Linda Loubert and Ms. Cari Harris (Morgan State University), Dr. Paul Robinson, (Charles Drew University of Medicine and Science), and Dr. Tony Graham, (North Carolina A&T University - retired).

BEYOND THE ROCKS

This session will feature a series of riveting 3-minute-thesis style presentations, showcasing diverse student experiences that epitomize the convergence of geoscience and STEM fields. Each student speaker will delve into their pioneering research, innovative ideas, and firsthand experiences, revealing how geoscience has become an integral component of their STEM pursuits. Discover various STEM areas where geoscience intertwines and join us for an inspiring celebration of curiosity, scientific excellence, and the limitless opportunities of geoscience beyond the rocks, shaping a brighter future for us all and charting new paths.

David Davis - Rutgers University

David Davis is a Ph.D. candidate at Rutgers University in the Department of Marine and Coastal Sciences. He studies geomicrobiology and I study how halophiles and other microorganisms influence the precipitation of salts, such as halite and gypsum.

I am also studying K and Fe stable isotope fractionation that occurs in microbial illitization.

My talk will focus on my experiences this summer in Italy and at Penn State as a student in the International Geobiology Course. This course provides training in geomicrobiological field and lab methods.

Jordon Massey - Oklahoma State University

Jordon Massey is a dedicated Ph.D. student at Oklahoma State University who delving into the intricate world of hydrogeology. My academic journey has led me to explore the captivating realm of karst-like land-forms and their fascinating relationship with substantial methane discharges. Originating from Detroit, Michigan, the prospect of studying hydrology abroad felt distant until an internship opportunity arose in Morocco. Four transformative weeks immersed in Moroccan culture, policy dynamics, and hydrological insights reshaped my perspective and broadened my horizons. Join me as I share my insights and experiences abroad and at home. I look forward to contributing to the enriching discourse.

BEYOND THE ROCKS

Paris Smalls - CEO, Co-Founder, Eden

Paris Smalls is the co-founder and chief executive officer of Eden, a leader in sustainable natural resource recovery. We break rocks with electricity to maximize subsurface permeability.

We believe that a more sustainable approach to natural resource recovery is critical to creating a carbon-neutral future. By using high-voltage electricity and proprietary modeling and reservoir characterization techniques, we can achieve precise fracture permeability enhancement, while preventing the high-water consumption and environmental risks associated with traditional hydraulic fracturing operations.

With backing from public and private institutions, our next-generation rock permeability enhancement technology is being demonstrated in multiple geologies across the world.

We're working with industry leaders in geothermal energy, geologic hydrogen, geologic carbon storage, and mining to redefine how we recover Earth's natural resources.

To learn more about Eden and our groundbreaking technology, visit: **edengeopower.com**.

Tobi Ore - West Virginia University

Tobi Ore is a Geophysics Ph.D. candidate at West Virginia University, where he is working at the intersection of seismic interpretation and machine learning.

He earned a bachelor's degree in geophysics from the University of Lagos in Nigeria and a master's in geology from West Virginia University. Tobi was a geophysicist intern at BP and has completed 2 data science internships at Resermine. He is one of the founding members of the Association of Nigerian Scholars in America, and a member of the SEG research committee, NABG, GSA, and AAPG, among other organizations. Geoscientists are the modern-day explorers of our planet, decoding its geological story and unraveling its mysteries. But did you know that their skill set seamlessly aligns with the demands of a data science career?

Join me as we explore the fascinating parallels between these realms. From interpreting complex datasets to collaborating in multidisciplinary teams, from crafting insightful reports to uncovering patterns within observations – geoscientists possess a unique blend of abilities that closely mirror the requirements of data science.

Chven Mitchel - Sandia National Laboratories

Chven Mitchell received an MSc in Geophysics from Stanford University, CA, USA and a PhD in Geophysics from Purdue University, IN, USA. Currently, Chven is a research intern at Sandia National Laboratories in the Nuclear Waste Disposal Research and Analysis Group. Chven's research interests focuses on the fundamental controls and impact of single and/Or coupled thermo-hydro-chemo-mechanical processes through multi-scale laboratory and computational experiments of the mechanical behavior, damage characteristics, and (reactive) fluid flow in (natural and engineered) subsurface systems. At present Chven serves as the NABG member at large for student members. Chven's presentation will discuss the applicability of geosciences in sustainable energy, and waste management and disposal.

CARBON NEUTRAL FUTURE — *Dr. Sherilyn Williams-Stroud*

Success in meeting net-zero greenhouse gas emissions will require efforts not only to find alternative sources of energy that do not produce greenhouse gases, but also reductions in current levels of greenhouse gases already found in the atmosphere. Two of the most important greenhouse gases currently being targeted for reductions are carbon dioxide and methane. Reduction of emissions of methane, which has an atmospheric half-life residence of about 10 years, can have a significant impact on greenhouse gases in the short term. Carbon dioxide, on the other hand, also needs to be removed from the atmosphere in significant quantities in order to effect significant reductions in its climate impacts, given its 120-year half-life atmospheric residence time. Carbon capture and storage at an emitter source is one technology that has the potential to greatly reduce future emissions and resource assessments of geologic storage needed for sequestering of CO2 in the deep subsurface suggest it can be done safely and at scale. A developing technology aimed at removing atmospheric carbon is Direct Air Capture (DAC), but current volumes of CO2 extracted from the atmosphere are relatively small and the technology needs to be scaled-up to have significant impact on current atmospheric levels of carbon dioxide. Sequestration in the biosphere and pedosphere, on the other hand, could potentially lead to major reductions in atmospheric carbon dioxide through techniques like regenerative agricultural practices.

The goal of this panel is to promote discussion of the different methods and technologies currently being deployed for greenhouse gas reduction and extraction, impacts of alternative energy use, and how implementation of those could potentially affect different industries, communities, and other stakeholders.

CARBON NEUTRAL FUTURE PANEL		
NAME	**ORGANIZATION**	**TOPIC**
JERRY CARR	DOE NATIONAL ENERGY TECHNOLOGY LAB	ACCELERATING CCS
MAHETEME GEBREMEDHIN	KENTUCKY STATE UNIVERSITY	REGENERATIVE AGRICULTURE AND ATMOSPHERIC CO2 REDUCTION
DEBONNE WISHART	CENTRAL STATE UNIVERSITY	GHG-FREE ENERGY PRODUCTION FROM GEOTHERMAL SOURCES
JANELLE RANDLE	EDEN GEOTECH	INTERSECTION OF O&G TECHNOLOGY , CCS, GEOTHERMAL
CHVEN MITCHELL	SANDIA NATIONAL LABORATORIES	NUCLEAR POWER FOR GHG-FREE ENERGY

CONFERENCE AGENDA

WEDNESDAY SEPTEMBER 27 th & THURSDAY SEPTEMBER 28 th

WEDNESDAY, SEPTEMBER 27					
SESSION TIME (EST)	**TITLE**	**SPEAKER**	**INSTITUTION**	**LOCATION**	
12:00PM - 5:00 PM	Pre-conference Workshops (Invite Only)			Third Rock - Blue Marble - Clouds	
	Exxon Mobil Workshop			Luna	
	NEED Workshop			Mountain View/Volcano	
	Economics Workshop			Third Rock	
6:00 PM - 8:00 PM	Welcome Reception/Check-in			Rooftop Lounge and Main Lobby	
THURSDAY, SEPTEMBER 28	**Moderator: Kashauna Mason**				
SESSION TIME (EST)	**TITLE**	**SPEAKER**	**INSTITUTION**	**LOCATION**	
7:00 - 8:00 AM	**Breakfast/Check-In**			**Main Lobby**	
8:00 - 8:15 AM	Conference Welcome and Opening Remarks	Tramond Baisden, Brandon Jones	NABG/Shell, AGU	Luna/Mountain/Volcano	
8:15 - 8:45 AM	Exhibitors Introductions	All Exhibitors			
8:45 - 9:00 AM	CORAL REEFS A BENEFIT TO MEDICAL SCIENCE	Swazi Gurnell	Texas Southern University	Luna/Mountain/Volcano	Oral Presentations (Climate & Environmental Science)
9:00 - 9:15 AM	CAN EAST AFRICAN RIFT BASALTS SEQUESTER CO2? CASE STUDY OF THE KENYA RIFT	George Okoko	Columbia University in the City of New York		
9:15 - 9:30 AM	EMPLOYING REMOTE SENSING TECHNIQUES TO UNDERSTAND SEASONAL CHANGES IN WATER QUALITY – MUSKINGUM CONSERVATORY WATERSHED DISTRICT (MCWD)	Spencer Williams	Kent State University		
9:30 - 9:45 AM	MODELING FLUID PRESSURE PROPAGATION INTO BASEMENT ROCKS DURING MANAGED AQUIFER RECHARGE IN THE VIRGINIA COASTAL PLAIN AQUIFER	John Ogunleye	Virginia Polytechnic Institute and State University		
9:45 - 10:00 AM	QUANTIFICATION OF BIOGENIC GAS PRODUCTION BENEATH A CLAYPAN	Jordon Massey	Oklahoma State University		
10:00 - 10:10 AM	**Break**				
10:10 - 10:25 AM	0.34% ENTHALPY CHANGE PER YEAR FROM THE KIBIRO GEOTHERMAL PROSPECT ALONG THE ALBERTINE-RHINO GRABEN, UGANDA.	Folashade Ojo (Virtual)	Adekunle Ajasin University	Luna/Mountain/Volcano	Oral Presentation (Geochemistry & Marine Science)
10:25 - 10:40 AM	ASSESSMENT OF RADIOLOGICAL HAZARDS OF SOIL SAMPLE AROUND A DUMPSITE IN IGBUDU AREA OF WARRI, DELTA STATE.	Joy Foluso	University of California, Davis		
10:40 - 10:55 AM	ISOTOPIC TRACERS IN UNDERSTANDING GROUNDWATER CONTAMINATION:	Adeyinka Olaseinde	Federal University of Technology Akure		
10:55 - 11:10 AM	IMPACTS OF CLIMATE AND WATER CHEMISTRY ON BENTHIC FAUNA IN THE CHESAPEAKE BAY	Seyi Ajayi	Pennsylvania State University		
11:10 - 11:30 AM	**Break**				
11:30 AM- 12:30 PM	Brownbag Keynote Luncheon	Maria Angela Capello		Luna/Mountain/Volcano	Intro: Chelsea McDonald
12:30 - 12:45 PM	**Break**				
12:45 - 2:00 PM	Carbon Neutral Future Panel			Luna/Mountain/Volcano	
2:00 - 2:35 PM	Beyond the Rocks - Lightning Talks			Luna/Mountain/Volcano	
2:35 - 6:00 PM	SIMULATING EARTHQUAKES USING HIGH PERFORMANCE COMPUTING	Emanuel Murphy	Fort Valley State University	Lower Level Corridor/Main Lobby, L/M/V, Lower Lobby	Geology, Geophysics & Geoscience Education
Poster Session/Visit Exhibitor Booths/Networking	ARTIFICIAL NEURAL NETWORK MODELS FOR RESERVOIRAQUIFER DIMENSIONLESS VARIABLES: INFLUX AND PRESSURE PREDICTION FOR WATER INFLUX CALCULATION	Idongesit Ansa	West Virginia University		
	UNLOCKING SUBSURFACE RESERVOIR INSIGHTS: GEOSPATIAL GEOSTATISTICAL MODELING AND DATA SCIENCE APPROACH	Omodolor Hope	Case Western Reserve University		
	EXPLORING EARTHQUAKE SWARMS: A TRANSFORMATIVE SUMMER TRAINEESHIP AT FORT VALLEY STATE UNIVERSITY	Sharif Coker	Fort Valley State University		
	MAPPING OF YARDANGS SURROUNDING MEAD CRATER ON VENUS: EVIDENCE FOR MEGAYARDANGS	Wynnie Avent II	Wesleyan University		
	USING HISTORICAL AND REFLECTIVE NARRATIVES TO CREATE AWARENESS ABOUT THE DEVELOPMENT OF SCIENTIFIC THEORIES	Isheka Orr	Indiana University- Purdue University Indianapolis		
	EXPLORING GROUND-PENETRATING RADAR (GPR) APPLICATIONS FOR SUBSURFACE MAPPING AND ANALYSIS.	Raven McRae	Fort Valley State University		
	STRONG GEOSCIENTISTS AT MSIS-STRENGTHENING TRAINEESHIP AND RESEARCH OPPORTUNITIES FOR NEXT GENERATION GEOSCIENTISTS AT MSIS	Maurice Releford	Fort Valley State University		
	INCREASING DIVERSITY IN THE GEOSCIENCES THROUGH COMMUNITY PROJECTS: RESEARCHING HARMFUL ALGAL BLOOMS IN URBAN ENVIRONMENTS	Devin Moore	Tennessee State University		
	PALEOECOLOGICAL RECONSTRUCTION OF SUMMIT LAKE, NEVADA USING DIATOM RECORDS	Ayowole Fifo	University of Nevada, Reno		
	GRAIN COORDINATION NUMBERS, GRANULAR TEXTURE FROM MICRO-X-RAY TOMOGRAPHY OF ANGULAR SEDIMENTS: VELOCITY PREDICTION USING HERTZ-MINDLIN THEORY	Kwabena Poku- Agyemang	Louisiana State University		
	ESTIMATING THE ELECTRICAL RESISTIVITY OF THE UPPER MANTLE WITH THE VERY BROADBAND RHEOLOGY CALCULATOR (VBRC)	Samuel Ofori	Georgia Institute of Technology		
	GEOPATHS SUMMER TRAINING PROGRAM IN STEM: A SUMMER TRAINING RESEARCH PROGRAM IN GROUND PENETRATING RADAR AT FORT VALLEY STATE UNIVERSITY	Justin Jordan	Fort Valley State University		
	GEOSCIENCES UNITED ONBOARD THE JOIDES RESOLUTION: EARTH AND OCEAN SCIENCE COLLABORATIVE LEARNING OPPORTUNITIES WITH THE INTERNATIONAL OCEAN DISCOVERY PROGRAM	Chelsea McDonald	Texas A&M University		
	2023 GEOPATHS SUMMER INTERNSHIP PROGRAM IN GEOPHYSICAL TECHNIQUES: RESISTIVITY SURVEY	Keiana Mazzio	Fort Valley State University		
	BEING STRONG IN THE GEOSCIENCES	Mieko Smith	Fort Valley State University		
	GROUNDWATER TABLES AMIDST CLIMATE CHANGE IN LOW-LYING BEAUFORT, SOUTH CAROLINA	Riliwan Damilola Abioye	University of South Carolina		
	NABG Business Meeting			**Offsite**	

FRIDAY SEPTEMBER 29 th & SATURDAY SEPTEMBER 30 th

FRIDAY, SEPTEMBER 29	Moderator: Richard Asirifi					
SESSION TIME (EST)	TITLE	SPEAKER	INSTITUTION	LOCATION		
7:00 - 8:00 AM	Breakfast/Check-In			Main Lobby		
8:00 - 8:15 AM	EXPLORATION AND ANALYSIS OF A PROSPECTIVE HIDDEN GEOTHERMAL RESOURCE IN THE JERSEY SUMMIT AREA, PERSHING AND LANDER COUNTIES, NORTH-CENTRAL NEVADA	Quentin Burgess	University of Nevada	Luna/Mountain/Volcano	Oral Presentation (Geology * Geophysics)	
8:15 - 8:30 AM	LABORATORY SPECTRAL ANALYSIS OF ABANDONED MINE WASTE FROM THE FORMER KATHERINE GOLD MINE, ARIZONA: MINERALOGICAL AND TEXTURAL CHARACTERISTICS WITH IMPLICATIONS FOR FUTURE REMOTE SENSING STUDIES	Bernard Hubbard	U. S. Geological Survey			
8:30 - 8:45 AM	APPLYING WAVEFORM CORRELATION ANALYSIS TO MICROSEISMICITY AT THE FORGE SITES TO DETECT AND CHARACTERIZE FRACTURES	Richard Asirifi	Virginia Tech			
8:45 - 9:00 AM	FAULT-CONTROLLED GEOTHERMAL RESOURCES OF KATWE-KIKORONGO VOLCANIC FIELD IN UGANDA	Asenath Kwagalakwe	Texas A&M University			
9:00 - 9:15 AM	SEDIMENT SORTING AND ROUNDING IN A BASALTIC GLACIO-FLUVIO-AEOLIAN ENVIRONMENT: ÞHÓRISJÖKULL GLACIER, ICELAND	Kashauna Mason	Texas A&M University			
9:15 - 9:30 AM	NSF GraduateResearch Fellowship Program Overview	Wren Aye	National ScienceFoundation			
9:30 - 9:45 AM	Break					
9:45 AM - 11:00 AM	Environmental Justice Panel			Luna/Mountain/Volcano		
11:00 - 11:15 AM	PRELIMINARY RESULTS FROM THE PROGRAM EVALUATION OF GEOSCIENCE COOPERATIVE EMPLOYEE RESOURCE GROUPS	Akilah Alwan	Auburn University		Geoscience Education	
11:15 - 11:30 AM	PSYCHOSOCIAL PREDICTORS OF STUDENT PERSISTENCE IN SCIENCE: FINDINGS OF BLACK STEM & SCIENCE EDUCATION STUDENTS IN A SUMMER INTERNSHIP PROGRAM AT A HBCU	Taylor Royal	Fort Valley State University			
11:30 - 11:45 AM	DEVELOPING COLLABORATIVE ALLIANCES TO BRING HBCU STUDENTS TO SEA: THE STEMSEAS-HBCU PARTNERSHIP PROGRAM	Lisa White	University of California, Berkeley			
11:45AM - 1:15 PM	Lunch			Offsite - on your own		
1:15 -1:30 PM	PALEOECOLOGY AND CLIMATICCYCLICITY IN THE KERIO VALLEY BASIN, KENYA	Opeyemi Taiwo (Virtual)	University of Aberdeen, United Kingdom			
1:30 - 1:45 PM	INFLUENCE OF MINERALOGY ON THE ELECTRICAL CONDUCTIVITY OF VOLCANICASH	Isaac Ogunrinde	TheUniversity of Alabama	Luna/Mountain/Volcano	Volcanology & Paleontology	Oral Presentation (2h 15 mins, 9 presentations)
1:45 - 2:00 PM	THE GREAT AND SUDDEN RISE OF MONO LAKE, CALIFORNIA 16,000 YEARS AGO	Guleed Ali	Stony Brook University			
2:00 - 2:15 PM	MORPHOLOGICAL AND PHYLOGENETIC ANALYSIS OF A PALEOGENE TYPOTHERIA FROM CACHAPOAL	Dozie Itie	Bargas			
2:15 -2:30 PM	USAID-USGS DISASTER ASSISTANCE: BUILDING TECHNICAL CAPACITY AND REDUCINGRISK THROUGH INTERNATIONAL PARTNERSHIPS	Gari Mayberry	USGS and US Agency for International Development		Disaster Risk	
2:30 - 4:00 PM Poster Session	EL NIÑO HYDROCLIMATICRESPONSE TO GREENHOUSE FORCING	Mary Gbenro	University of Maryland	Lower Level Corridor		
	EARLY HOLOCENE CLIMATE AND VEGETATION ACROSS TEXAS USING OXYGEN AND CARBON ISOTOPES IN LAND SNAIL SHELLS	Wisdom Afuke	Jackson School of Geoscience			
	C-ISOTOPE CHEMOSTRATIGRAPHY AND PCO2 CALCULATIONS FROM THE CLOVERLY FORMATION IN NORTHERN WYOMING	Queen Kalu	University of Arkansas			
	A BIOMARKER RECORD OF PALEOCLIMATE AND ENVIRONMENTAL CHANGE IN TROPICAL NORTH AMERICA FROM THE SEDIMENTS OF LAKE CHALCO, MEXICO	Emeka Emordi	University of Pittsburgh			
	CONTINENTAL WEATHERING ACROSS THE END-PERMIAN MASS EXTINCTION	Joseph Mayala Nsingi	Montclair State University			
	INVESTIGATING THE RESPONSE OF BENTHICFORAMINIFERA TO ENVIRONMENTAL CHANGES IN THEARCTIC: IMPLICATIONS FOR CLIMATE FORECASTS	Gael Ndi, Nkwain	Texas A&M University			
	GEOMECHANICAL STRESS-FIELD ASSESSMENT FOR OFFSHORE GEOLOGIC CARBON STORAGE IN THE CENTRAL GULF OF MEXICO	Joshua Ademilola	Oklahoma State University			
	PRELIMINARY INVESTIGATION OF THE CHILEAN PATAGONIAN COMMON ERA ENVIRONMENTAL AND CLIMATIC CONDITIONS USING SCANNING X-RAY FLUORESCENCE ANALYSIS OF LATE HOLOCENE LACUSTRINE RECORDS	Godspower Ubit	University of Pittsburgh			
	RECONSTRUCTING FIRE USING MACROSCOPIC CHARCOAL ABUNDANCES IN PLIOCENE FLUVIO LACUSTRINE SEDIMENTS IN THE TERUEL BASIN, SPAIN	Maya Smith	Fort Valley State University			
	CARBON DIOXIDE AND METHANE FLUXES IN THE YUKON-KUSKOKWIM DELTA PERMAFROST	David Davis	Rutgers University			
	ASSESSING THE LINK BETWEEN STRUCTURAL COMPLEXITY AND MULTI-TROPHIC DIVERSITY IN FOREST ECOSYSTEMS USING REMOTE SENSING DATA	Ayanna St Rose	University of Arkansas			
	EXPRESSION OF OAE-2 IN THE WEST AFRICAN BENUE TROUGH	Sadiq Rijiya	Texas A&M University			
	CHARACTERIZING MESERVE GLACIER FLOW PATTERNS THROUGH THE PROVENANCE OF MORAINE TILLS	Nadia McGlynn	Vanderbilt University			
	A ROCK VOLUMETRICESTIMATE OF REE BEARING UNDERCLAY DEPOSITS IN THE EASTERN MIDDLE ANTHRACITE FIELD OF LUZERNE COUNTY, PENNSYLVANIA	Harrison Spiller	University of Arkansas			
	EXPLORING MICROBIAL POPULATIONS ACROSS THE THREE DOMAINS OF LIFE IN HOT SPRINGS AT LASSEN VOLCANICNATIONAL PARK	Makeda Mills	Texas A&M University			
	INFLUENCE OF TILE WATER ON NITRATE AND CHLORIDE CONCENTRATIONS IN THE GROUNDWATER: A CASE STUDY OF A SATURATED RIPARIAN BUFFERZONE, MCLEAN COUNTY, CENTRAL ILLINOIS	Aminat Tosin Abdulsalam	Illinois State University			
	A PALEOENVIRONMENTAL REAPPRAISAL OF THE PENNSYLVANIAN (BASHKIRIAN-MOSCOVIAN) SOUTH BAR FORMATION AND LOWER SYDNEY MINES FORMATION OF CAPE BRETON, ATLANTIC CANADA	Oluomachi Onuoha	University of Connecticut			
	THE INFLUENCE OF MULTISCALE STREAMBED TOPOGRAPHY ON HYPORHEICZONE PROCESSES ALONG RIVER CORRIDORS	Adebayo Sadiq	Kent State University			
4:00 - 6:00 PM	Break					
5:00 - 6:00 PM	Happy Hour			Rooftop Lounge and Lobby		
6:00 - 7:15 PM	Keynote and Awards Reception	Keynote: Dr. Asmeret Asefaw Berhe		Luna/Mountain/Volcano	Intro: Leiaka Welcome	
SATURDAY, SEPTEMBER 30						
SESSION TIME (EST)	TITLE	SPEAKER	INSTITUTION	LOCATION		
7:00 - 8:00 AM	Breakfast					
8:00 - 12:00 PM	FIELD TRIP: GREAT FALLS	Mercer Parker	USGS	Great Falls (Meet in Churchill lobby)		
	Volunteer Event: Anacostia River Cleanup	Ibrahim Goodwin	EPA			

2023 CONFERENCE EXHIBITORS

American Geophysical Union

Our Mission: To support and inspire a global community of individuals and organizations interested in advancing discovery in Earth and space sciences and its benefit for humanity and the environment.

Our Programs: No matter your career stage, professional and career development are important to advancing yourself and helping guide others. AGU provides career and educational resources, webinars, mentoring services, and support for students and professionals at all levels in Earth and space science. At AGU, we're especially committed to inspiring and educating present and future generations of diverse, innovative, and creative Earth and space scientists. Continue to explore our website and our career center to learn more about all the programs AGU has to offer.

We want to bring your attention to three specific programs: AGU Bridge Program - Advancing the Earth and space sciences through increased representation of Hispanics, African Americans, American Indians, Pacific Islanders, Alaska Natives, and Native Hawaiians in geoscience graduate programs. Opens in mid-December for student applications.

Mentoring365:

Mentoring365 is a virtual mentoring program developed among Earth and space science organizations to facilitate an exchange of professional knowledge, expertise, skills, insights, and experiences through dialogue and collaborative learning. Open year round for seeking mentors.

Student and Early Career Conference – (at the AGU annual conference AGU23 formerly known as the Fall Meeting). The 2023 AGU Student and Early Career Scientist Conference will provide attendees with valuable learning and discussions geared around professional development and skills-building and a chance to meet and interact with their peers from across the Earth and space sciences. Open now for registration.

Contact **Pranoti Asher** (pasher@agu.org), **Eva Kostyu** (ekostyu@agu.org), **Liz Gilden** (lgilden@agu.org) or other staff at the conference with your questions about AGU programs.

bp

bp is re-imagining energy for people and our planet. As a leading global energy company, we provide heat, light and mobility to customers worldwide. Across the bp landscape, we're home to a range of brands that touch all areas of our industry – from petrol stations to liquid engineering. Explore our offering and browse our brand portfolio at www.bp.com. We're fundamentally transforming what we do so we can reach net zero by 2050 or sooner. By working hard to decarbonize and diversify our business, over the next decade we'll become a different kind of energy company.

It's an exciting time to join bp. As a global business, it's paramount to us that the differences we see in the world around us are reflected in our workplace. Because we know that diversity in all its forms is great for bp and its people. Different perspectives, life experiences and backgrounds create an environment rich in new ideas and smart solutions – exactly what we need to complete our transformation and achieve our net zero ambition. Who you are is what counts, not where you're from or how you live your life. That's why, to help our people thrive, we nurture a culture that values everyone and ultimately benefits all of us.

Go to www.bp.com/uscampus to explore early career opportunities.

Earthscope Consortium

EarthScope Consortium is a university consortium dedicated to supporting transformative global geophysical research and education. Our vision is an engaged society, resilient to geohazards, informed by geophysical discovery and global collaboration. EarthScope Consortium operates NSF's GAGE and SAGE Facilities previously operated by UNAVCO and IRIS.

EarthScope offers paid summer internships for undergraduate and graduate students and recent graduates.

For more information, and to see the work of our previous internship cohorts, please visit:
www.earthscope.org/internships/

ExxonMobil

We work to provide the fuels and chemicals that make modern life possible and support human progress. For us, providing the energy our global economy requires while also offering lower-emission solutions shouldn't be an either/or choice; we like to think of it as an "and" equation, and that's an equation we're built to help solve.

Operating in more than 60 countries, we are constantly seeking solutions to meet society's evolving needs – something ExxonMobil has been doing for more than 140 years.

At heart, we are a global team of 62,000 scientists, engineers, researchers, technicians, professionals and other employees, representing more than 160 nationalities, who are focused on safely meeting the world's energy and product needs. Together, we're determined to play a key role in a thoughtful transition to an energy-secure, lower-emissions future for society.

Industry-leading geology and geophysical research starts here. Our geoscience career path collects and analyzes data across the globe to identify the next opportunity for ExxonMobil to explore. We foster opportunities for a variety of skill sets, from geoscience technicians and data processing to reservoir modeling and geophysical applications.

Geological Society of America

The Geological Society of America helps a diverse community of geoscientists find the tools, confidence, and connections they need to navigate the complexity involved in advancing our science and driving their careers to fulfilling new heights.

Our mission is to advance geoscience research and discovery, service to society, stewardship of Earth, and the geosciences profession. We offer numerous grants, fellowships, and awards to students and early career scientists to support them in their education, research, and conference attendance. We encourage NABG attendees and members to consider nominating a colleague (or themselves!) for one of our Awards!

Georgia State University

Designated a Predominantly Black Institution by the U.S. Department of Education, Georgia State University (GSU) graduates more African American students than any other public or nonprofit higher education institution.

Having doubled external research funding in the past five years, GSU is recognized as having one of the fastest-growing research portfolios in the United States. Between 2014 and 2023, the Geoscience Department awarded the third highest number of bachelor's degrees to Black students across all geoscience departments in the United States. Grants awarded to faculty in our department support deepening, expanding, and promoting a sustainable model for training diverse cohorts of baccalaureate, post-baccalaureate (postbac), and Master's students. Our funded opportunities range from domestic and international REU programs to fully funded master's degrees.

National Academies of Science, Engineering and Medicine

The National Academies of Science, Engineering, and Medicine are private, nonprofit institutions that provide expert advice on the most pressing challenges facing the nation and world. Our work helps shape sound policies, inform public opinion, and advance the pursuit of science, engineering, and medicine.

The Board on Earth Sciences and Resources oversees issues including Earth science research, the environment, natural hazards, resources, geographic science and geospatial information, and data and education. The Water Science and Technology Board's scope covers all dimensions of water resources including science, engineering, economics, policy, and social and educational issues. We provide full-time employment, fellowships for graduate students and post-terminal scholars, and myriad volunteer opportunities for subject matter experts.

National Science Foundation

Research and education programs supported by the Directorate for Geosciences (GEO) at the National Science Foundation (NSF) help to provide a comprehensive understanding of the Earth that spans billions of years—from how the planet formed to how its primary components (air, ice, land, and water) affect our lives today. Among its educational opportunities, GEO supports undergraduate, post-baccalaureate, and graduate students, postdoctoral researchers, early career investigators, research experiences for teachers, K-12 projects, veterans, interns, and principal investigators working on individual or collaborative projects. Program details can be found at https://www.nsf.gov/geo/adgeo/education.jsp.

GEO's Education and Diversity Incubator in its new Research, Innovation, Synergies, and Education (RISE) Division is working across GEO to facilitate talent development, outreach, and broadening participation.

Pennsylvania State University

Department of Geosciences and College of Earth and Mineral Sciences

The Department of Geosciences pursues fundamental, cutting-edge and strategic research in areas of the geosciences that have great societal impact and educates students for careers that advance the forefront of knowledge in the geosciences. The College of Earth and Mineral Sciences advances knowledge, talent and leadership to understand Earth processes and history, harness and sustain natural resources and materials, and develop novel solutions to major challenges in energy, environment and well-being. Strong departmental and college communities, alumni networks, and industry and government connections provide a foundation for learning and research that prepares students for rewarding careers that have an impact on the world.

We offer funded undergraduate research (REUs) and graduate (MS and PhD) programs.

Stony Brook University

The Department of Geosciences of Stony Brook University, New York offers undergraduate and graduate programs. We sponsor international students. We are currently hiring for two full-time tenure-track Assistant Professor faculty positions. One position is in high-temperature experimental geochemistry. The other is in computational geophysics.

Undergraduate degree programs include a B.S. and a minor in Geology in addition to a B.A. in Earth and Space Science. Teaching focused degrees that are offered include a B.A. in Earth and Space Sciences/ Science Education and a combined B.A. and a Masters of Arts in Teaching Earth Sciences.

Graduate students may choose among degree programs with emphasis in different areas in Geosciences. Ph.D. programs are offered with areas of emphasis that include seismology and tectonics, mineral and rock physics, crystal chemistry, geochemistry, petrology, and sedimentary geology, planetary geosciences and hydrogeology. New Ph.D. students in these programs are typically supported with a full tuition waiver and a competitive annual salary. Other graduate student fellowship opportunities offered by Stony Brook University are another means of support. The department sponsors international students.

The department also offers a non-thesis M.S. program in hydrogeology focused primarily on training professionals in environmentally related fields. In addition, there is a Masters of Arts in Teaching Earth Sciences, which leads to initial certification for teaching Earth Science in secondary schools of New York State. There is also a M.S. in Geosciences with concentration in Earth and Space Sciences. These programs generally do not provide tuition waivers or salary support.

United States Department of Energy

The mission of the Energy Department is to ensure America's security and prosperity by addressing its energy, environmental and nuclear challenges through transformative science and technology solutions.

The U.S. Department of Energy's (DOE) Mickey Leland Energy Fellowship (MLEF) Program is a 10-week summer research intetnship for undergraduate and graduate students in STEM majors. Participants complete a cutting-edge research project at one of the Department's National Laboratories or DOE Headquarters. Participants receive a weekly stipend, and may be eligible for housing and travel allowances.

United States Geological Survey

The U.S. Geological Survey is the science arm of the Department of the Interior. Our scientists study the solid Earth, ground water, surface water, terrestrial and near-shore ecosystems, natural hazards, and planetary bodies. We hire scientists and engineers of all kinds, with an increasing focus on data scientists. (As a federal agency, we can only hire US Citizens or Green Card holders.)

University of Alabama

The Department of Geological Sciences (DGS) at The University of Alabama (UA) offers MS and PhD degrees, providing students with focused research opportunities in a range of Earth science specialties including hydrology, climatology, geochemistry, geophysics, and critical resources, among others. Selected students, both domestic and international, are guaranteed two years of support for the MS and five years of support for the PhD. Funded students are provided with either a teaching assistantship, research assistantship, graduate fellowship, or a combination of these throughout their degree program. In addition to a monthly stipend, tuition, health insurance, and funds for college/department fees are also provided. The DGS is a partner institution in the AGU Bridge Program.

The DGS is currently advertising to fill two faculty positions beginning in the fall of 2024. One position calls for an assistant professor specializing in exploration and evaluation of critical mineral resources. The other position is part of a cluster hire between three science departments (Geological Sciences, Chemistry & Biochemistry, Physics & Astronomy), seeking an assistant professor specializing in artificial intelligence and machine learning.

University of Arkansas

Mission Statement: The University of Arkansas is determined to build a better world by providing transformational opportunities and skills, promoting an inclusive and diverse culture, nurturing creativity, and solving problems through research and discovery, all in service to Arkansas.

Geosciences and Environmental Dynamics have been participants at NABG for over 17 years and hosted the conference in 2009 and 2019. NSF awards to Dr. Stephen K. Boss since 2009 supported over 300 unique students from over 100 institutions over 600 times.

The Geosciences Department offers BS through PhD and has 26 full-time and research faculty. The department hosts a variety of specialties including hydrology, oil and gas exploration, climate modeling, and GIS. For more information please visit our website at:

https://fulbright.uark.edu/departments/geosciences/

The Environmental Dynamics Program is an interdisciplinary program offering a MS or PhD. We host over 80 faculty from all across campus who mentor our students. Our focus on human-environment interactions looks into deep time recreating paleoclimates and how this affected human development and into the present researching natural and social impacts of global climate change, impacts of rapid economic development on environmental quality, landscape evolution and degradation, natural hazards, watershed sciences, soil erosion and nutrient depletion to name some areas of study.

For additional information on our program go to our website at:

https://environmental-dynamics.uark.edu/prospective-students/index.php

Please feel free to contact **Dr. Steve Boss sboss@uark.edu** or **Jo Ann Kvamme jkvamme@uark.edu** with specific questions or how to apply!

University of Texas - Jackson School of Geosciences

The Jackson School of Geosciences has opportunities for geoscientists at all career and educational stages. Undergraduates and post-baccalaureate students from geoscience and STEM majors are encouraged to apply to the JSG Research Traineeship Experience (RTX), a paid, 9-week summer internship focusing on preparation for graduate school and the workforce. Prospective graduate students can pursue MS and PhD degrees in Geoscience through the Department of Earth and Planetary Sciences. The Energy & Earth Resources program offers interdisciplinary Masters degrees and dual degrees in policy and business. We encourage interested students to apply to attend the Gateway to Graduate Studies (G2S2), a free and expenses paid two-day graduate preview at UT Austin, November 13-14, 2023.

Thank you for attending
& supporting the

42nd Annual Technical Conference of the

National Association of Black Geoscientists

FIELD TRIP INFORMATION

2023 FIELD TRIP

Geology of the Billy Goat Trail, C&O Canal National Historical Park, Maryland

Mercer Parker, MSc. (USGS) Geologic Mapper, Sedimentary Petrologist

The Billy Goat Trail at the C & O Canal National Historical Park provides a good overview of the geological and geomorphological history of the Central Piedmont region of the Appalachian Mountains.

Many of the metamorphosed sedimentary rocks along the Billy Goat Trail are a part of the Mather Gorge Formation, after the rocks exposed at the location. These rocks were metamorphosed during multiple collisional events that resulted in the Appalachian Mountains. The Mather Gorge Formation is interpreted as being approximately 600 million years old and was initially deposited as clays, silts, and sands in the Iapetus Ocean (predecessor to the Atlantic Ocean).

Later, various suites of igneous rocks were emplaced, including, an amphibolite (~540 million years ago), (a granodiorite and pegmatite (~470 million years ago), and finally lamprophyre dikes (~360 million years ago).

Hot silica-rich fluids that were injected as veins of white quartz crosscut many of these rocks and some of the vein quartz in Maryland was mined for gold from 1861-1951 (Southworth and Fingeret, 2000).

Participants will also learn a little about the incision history of Great Falls Park and how the downcutting of the Potomac River has created terraces that contain features like islands, islets, pinnacles, oxbows, plungepools, and potholes.

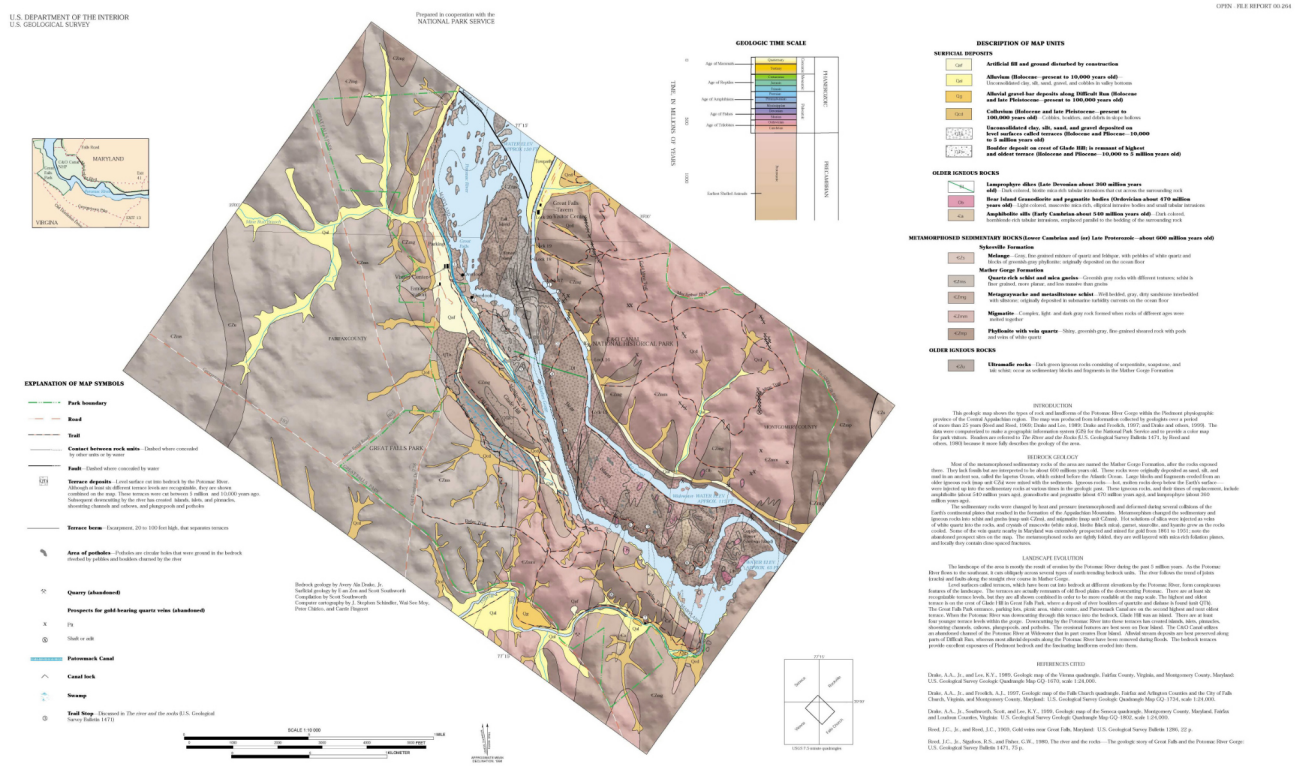
There are six recognizable terraces located at the park. The field trip will begin and end at the Great Falls Tavern Visitors Center (Maryland).

Section A of The Billy Goat Trail can be strenuous for some people.

Larger groups will be broken into smaller numbers for safety and to accommodate everyone on the trail.

Geologic Map of the Potomac River Gorge :

Great Falls Park, Virginia
& Part of the C&O Canal Historic Park, Maryland



GEOLOGIC MAP OF THE POTOMAC RIVER GORGE:
GREAT FALLS PARK, VIRGINIA, AND PART OF THE C&O CANAL NATIONAL HISTORICAL PARK, MARYLAND

Compiled by Scott Southworth and Carrie Fingeret
2000

Aerial photograph of the Great Falls area, showing the wide, shallow river upstream from Great Falls, the location of the water diversion dam (start of the Washington Aqueduct, which leads to the Dalecarlia Reservoir in NW Washington, DC), the location of the Great Falls Tavern Visitor Center (MD), the falls themselves (whitish area shows main cataracts), the long, linear stretch of Mather Gorge, and the old, abandoned channel of the Potomac River utilized by the C&O Canal at Widewater.

References:

Southworth, S. and Fingeret, C., 2000, Geologic Map of the Potomac River Gorge:
Great Falls Park, Virginia, and part of the C & O Canal National Historical Park, Maryland. USGS OF246.

NABG 2023 ABSTRACTS

Abioye, Riliwan Damilola, Wilson, Alicia M.

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GROUNDWATER TABLES AMIDST CLIMATE CHANGE IN LOW-LYING BEAUFORT, SOUTH CAROLINA

Increases in the intensity of rainfall and rising sea levels associated with climate change lead to rising coastal groundwater levels that threaten subsurface infrastructure and coastal resilience. To evaluate this threat, fifteen monitoring wells were set up in Beaufort County, South Carolina, where septic systems play a significant role in wastewater treatment. The hydraulic head was recorded every fifteen minutes for 15 months, from May 2022 to August 2023. Pastas Groundwater, which is an open-source Python package that implements a transfer function noise model based on a response function, was used to model the water levels in each well to estimate the risk of groundwater impairment of septic systems over three decades. Tidal and rainfall data were downloaded from Ft. Pulaski and Beaufort Marine Corps Air Station (MCAS), respectively. Model calibration was done using only the first 13 months of field data. Model fits declined significantly when using the full 15 months of data, potentially owing to heavy local rainfall at the MCAS site that did not affect the rest of the field area. In this study, the results from twelve wells that were not installed directly in tidal creeks are presented. In all but one of these wells, the water level rose significantly by about 1 m during a period of increased rainfall between August and September 2022, after which the water level receded to the baseline. We defined baseline as a low water level that persisted for about 15 days. The observed baseline water levels were consistent with 1D analytic solutions that show an increase in water level with increasing distance from the shoreline. This is corroborated by an increase in tidal amplitude as the shoreline distance decreases. The numerical models also confirm a mean annual variability of about 1m over three decades, except for a period of extreme weather conditions. This variability is significant enough to cause impairment of septic systems at least twice a year in about 83% of the wells, and this trend increases in simulations that use a detrended tide and future rainfall scenarios associated with temperature increases. The water tables did not rise further when rainfall rates were increased beyond the 1.5°C scenario of rainfall, signifying a topography-limited mode in about 83% of the wells. However, 17% of the wells exhibited recharge-limited situations where water levels increased progressively by about 10% at 2°C and 4°C scenarios of rainfall. No correlation was found between the percentage risk of impairment and distance from the shoreline, but the risk correlated with the accommodation space, which is defined as the difference between water level baseline and surface elevation. This relationship allows the extrapolation of point data from wells in a GIS framework to create a risk map. The results of this study will help in understanding other coastal processes that are affected by groundwater flow, including salt marsh migration, ghost forests, and coastal flooding, and improve coastal resilience as well as adaptation.

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GEOMECHANICAL STRESS-FIELD ASSESSMENT FOR OFFSHORE GEOLOGIC CARBON STORAGE IN THE CENTRAL GULF OF MEXICO

The available opportunities for offshore geologic carbon dioxide (CO_2) storage are hugely promising, but improper assessment of the subsurface stress condition may lead to leakage of CO_2, which may jeopardize the storage potential of carbon in proposed storage site. This research aims to assess the stress field of subsurface strata to know if the area has the ability for long-term CO_2 storage and to prevent future leakage of stored carbon as part of the Southeast Regional Carbon Sequestration Offshore Partnership program. This objective was achieved by using well-log data and four-arm caliper logs for geomechanical assessment and borehole breakout analysis of six wells in three protraction areas such as the Eugene Island, Ewing Bank, and Green Canyon areas. Results of the borehole breakout analysis and 1D geomechanical model reveal that wells with high volume of breakouts show low CO_2 storage potential because the pressure plots of these wells show pore pressure approaching the minimum horizontal stress and lithostatic pressure. The average vertical stress gradient and hydrostatic pore pressure gradient are 1 psi/ft and 0.46 psi/ft. The average pore pressure is 0.72 psi/ft, and the fracture gradient of the storage strata ranges from 0.64 – 0.89 psi/ft and the effective stress coefficient is 0.3. The borehole breakout analysis shows NW-SE and NE-SW minimum and maximum horizontal stress orientation respectively. In addition, the 1D geomechanical assessment reveals the subsurface state of stress and safe CO_2 injection pressure to be below the estimated minimum horizontal stress to prevent fracturing the reservoirs and reduce inter-formational flow risk. Thus, this research has provided insight into understanding the interplay between borehole breakouts and subsurface stress and their implication for carbon storage.

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EARLY HOLOCENE CLIMATE AND VEGETATION ACROSS TEXAS USING OXYGEN AND CARBON ISOTOPES IN LANDSNAIL SHELLS

The large humidity gradient across Texas gives rise to forests in the east and desert in the west. With a warming climate, there is potential for arid ecosystems to expand eastward, posing a significant impact on densely populated regions in central Texas. Understanding the distribution of vegetation in the past may help us understand ancient aridity gradients and human influences on ecosystems through time. Prior research has shown that the δ 13 C values of the shells of the land snail Rabdotus decrease with increasing canopy cover, whereas oxygen isotope compositions provide an indicator of humidity. In this study, we measured the stable carbon and oxygen isotope compositions of Rabdotus shells as indicators of climate and vegetation obtained from collections at the Texas Archeological Research Laboratory (TARL). TARL collected these shells from two early Holocene archaeological sites. The mean δ 13 C values of Rabdotus shells from an eastern site in Zilker Park, Austin, and a western site near San Angelo are -9.1 ± 0.096 and -8.1 ± 0.212 ‰, respectively. Considering the 2‰ decrease in the δ 13 C value of atmospheric CO 2 over the past 150 years, these shell values correspond to a canopy cover greater than 70%, with the lower values in Austin possibly indicating even greater canopy cover. The mean δ 18 O value at both sites is 30.9 ±

0.204 ‰, suggesting a similar humidity. The difference in canopy cover despite comparable humidity could be attributed to human influence on vegetation during the early Holocene in Central Texas.

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IMPACTS OF CLIMATE AND WATER CHEMISTRY ON BENTHIC FAUNA IN THE CHESAPEAKE BAY

The Chesapeake Bay is vital in transforming carbon and alkalinity transferred between land and ocean. Estuarine numerical models have tended to include microbiota but not macrobiota to understand biogeochemical transformations. However, macrobiota, such as benthic fauna, could also significantly affect carbon and alkalinity transformation within estuaries. For example, it was recently posited that the bivalve Corbicula fluminea contributes to a large alkalinity sink within the Potomac River Estuary. Our study examines historic benthic fauna data collected annually by the Chesapeake Bay Program's long-term Benthic Monitoring Program. Data include ash-free dry weights of different benthic species, species abundances, and various water property measurements. This study focused on the benthic data collected in the York and Potomac Rivers, two tidal tributaries feeding the Chesapeake Bay. The carbon and alkalinity dynamics in these two tributaries span the range of carbon and alkalinity dynamics in estuaries worldwide. We searched for correlations of important climate-associated and water chemistry variables with the benthic biomass data using generalized additive models. We specifically focused on bivalve biomass because bivalves are the dominant class of benthic species in the Chesapeake Bay and have the most significant impact on carbon and alkalinity dynamics. Preliminary results show important relationships between salinity and biomass of some of the most abundant bivalve species, C. fluminea and Rangia cuneata. Corbicula fluminea strongly prefer the tidal fresh zone, whereas R. cuneata are more evenly distributed throughout the tributary (although slightly lower in the mesohaline zone). Bivalves are present in higher quantities in the Potomac River than the York River, possibly because of the lower salinity within the Potomac. Other interesting associations of important environmental and water-chemistry variables with benthic biomass will be presented. These associations can help improve our understanding of the different environmental factors that influence the abundance of benthic fauna in other estuaries worldwide and hence the impact of benthic fauna on estuarine carbon and alkalinity transformations.

Ali, Guleed [1], Ke, Lin [2,3], Hemming, Sidney[3], Stine, Scott[4], and Wang, Xianfeng [2,3]
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THE GREAT AND SUDDEN RISE OF MONO LAKE, CALIFORNIA 16,000 YEARS AGO

Most recent studies of endorheic lake basins in the western U.S. show that lake high stands date to the time spanning 18,000 to 15,000 years ago, thus linking peak regional wetness to the generally cool conditions that occurred across the northern hemisphere during Heinrich Stadial 1. Although Heinrich Stadial 1

and peak regional wetness were generally coeval, a precise causal link between the two is hampered by uncertainties in the dating of lake high stands. Most of the reported ages assigned to those peak lake levels are based on radiocarbon analyses on lacustrine carbonates whose accuracy are open to question owing to unconstrained lake-reservoir effects and post-depositional carbon contamination. To circumvent those uncertainties, we employed the uranium-series geochronometer to date near shoreline carbonates at Mono Lake in east-central California. The resultant ages, when combined with careful field observations of the geomorphic and sedimentary records in the Mono Basin, compose a century-scale time series of the rise to the lake's late-glacial high stand at 2155 m. That record shows a broad lake rise from 2030 to 2100 m between 20,300 and 16,100 years ago that equates to a ~50% expansion of the lake surface. That broad rise contrasts with the later 55 m rise to the high stand. That rise began after 16,100 ± 60 years ago and likely ended by 15,920 ± 40 years ago, producing a ~25% expansion of the lake surface in 200 years. Our findings are consistent with prior 14 C-based age constraints for the Mono Lake high stand, and they agree with the correlations made between the high stands of other western U.S. lakes and Heinrich Stadial 1. But more significantly, the precision of our uranium-series ages now allows us to correlate Mono Lake's fleeting high-stand transgression with abrupt events that occurred within the span of Heinrich Stadial 1—most notably the short-lived spike in atmospheric CO 2 and oscillation in atmospheric CH 4 at ~16,100 years ago. There is no consensus on the source of the abrupt change in climate 16,100 years ago, but most fingers point to Heinrich Event 1, a short-lived but massive flux of ice and meltwater into the North Atlantic from the Laurentide Ice Sheet. This raises the intriguing possibility that the transient but extreme climatic impact of Heinrich Event 1 may be the precise cause for the dramatic wetting that lifted the western U.S. lakes to levels higher than any attained in tens of thousands of years.

Alwan, Akilah [1] and Dunewood, Leigh Amadi [2]

1. Auburn University
2. University Corporation for Atmospheric Research, Colorado

PRELIMINARY RESULTS FROM THE PROGRAM EVALUATION OF GEOSCIENCE COOPERATIVE EMPLOYEE RESOURCE GROUPS

Employee Resource Groups (ERGs) are affinity-based organizations that aim to support Employees'; and employers'; needs. ERGs are a promising solution for many sciences, technology, engineering, and math (STEM) employers' quests to improve the diversity of their employee bodies through recruitment and retention and to reach their business goals. Using a qualitative research approach, I conducted a program evaluation of the Geoscience Cooperative's (GC) ERGs to assess their value in improving employee sense of belonging and supporting their diversity, equity, and inclusion (DEI) Strategic Plans. GC is a conglomerate of geoscience- focused research laboratories, educational facilities, and administrative personnel. For the evaluation, I conducted a total of five virtual focus group interviews that lasted 90 minutes with three to five members of each ERG at GC, as well as an individual interview with the Chief Diversity Officer. Participants' responses to the semi-structured interviews were recorded and transcribed via the Zoom and Otter.ai platforms, and participants also responded to the series of prompts using the Jamboard platform. These media were then coded using a grounded theory approach within the Dedoose analysis platform to uncover the emergent themes within the participants' narratives. Four major themes were revealed across all five ERGs. First, while GC is a segmented organization across several major divisions, the ERGs create opportunities for community, collaboration, and leadership, and they are also successful in increasing members' sense of belonging. Second, participants felt the ERGs amplified their voices within the organization as a collective and that individually the weight of their voice depended on what level of the

organization they were engaged with. Third, ERGs were revealed to be a powerful tool in raising and tackling DEI issues and pushing for institutional policy change. Finally, ERGs motivate many ERG members to stay at the organization and help recruit new employees, specifically those from historically excluded groups (HEGs) in the geosciences. The implications of these emergent themes within the evaluation are that ERGs are vital in improving GC employees'; sense of belonging and should be engaged to improve workplace culture and achieve STEM organization's business/strategic plans related to DEI.

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ARTIFICIAL NEURAL NETWORK MODELS FOR RESERVOIR-AQUIFER DIMENSIONLESS VARIABLES: INFLUX AND PRESSURE PREDICTION FOR WATER INFLUX CALCULATION

Water-bearing formation commonly known as aquifers usually underlie petroleum reservoirs and often serve as the natural energy source or drive for the reservoir. Pressure drops also known as depletion, occurs when there is decrease in the reservoir pressure owing to the production of oil and gas. This depletion allows water from the aquifer beneath the reservoir to enter the reservoir. Water influx plays a significant role in contributing the needed energy or driving force to produce hydrocarbons. Calculation of water influx into petroleum reservoir is a tedious evaluation with significant reservoir engineering applications. The classical approach developed by van Everdingen–Hurst (vEH) based on diffusivity equation solution had been the fulcrum for water influx calculation in both finite and infinite-acting aquifers. The vEH model for edge-water drive reservoirs was modified by Allard and Chen for bottom-water drive reservoirs. Regrettably, these models' solution variables: dimensionless influx (WeD) and dimensionless pressure (PD) were presented in tabular form. In most cases, table look-up and interpolation between time entries are necessary to determine these variables, which makes the vEH approach tedious for water influx estimation. In this study, artificial neural network (ANN) models to predict the reservoir-aquifer variables WeD and PD was developed based on the vEH datasets for the edge- and bottom-water finite and infinite-acting aquifers. This research is aimed at developing suitable AI models to predict the reservoir-aquifer variables WeD and PD. This is achieved by the utilization of the dimensionless datasets provided by Ahmed and McKinney (2005) for infinite and infinite acting reservoirs. These datasets include time (tD), radius (reD), vertical distance (zD) and water influx (WeD). The dimensionless data is processed, and new attributes related to production of hydrocarbons via water drive is generated. Evaluated the model's performance using cross-validation and compared to existing correlations. With new datasets, the generalization capacities of the developed models were evaluated using statistical tools: coefficient of determination (R2), R, mean square error (MSE), root-mean-square error (RMSE) and absolute average relative error (AARE). The resulting model is data-driven, devoid of interpolations, simplifications or even assumptions with a high accuracy. The generated model will aid in predicting WeD and PD for the various aquifer sizes.

Asirifi, Richard [1], Chen, Xiaowei[1], Ratre, Pranshu [2], and Ng, Raymond [2]

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2. University of Oklahoma *Now at Google

APPLYING WAVEFORM CORRELATION ANALYSIS TO MICROSEISMICITY AT THE FORGE SITES TO DETECT AND CHARACTERIZE FRACTURES

The Frontier Observatory for Research in Geothermal Energy (FORGE) is a geothermal project located at Milford, UTAH, providing pioneer research in Enhanced Geothermal Systems (EGS). Microseismic monitoring is essential during stimulation that aims at creating a permeable fracture network. During hydraulic fracturing, different fractures are activated, some of which have low seismogenic potential while others can host large seismic events. Waveform cross-correlation is a powerful tool to identify events originating from the same faults and long-term monitoring with matched filter detection can identify the early onset of fault activation, which is an essential step for developing a proactive traffic light system. Waveform cross-correlation can also identify isolated asperities that generate events with nearly identical waveforms. Application to the 2019 stimulation found several similar event clusters that correspond to different stimulation stages and repeated activation of asperities. The 2022 stimulation features over 2000 microseismic events over three stages. Applying a machine-learning- based clustering algorithm to the microseismic event catalog found several fracture planes. However, different algorithms identify different sets of fractures, likely due to uncertainties in event location. Here, we apply waveform correlation analysis to microseismic events during stage 3 of 2022 stimulation to further detect fractures via similar event clusters, and asperities with nearly identical waveforms. We will measure precise relative magnitude based on principle component analysis of aligned waveforms, which will be used for magnitude calibration. The improved magnitude will be used to characterize the seismogenic potentials of different fractures, and their relationship with injection history. Analysis of the waveforms will provide the basis for the end goal of developing a proactive traffic light system to detect the early onset of fault activation.

Avent II, Wynnie [1], Gilmore, Martha [1], and Ward, Wesley[2]

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2. USGS Astrogeology Center

MAPPING OF YARDANGS SURROUNDING MEAD CRATER ON VENUS: EVIDENCE FOR MEGAYARDANGS

Yardangs are relatively young (thousands of years in terms of time scale) aeolian erosional landforms that form due to a unidirectional prevailing wind carrying sand size particles that erode by abrading existing friable sediment material. The study of yardangs on Earth and Mars has proven critical to our understanding of aeolian environments, paleoclimate, and modern climate conditions on these planetary bodies as they represent that important interaction between surface and atmosphere. Yardangs are important not only as an indicator of regional wind direction, but due to their geomorphological evolutionary link to lakes and depressions they are also indicative of possible surface liquid and rock interactions. Two yardang fields on Venus had been identified, southeast and northeast of the 270 km diameter Mead crater. Further insight into the Venus yardangs will provide further information on the landscape evolution processes at play around Mead and serve as an additional data set to the formation of aeolian features in the solar system. In particular, the size (aspect ratio) of yardangs is found to be generally indicative of lithologic composition and competence of the sediment, allowing the properties of surface geologic units of planetary bodies to be inferred without direct sampling. In this study we measured and performed morphometric analysis of the two previously identified yardang fields to infer the wind direction, initiating mecha-

nism, age, lithology, and classification to further constrain the formational mechanisms and landscapes that produced these features. We utilized Venus Magellan FMAP Left-Looking and Stereo (Cycle 1 & 3) Look Global Mosaic (~75 m/pixel) Synthetic Aperture Radar (SAR) at S-Band (12.6 cm) wavelength data in ESRI ArcGIS software to map and measure the orientation, length/width of the yardang crests, and spacing of the yardang troughs. Preliminary data of a portion of the yardangs in the southeast field indicates a 40° northeast-southwest wind direction and an average length of ~19 km and width of ~0.5 km yielding a length:width ratio of 39:1 yielding a derived height range of 183-247 meters. These data suggest that the yardangs found in the southeast field are elongate ridge mega yardangs that are composed of competent lithologies such as indurated sediments or bedrock. The average spacing between the Mead yardangs is ~ 1km, yielding a width:spacing consistent with mature yardangs on Earth. The length:width and spacing requires an initiating mechanism with an original spacing on the order of 2 km that may be related to the underlying structures. Our morphometric confirms the identification of yardangs and provides insight into the wind regime and supports the previous hypothesis that the yardang fields found around Mead crater are formed out of crater impact ejecta.

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EXPLORATION AND ANALYSIS OF A PROSPECTIVE HIDDEN GEOTHERMAL RESOURCE IN THE JERSEY SUMMIT AREA, PERSHING AND LANDER COUNTIES, NORTH-CENTRAL NEVADA

Geothermal energy is an ever-growing form of renewable power production that utilizes heat found in the subsurface of the Earth. Individual geothermal systems can generate tens to hundreds of megawatts (MWe) of sustainable, clean energy at baseload capacities, giving it advantages over other renewables like wind or solar. These resources are usually located within or close to tectonically active regions, where hot fluids and/or steam are transferred to the surface of the Earth or can be accessed at shallow depths. The Great Basin region (GBR) in the western United States is known for abundant geothermal activity and has been identified as having substantial geothermal resource potential due to its favorable tectonic setting resulting from prolonged periods of Cenozoic extensional faulting and crustal thinning. In many areas, extension has continued through the Quaternary, resulting in increased geothermal gradients ranging from ~25°C/km to >70°C/km (Faulds et al., 2004; Coolbaugh et al., 2005; Blackwell et al., 2011). Faults generally control primary permeability pathways of geothermal systems (Caine et al., 1996; Micklethwaite and Cox, 2004), with permeability favoring areas of structural complexity (Curewitz and Karson, 1997; Blackwell et al., 1999; Faulds et al., 2004, 2012, 2015). This combination of high geothermal gradients and active faulting facilitates prolific geothermal activity throughout the GBR, allowing it to host numerous geothermal operations. Currently, the GBR produces ~1 gigawatt (GW) of geothermal energy (Robins et al., 2021). However, estimates suggest ~10 GWe of undiscovered geothermal resource potential within the region (Williams et al., 2008). This geothermal potential is greatest in areas that contain favorable structural settings characterized by increased structural complexity. Faulds and Hinz (2015) characterized and inventoried 426 known geothermal systems (>37°C) across the extensional to transtensional terrane of the GBR. Through this inventory, they were able to identify eight favorable structural settings capable of hosting geothermal systems in the region. Out of these eight settings, six accommodate the vast majority of known geothermal systems, including 1) fault step-overs or relay ramps along normal faults; 2) normal fault terminations; 3) fault intersections between normal faults; 4) accommodation zones whereby oppositely dipping normal fault systems intermesh; 5) displacement transfer zones; and 6) transtensional pull-

aparts in strike-slip faults (Faulds et al. 2011, 2012, 2015). Hybrid systems with more than one structural setting can have additional structural complexity that can further enhance permeability favoring geothermal upwellings (Faulds et al., 2013).'

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USAID-USGS DISASTER ASSISTANCE: BUILDING TECHNICAL CAPACITY AND REDUCING RISK THROUGH INTERNATIONAL PARTNERSHIPS

The Earthquake Disaster Assistance Team (EDAT), Landslide Disaster Assistance Team (LDAT), and Volcano Disaster Assistance Program (VDAP) are three joint efforts implemented by the U.S. Geological Survey (USGS) and co-funded by the U.S. Agency for International Development's Bureau for Humanitarian Assistance (USAID/BHA). These groups support their international counterparts with reducing risks from natural hazards by providing trainings, monitoring equipment, emergency response support, and situational awareness. USGS and USAID co-founded VDAP in 1986, EDAT in 2009 and LDAT in 2019 – each with the similar goal to support and empower foreign counterparts in identifying and mitigating their natural hazards through building on their existing knowledge and capacity. All three assist foreign partners, upon their request, specifically with technical capacity. In addition to helping partners reduce natural risk, the partnerships allow USGS scientists to broaden their scientific and cultural perspectives and develop important relationships with international colleagues that promote scientific diplomacy. EDAT is engaged in the Dominican Republic, Haiti, Costa Rica, El Salvador, Mexico, Ecuador, Colombia, Tonga, Fiji, Indonesia, Nepal, Thailand, Albania, and Türkiye. EDAT often supports earthquake response efforts, including the recent 2023 Türkiye/Syria earthquakes. LDAT is engaged with Sri Lanka, Chile, Federated States of Micronesia, Fiji, and El Salvador. VDAP has responded to over 70 crises at more than 50 volcanoes since 1986 and helped strengthen response capacity in 13 countries. Current VDAP projects include Chile, Colombia, Costa Rica, Ecuador, El Salvador, Fiji, Tonga, Guatemala, Indonesia, Peru, Solomon Islands, and St. Vincent and the Grenadines.

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ASSESSMENT OF RADIOLOGICAL HAZARDS OF SOIL SAMPLE AROUND A DUMPSITE IN IGBUDU AREA OF WARRI, DELTA STATE.

Assessment of radiological hazards of soil sample around a dumpsite in Igbudu area of Warri, delta state was investigated by the use resistivity method and gamma-ray spectroscopy. The objectives of the study were to determine the radioactivity concentrations in soil and groundwater. Results show that the soil and ground water have been contaminated by dumpsite emissions and radioactive materials throughout the dumpsite area. The Distribution of the contaminations is uneven and spotty, both horizontally and verti-

cally, and has penetrated to depths exceeding 1m into the ground water aquifer. The primary contaminants found in the site are the radionuclides of K-40, U-238 and Th-232. The mean activity concentration of K-40, U- 238 and Th-232 in the soil sample study estimated were 76.637 5.898, and 7.806 Bqkg -1 respectively, also the absorbed effective dose was also as 10.9813nGyh -1 and 13.467Svyh -1 respectively. When comparing with the world average of 390, 35, and 35 Bqkg -1 for K-40, U-238 and Th-232 respectively, the activity concentration is said to lower. The mean activity concentration of U-238 is 5.898 Bqkg -1, Th-232 is 7.806 Bqkg -1, and K-40 is 76.637 Bqkg -1. The level of 232 Th may be observed to the geology of the area (including the presence of metamorphic rock like shale). The mean activity concentration detected from the soil samples were lower compared to the world average. Hence, it poses no threat to the community of this area.

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EXPLORING EARTHQUAKE SWARMS: A TRANSFORMATIVE SUMMER TRAINEESHIP AT FORT VALLEY STATE UNIVERSITY

There is an urgent need to comprehend the contrasting characteristics of earthquake sequences, particularly the distinctions between major earthquakes accompanied by aftershocks and smaller magnitude earthquake swarms. The Mexico subduction zone which is a seismically active region known for its complex tectonic interactions, is also a substantial seismic hazard to the surrounding communities and has been active in the last 10 years with earthquakes of magnitude greater than seven. The broader impacts of the underlying mechanisms that govern earthquake sequences in this high-risk zone are investigated through systematic examination of seismic waveform data. To achieve this, Shell scripts on a Linux operating system were employed to analyze and visualize seismic data from a catalog compiled by year. By leveraging the Generic Mapping Tools (GMT) for plotting and effectively distinguishing mainshocks-aftershocks events from earthquake swarms based on their temporal and spatial distribution. This approach allowed for a comprehensive analysis of each event's occurrence and magnitude, revealing crucial insights into the earthquake sequence characteristics. The findings from this study contribute to our understanding of earthquake behavior in the Mexico subduction zone and highlight the significance of computational semiology as a powerful tool in seismic research. The knowledge gained from this investigation can aid broader studies, ultimately enhancing earthquake preparedness and risk mitigation strategies, thus safeguarding lives and infrastructure in seismically active regions worldwide.

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CARBON DIOXIDE AND METHANE FLUXES IN THE YUKON-KUSKOKWIM DELTA PERMAFROST

Rapid Arctic warming is thawing landscapes of the Alaskan tundra. This thawing can promote microbial decomposition of organic matter previously locked away in permafrost. When permafrost thaws in ice-rich soils, the ground collapse and thermokarst development can exacerbate thawing rates– potentially re-

sulting in higher respiration rates and increased CO2 fluxes. Thermokarst processes along lakes can increase lake CO2 and CH4 ebullition as a result of inputs of labile carbon from recently thawed soils. Here we examine organic matter composition and lability of a thermokarst feature and the impacts of thermokarst processes on lake ebullition from a shallow tundra lake in the Yukon-Kuskokwim Delta, Alaska. We measured the concentrations and biolability (soil leachate experiments) of dissolved organic carbon (DOC) of soil leachates and respiration rates of soils collected along a depth profile of an active thermokarst feature. We also measured dissolved CO2 and CH4 and estimated lake ebullition rates over seven days in July 2022 from areas adjacent to the thermokarst and adjacent to undisturbed tundra. Ebullition rates near the thermokarst landform were more than ten-fold greater than ebullition rates than undisturbed tundra. CO2 fluxes from the thermokarst soils were highest in organic soils, followed by mineral soil and lake sediment. These results demonstrate the contribution of abrupt permafrost thaw to lake greenhouse gas emissions and highlight the potential for nonlinear impacts of abrupt thaw events on carbon emissions from the Arctic.

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A BIOMARKER RECORD OF PALEOCLIMATE AND ENVIRONMENTAL CHANGE IN TROPICAL NORTH AMERICA FROM THE SEDIMENTS OF LAKE CHALCO, MEXICO

The highly populated Mexico City region, which is home to over 20 million people and contains Lake Chalco, is predicted to experience reduced precipitation as a result of anthropogenic climate forcing, along with a rise in the frequency and severity of droughts. Changes in the Pacific and Atlantic basins' sea surface temperatures, as well as the movement of the Intertropical Convergence Zone, westerlies, and the North American Monsoon, all have an impact on the location. At an altitude of 2240m above sea level which is characteristic of much of western North America, it provides a crucial starting point for understanding the enormous hydrological variability in tropical and subtropical North America. In-depth climatic data that are gathered in southern North America and the Caribbean have been the focus of earlier climate- based study in the region. They have shown a link between droughts in southern North America and changes in tropical Pacific Sea surface temperatures, and they also suggest that patterns in the Atlantic Ocean's circulation may have played a role in earlier climatic variability. My research aims to present biomarker data for reconstructing precipitation (the distribution and stable isotope composition of leaf waxes), and temperature (branched glycerol dialkyl glycerol tetraether lipids, brGDGTs) from sediments of Lake Chalco. This

study will enhance our understanding of neotropical climate change which will also help us better comprehend climatic and hydrological variability in one of the densest urban areas of the world.

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PALEOECOLOGICAL RECONSTRUCTION OF SUMMIT LAKE, NEVADA USING DIATOM RECORDS

A diatom-based study of Holocene sediment cores from Summit Lake, NV, has demonstrated significant potential to aid our understanding of past ecological changes in this region. Summit Lake is a desert terminal lake in northwestern Nevada with a maximum depth of 10 m and an elevation of 1780 m.a.s.l. The lake is dimictic, eutrophic, and alkaline, with a surface area of 2.8 km2. The lake falls within the domain of the Summit Lake Paiute Tribe, which has an inextricable cultural connection to the lake via the native Lahontan cutthroat fishery. The Tribe's original name, Agai Panina Ticutta, translates as the Summit Lake Fish Eaters. The surface core was dated with 210Pb, and the upper 40 cm represents the last 150 years. There is a significant presence of the epiphyte Cocconeis placentula and of the diatom Stephanodiscus sp. in the sediment sections above 21 cm depth (since ~63 years ago). However, between layers 22- 23 cm, there is a decline in Stephanodiscus, and below 30 cm (around 1939 CE), Stephanodiscus is completely absent which may suggest shifts in the lake nutrient levels over this period. Throughout the core, the presence of the benthic taxon Epithemia, associated with symbiotic cyanobacteria, remains consistent, possibly indicating times of increased cyanobacterial blooms. Comparisons are made between the early and middle Holocene sections of the core using smear slides. Samples from the early Holocene (11-9 ka) are characterized by a large presence of Stephanodiscus and from scarce to absence of benthic species indicating deep water environments. In contrast, the middle to late Holocene has a more mixed and variable diatom assemblage. Some intervals in the middle Holocene are dominated by benthic gomphonemoids, nitzschioids, and/or surirelloids, suggesting periodic or sustained lake level drops and an expanded marshy habitat. Analyses of diatom assemblages will continue downcore and be integrated with other proxy data, including tree rings and sedimentary ancient DNA (sedaDNA) to help reconstruct the climate and environmental history at Summit Lake and assist the Tribe's management efforts to maintain a resilient watershed and fishery.

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0.34% ENTHALPY CHANGE PER YEAR FROM THE KIBIRO GEOTHERMAL PROSPECT ALONG THE ALBERTINE-RHINO GRABEN, UGANDA

We report the major ion and δ18O and δ2H ratios and used silica (SiO2) concentrations to assess the geothermometry and enthalpy (heat loss) changes of hot springs along the Albertine-Rhino Graben (ARG). The ARG is a rift segment along the magma-poor Western Branch of the East African Rift System with three main prospective geothermal fields (the Kibiro, Buranga, and Katwe-Kikorongo geothermal fields), however, changes in the enthalpies of any of these geothermal fields have not been investigated. Our objectives are to (1) estimate the reservoir temperature and enthalpy of hot springs along the ARG using hot spring chemistry, and (2) quantify the temporal amount of enthalpy of geothermal reservoirs associated with hot springs. New geochemistry data (major ion chemistry, silica concentration, and δ18O and δ2H ratios) for 26 hot springs along the entire 600 km length of the ARG were analyzed and classified as mostly Na-SO4, Na-HCO3, Ca-HCO3, and Na-Cl water types controlled by the mineralogy of the hot rock. The δ18O and δ2H values of the hot springs show that the hot springs are sourced from meteoric water that flows through faults, is heated, and then ascends to the Earth's surface. The quartz conductive silica geothermometer indicates reservoir temperatures that range from 53 0C to 140 0C with enthalpies ranging from 221 kJ/kg to 589 kJ/kg. The Kibiro, Buranga, and Katwe-Kikorongo geothermal fields' reservoir temperature is 140 0C, 119-124 0C and 120 0C with enthalpies of 588 kJ/kg, 501-523 kJ/kg, and 506 kJ/kg, respectively. Temporal investigations of the SiO2 concentration and enthalpy of Kibiro, a hot spring in one of the 3 main geothermal fields in Uganda, show a 17% decrease in its enthalpy over a period of 51 years. The enthalpy decline is consistent with the enthalpy decrease that ranges from 0.68 to 3.4 % over a period of 17 years in the Nyasimbe hot spring in the Buranga geothermal field and other hot springs in the minor geothermal fields in Uganda. We suggest that the enthalpy changes are because of the decrease in SiO2 concentrations over time, which we infer may be due to SiO2 precipitation along the fault the hot spring water flows through instead of a decline in the stability of the geothermal reservoir itself. We conclude that the use of silica geothermometry, especially for immature and partially mature hot springs whose enthalpies can only be calculated using silica geothermometry, should be studied over long periods of time to fully understand the enthalpy state of geothermal reservoirs.

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INVESTIGATING THE RESPONSE OF BENTHIC FORAMINIFERA TO ENVIRONMENTAL CHANGES IN THE ARCTIC: IMPLICATIONS FOR CLIMATE FORECASTS

As global climate conditions shift towards warmer earth, the Arctic Ocean is forecast to experience the most severe changes given its high climate sensitivity. Arctic warming has already resulted in decreased snow and sea ice cover and the rate of decrease is accelerating. If sea ice extent continues to fall at the current rate and magnitude, it will result in ice-free summers by 2030. These transformations have profound implications for marine ecosystems and carbon cycling processes. Benthic foraminifera, single-shelled marine organisms, offer valuable insights into past climate change and the response of Arctic ecosystems to warming events. This study explores the relationship between sea ice proximity, organic carbon flux, water mass characteristics, freshwater input, and their influence on benthic community composition by analyzing benthic foraminiferal assemblages from surface sediments. We combine and analyze existing datasets from high latitude regions with modern oceanographic data, to identify key environmental factors driving faunal composition, particularly emphasizing the role of organic carbon as a primary control on benthic foraminiferal communities. Additionally, we examine the similarities between faunal assemblages from the Pacific and Atlantic water masses and those within the Arctic basins, aiding in the identification of major oceanographic boundaries over time. Preliminary results reveal clear variations in faunal composition associated with water depth and temperature in the Arctic. Ongoing analysis will further explore the complex interplay of environmental variables, including surface productivity and ice proximity, to enhance our predictive capabilities. These findings would contribute vital insights into past climate variations, ecosystem dynamics, and carbon cycling, enabling informed decision-making for the conservation and sustainable management of the Arctic region amidst ongoing climate change.

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EL NIÑO HYDROCLIMATIC RESPONSE TO GREENHOUSE FORCING

El Niño Southern Oscillation (ENSO) is a climatological phenomenon that controls precipitation and dryness in many climates around the Earth. The net anthropogenic forcing increases in the energy in the Earth's atmosphere due to human activity—usually by Greenhouse Gasses (GHGs)—and is a leading cause of global warming. Global mean temperatures, sea surface temperature, and tropical cyclone frequency all increase due to global warming occurring simultaneously with ENSO warm phases. However, there is not yet a consensus on the effect of global warming on ENSO. This study aimed to discover and understand El Niño's response to an increase in anthropogenic radiative forcing over time. We hypothesized that as anthropogenic greenhouse gasses increased in the atmosphere, that El Niño events would also increase. We null hypothesized that there would be no significant difference in the frequency of El Niño events as greenhouse gasses increased. We addressed this question by studying teak (Tectona grandis) wood that was collected from Muna, Indonesia by Dr. Rosanne D'Arrigo. As the tree rings were dated dendrochronologically, the rings on each core corresponded with the year of its growth. We measured the oxygen isotopic composition (δ18O) of cellulose extracted from each ring during two time periods. The two time periods 1730 to 1769 and 1940 to 1979 were chosen to study eras with a significantly varied concentration of greenhouse gasses in their respective atmospheres. To measure the oxygen isotopic composition of

each distinct ring, the chemically extracted cellulose was wrapped in silver capsules and vaporized in a furnace. These vaporized samples travel through an elemental analyzer where carbon monoxide is separated and then sent through a continuous flow isotope ratio mass spectrometer (CF-IRMS) where the isotopic composition is measured. The researchers analyzed the data with a chi-square test to determine the statistical significance in the difference in frequency of ENSO events between the two time periods. We found no statistically significant difference in the frequency of El Niño events after the Industrial Revolution. We found that although the concentration of anthropogenic greenhouse gasses increased, the amount of El Niño events decreased. Therefore, the null hypothesis was accepted. Current literature states that an increase in anthropogenic forcing will likely cause harsher and more frequent El Niño events in the future, and although severity was not studied, this is not in consensus with what we found. In observing the difference in literature projections compared to our own discoveries, we determined that the relationship between ENSO and anthropogenic climate change needs to be further studied.

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CORAL REEF RESEARCH A BENEFIT TO MEDICAL SCIENCE

Coral Reefs supply us with 50% of our oxygen to grow and sustain life, however they only cover .0025% of the Earth's surface. Devastatingly, during the past 10+ years, their oceanic presence has decreased by 14%. This is a problem because we, living organisms, use oxygen as a source for survival. Did you also know, according to the Coral Reef Alliance, 75% of the world’s coral reefs are currently threatened, 90% of coral reefs will be threatened by 2030 and 100% of coral reefs will be threatened by 2050 if we don’t act now? Moreover, if coral reefs continue to deplete, this will impact an upwards of 500 million people since they provide food, coastal protection, and income with an upwards of $375 billion in goods and services. In addition, the health of coral reefs and some animal research is heavily dependent upon medical research. Medical researchers/scientists have developed treatments and remedies to increase the quality of life for patients who suffer from cardiovascular disease, ulcers, leukemia, skin cancer and lymphoma. Threats to the health and location of coral reefs can significantly alter where they are able to gain sunlight, have reduced heat conditions and threats of overfishing. Scientists believe with the right consistent conditions which reduces the threats to their survival; coral reefs could provide medical breakthroughs, which I hope is done within marginalized communities that suffer heavily from cardiovascular disease, diabetes, and prostate cancer. Hence, this is one of the reasons why I want to take my skills of visual media production to the ocean capturing the story and life-altering benefits of coral reefs then share with community health providers, researchers and doctors to gain an internship that would allow for further research on how science can save lives, bring awareness and cause engagement to action for communities to gain the healthcare they need, no matter their economic status.

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LABORATORY SPECTRAL ANALYSIS OF ABANDONED MINE WASTE FROM THE FORMER KATHERINE GOLD MINE, ARIZONA: MINERALOGICAL AND TEXTURAL CHARACTERISTICS WITH IMPLICATIONS FOR FUTURE REMOTE SENSING STUDIES

The Katherine Au-Ag mine, in Lake Mead National Recreation Area, Arizona, was in operation from 1903 to 1943. Gold and silver were mined primarily from Comstock-type epithermal quartz veins. A reconnaissance study by the U.S. Bureau of Mines estimated that the mine generated approximately 640,000 tons of mill tailings, averaging 0.344 g/t Au and 15.2 g/t Ag. Seventy- four samples were collected and analyzed by the USGS using laboratory spectral reflectance methods spanning the < 1-mm wavelengths in the visible and near infrared (VNIR) > 2-mm wavelengths in the shortwave infrared (SWIR), and the 8- through 14-mm wavelength range also known as the thermal infrared (TIR). These samples were spread across 0.13 km 2 of exposed surface of the tailings piles. They include samples from the main alluvial channels directly upstream and downstream of the waste piles, as well as regolith and soil from older alluvial surfaces, not associated with previous mining activities. In terms of the most dominant phyllosilicate minerals detected, the 2-mm SWIR results show that the tailings piles are not mineralogically distinct from any of the surrounding alluvial sediments. Most tailings contain the same variety of “low Al” muscovite, which retains much of the iron and magnesium not removed as a result of hydrothermal alteration or other fluid enrichment or depletion processes. The 1-mm VNIR results show greater variability in the types of iron-bearing minerals detected across different tailings samples. This includes evidence of (in decreasing abundances): chlorite-muscovite intimate mixture, goethite grain coatings, unidentified amorphous ferric-iron phases, a monoclinic amphibole type (cummingtonite?) and hematite. In contrast, the surrounding alluvial samples are mostly dominated by goethite grain coatings. The TIR results display the most lithologic contrast between the tailings piles, and the surrounding alluvial channel and older fan/terrace regolith samples. For example, with the exception of one outlying sample, the tailings pile samples were all spectrally matched to a mixture of fine- grained hydrothermal quartz and fine-grained carbonate minerals. Alternatively, the alluvial samples contained mostly coarse-grained non-hydrothermal quartz and feldspars. For future hyperspectral remote sensing studies of Comstock-type Au-Ag mine waste, the TIR wavelengths will provide the best data for separating the waste piles from surrounding geologic substrates. The 1-mm wavelengths will allow the mapping of compositional variability within the actual waste piles.

Itie, Dozie

Bargas

MORPHOLOGICAL AND PHYLOGENETIC ANALYSIS OF A PALEOGENE TYPOTHERIA FROM CACHAPOAL

South America for most of the Cenozoic period was isolated. Due to its isolation, this led to the mammals of this period being endemic. This period has been referred to as the South American Land Mammal Ages or SALMA. A recently established SALMA, the Tinguiririan may possibly have a bigger geological range. A river valley that approaches the Tinguiririan, the Cachapoal River Valley, has been hypothesized to be part of the SALMA and could extend its geological range. To answer this question, I describe a fossil from the Cachapoal River Valley to determine whether the Cachapoal River Valley is Tinguiririan in age. Using my

description, I compared the characters I identified with other specimens and used phylogenetics to determine the species. The results of my studies indicate that the fossil is a sister group with Protypotherium Australe and Miocochilius. The geological ranges of these taxa make them younger than the Tinguiririca and indicate that the Cachapoal River Valley is not of the Tinguiririca age.

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GEOPATHS SUMMER TRAINING PROGRAM IN STEM: A SUMMER TRAINING RESEARCH PROGRAM IN GROUND PENETRATING RADAR AT FORT VALLEY STATE UNIVERSITY

This study is a part of a summer internship that trains African American STEM undergraduate students of a Historically Black Colleges and Universities, Fort Valley State University (FVSU) located in Middle Georgia with high tech hands-on geophysical equipment and techniques. This program, GEOPAths Summer Internship Program is funded by the NSF and in 2023 summer provided five FVSU STEM students with training in Ground Penetrating Radar. The interns were also involved in various other activities throughout the summer. Through a weeklong course, students were also introduced to different geoscience-related activities which included Resistivity methods to visualize the shallow subsurface of the earth, introduction to seismology, and learnt coding languages such as Python and Linux. The interns explored Stone Mountain on a field trip learning about the geological history of this igneous rock. The information gained from visiting Stone Mountain was shared with the middle school summer academy where the interns taught the younger students how to identify minerals and rocks in hand specimen. visited the Georgia Tech campus where they interacted with faculty and graduate students. These experiences increase both student engagement and retention in STEM and in geoscience. Ground Penetrating Radar (GPR) uses energy waves in the microwave band, ranging in frequency from 1 to 1000 MHz and requires two main pieces of equipment – a transmitter and a receiving antenna. GPR works by the transmitter emitting a pulse of electromagnetic energy into the ground; and then the receiver records the echo generated when the reflection of the emitted pulse when it encounters a subsurface object or a boundary (e.g., a different geologic unit) with different electromagnetic properties. The wave spreads out and travels downward until it hits a buried object or Part of the wave energy is reflected or scattered back to the surface, while part of the energy continues to travel downward. The wave is reflected to the surface to a receiver antenna that records the amplitude of the reflected energy and the arrival time of the wave on a digital storage device. The location of research chosen was an area on FVSU campus, a rectangular open space between Academic Classroom Building (ACL) to the north and Wildcat Commons dorm buildings 4 and 5 in the south. The area chosen had utility cables in the subsurface but the exact depth to which the cables were buried is not known. After careful measurement of the area, the researchers decided to create a grid to run the GPR using a 500 MHz antenna. The grid created was 40 meters in length and 40 meters in width. The GPR was selected to run every 5 meters both along the width and the length of the grid. The interns took turn collecting data on each of lines thus generating 18 data sets. Upon acquiring data in the field, EKKO project was used for data processing in the lab. The software analyzed the data and produced 18 time slices (grey imaging with hyperbolas) for the 18 lines of the grid mentioned above. The hyperbolas in the time slices represent the estimated width of an object and at what depth in the subsurface the object is located. The software then uses the time slices (vertical) and produces produce depth slices (horizontal). The depth slices are color coded with hot (red) to cool (blue) colors represent the variation of electromagnetic properties of the subsurface. Once the depth slices were processed, researchers compared the data with that of the utility map to gain more understanding of the equipment and of the subsurface of the project and certain utility cables and their buried depths could be deciphered by analyzing the depth and time slices.

The results from this study highlight the effectiveness and applicability of GPR as a powerful tool for non-destructive subsurface exploration and utility mapping in urban environments.

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EXPLORING GROUND-PENETRATING RADAR (GPR) APPLICATIONS FOR SUBSURFACE MAPPING AND ANALYSIS

This study utilizes GPR (Ground Penetrating Radar) to survey an area of research at Fort Valley State University located in Middle Georgia, using GPR. The research was conducted on a rectangular open space south of the Academic Classroom Building (ACL) and Wildcat Commons dorm buildings 4 and 5. GPR is a geophysical method that uses radar to send electromagnetic waves into Earth's subsurface. These pulses are reflected to the antenna used (500 MHz in this research) if a non-organic object is detected in the subsurface. Once contact is made with the non-organic material, The electromagnetic wave will bounce off the object revealing the depth in which it made contact. It is a non-intrusive method of surveying underground utility and structures. Upon acquiring data, EKKO project was used in the method of data processing, which produced time slices (grey imaging with hyperbolas. The hyperbolas represent the estimated width of the object which can produce depth slices with further processing. Once the depth slices were processed, researchers compared the data with that of the utility map to gain more understanding of the equipment and of the subsurface of the project. In addition to our GPR research data, we also did a study on the geophysical practice of Resistivity. The resistivity data collected was compared to the GPR data, which led students to conclude both methods are necessary when measuring below the subsurface without digging manual holes. As a part of our program, we participated in coding workshops which include Linux, SAC, DMT, and Python. We also did service learning and field days at Georgia Tech and Stone Mountain to better our understanding on geoscience and geophysics as a whole.

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C-ISOTOPE CHEMOSTRATIGRAPHY AND PCO 2 CALCULATIONS FROM THE CLOVERLY FORMATION IN NORTHERN WYOMING

The Early – Late Cretaceous transition in Western North America recorded a period of rapid climatic and tectonic change in Earth's history. Major climate events associated with large igneous province eruptions caused several instances of ocean anoxic events (OAE) and perturbations to the global carbon (C) – cycle. These perturbations to the global C-cycle are observed in the bulk organic C record of both marine and terrestrial deposits and can be used to correlate units across major depositional basins. Major efforts are being made to generate time- constrained palaeontologic and paleoclimate information from the North American Cordilleran foreland basin and C-isotope chemostratigraphy can aid in making these correlations. This study uses the isotopic composition of bulk organic carbon from the Lower Cretaceous Cloverly Formation to constrain the age of the Cloverly Formation within the Bighorn Basin, Wyoming.
The study also investigates paleoclimate proxies such as mean annual precipitation and atmospheric CO_2 concentrations. C-isotope chemostratigraphy of bulk organic carbon results range between -21‰ and -30.1‰ and average at -23.97 ‰. Two pedogenic carbonates nodules from the Little Sheep Member (CCC-

12 and CCC-24) were analyzed for δ 13 C org, δ 13 C carb, and δ 18 O carb. The Little Sheep Mudstone Member carbonate nodules have average δ 13 C carb values of - 6.72 ‰ at CCC-12 and -7.25 ‰ at CCC-24. The mudstone organic C isotopic values of the carbonate nodules are -26.27 ‰ for CCC-12, and -25.9 ‰ for CCC-24. The S(z) values (soil CO_2 concentration) were estimated to be between 1000 – 3000 ppm, typical of micro-high vertic soils. Atmospheric pCO_2 concentrations are calculated using the paleosol CO_2 paleobarometer of Ekart et al. (1999) and are reported at S(z) = 2000 ± 1000 ppm. Atmospheric C-isotopic composition of pCO_2 is estimated using the δ 13 C of bulk organic C in mudstones and the relationship between plant matter and pCO_2 outlined in Arens et al. (2000). Atmospheric pCO_2 values at 4 m above the Pryor Conglomerate, 14.5 m above the Cloverly-Morrison lithologic boundary are 352 ± 176 ppm and increase to 931 ± 465 ppm at 18.5 m. Mean annual precipitation (MAP) was calculated from weathering indices of metal oxides in soils using CALMAG and CIA-K equations. MAP increases up section from a minimum of 697- 984 mm/yr in the LSM to a maximum of 1291-1705 mm/yr in the Upper Himes Member. Given the maximum depositional age of the base of the Little Sheep Mudstone Member (129.4 ± 3.4 Ma) from D'Emic et al. (2019) , a maximum depositional age for the lower Himes Member at Crooked Creek of 103.6 ± 1.3 Ma (D'Emic et al., 2019) , the maximum depositional age of 112.09 ± 0.34 Ma (Carrano et al., 2021) from other Little Sheep Mudstone outcrops, and the high resolution C-isotope chemostratigraphic trend of the Crooked Creek Section constrains the positive C-isotope trend and decreasing (negative CIE) trend to the C-10 to C-11 C-isotope excursions associated with the CIE of Bralower et al. (1999) that occurs in the Late Aptian to Early Albian.

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FAULT-CONTROLLED GEOTHERMAL RESOURCES OF KATWE-KIKORONGO VOLCANIC FIELD IN UGANDA

Uganda has been identified as having significant geothermal resources, however they have not been fully explored commercially. Among the three geothermal resources in Uganda is the Katwe-Kikorongo Volcanic Field (KKVF) located in southwest Uganda within the northern Western Branch of the East African Rift System. The KKVF has been prospected for geothermal energy since 1935 primarily due to the presence of hot springs and volcanic craters, which are presumably magma-controlled. Despite these indications, the KKVF has yet to be commercially explored due to incomplete understanding of the heat source. This work synthesizes early geological records, including drilled temperature gradient holes, seismic tomography data, resistivity, and gravity studies. These data are combined with the more recent magnetotellurics, and

geochemical studies conducted in the region. The objective is to determine whether the geothermal resources in KKVF are derived from a shallow magmatic heat source or if the heat originates from deep circulation resulting from fault interactions (fault-controlled). Our Interpretations based on the new magnetotelluric and geochemical data, with previous datasets, indicate that the KKVF is a fault-controlled hydrothermal geothermal resource. This new synthesis strongly suggests the presence of thermal anomalies along the Nyamwamba fault, close to Lake Kitagata, thereby confirming proposed prospects for geothermal exploration in this area.

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SEDIMENT SORTING AND ROUNDING IN A BASALTIC GLACIO-FLUVIO-AEOLIAN ENVIRONMENT: ÞHÓRISJÖKULL GLACIER, ICELAND

Sediments and sedimentary rocks preserve a rich record of environmental and climate history. Identifying these signals requires an understanding of the physical and chemical processes that have affected sedimentary deposits. Although these processes have long been studied in quartz-dominated sedimentary systems, the relative paucity of studies in basaltic systems limits paleoenvironmental interpretations where basaltic source rocks dominate, such as on Mars. This study is part of the SAND-E: Semi-Autonomous Navigation for Detrital Environments project, which uses robotic operations to examine physical and chemical changes to sediments in basaltic glacio-fluvial-aeolian environments in Iceland. Here, we study changes in sorting and rounding of fluvial-aeolian sediments along a proglacial proximal-to-distal transect in the outwash plain of the Þórisjökull glacier in SW Iceland. To this end, we map the source rocks in the catchment, determine particle size and shape for silt- to-cobble grain-size fractions, and evaluate the wind speed required to mobilize available sediments. The aspect ratio of grains increases with grain size. Wind transport thresholds for both fluvially and wind-transported sand range from 0.42 to 0.57 m/s (Fig.1). Average field-measured wind speeds were not sufficient to mobilize either fluvial or aeolian sands at any site. Maximum wind speeds, in contrast, exceeded the threshold calculated for the mean size of fluvial sand at the proximal location. This suggests that higher wind speeds than measured must occur to mobilize observed aeolian sediments.

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QUANTIFICATION OF BIOGENIC GAS PRODUCTION BENEATH A CLAYPAN

Numerous studies have documented methane accumulation and emissions from saturated inland environments such as wetlands and bogs. However, fine grained lithology provides other potentially significant inland sources of methane. This study explores a terrestrial zone containing a claypan along a hillslope

adjacent to a lake in Stillwater, Oklahoma, which presents a new environment for observing methane accumulation and emissions beneath a hydraulic barrier. Hydraulic barriers induced by fine sediment have been observed to limit the diffusion of gas through the sediment eventually occluding water from pores and extending the depth of the vadose zone beneath the water table elevation. This gas accumulation, with a water table depression was observed at the study site. Using electrical resistivity imaging, soil coring techniques, and hydrologic data collection, groundwater beneath the hillslope base was shown to be greater than four meters beneath the surface of the adjacent lake. Data from another study suggests the following: 1) methane concentrations collected from piezometers distributed along the hillslope, 2) show an inverse relationship with atmospheric pressure fluctuations, 3) demonstrating gas may be occluding groundwater from the available pore spaces, and 4) discharging when atmospheric pressure is low. This study aims to quantify the volume of gas beneath the claypan and estimate the methane flux out of the hillslope. We will investigate the potential relationship between the presence of hydraulic barriers on hillslopes and the diffusive flux exiting through these barriers, considering their interaction with the current gas volume. Our findings may shed light on the possibility of a dynamically changing emission of biogenic gas from inland environments due to these processes.

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GEOPaths Program, Fort Valley State University

2023 GEOPATHS SUMMER INTERNSHIP PROGRAM IN GEOPHYSICAL TECHNIQUES: RESISTIVITY SURVEY

GEOPaths is a summer internship program at Fort Valley State University, a HBCU in middle Georgia that provides interns with authentic, career-relevant hands-on experiences with high tech equipment and cutting-edge software. Interns in the Geo-Paths internship program were able to gain experiences through many activities this summer which included using GPR and Resistivity methods, introduction to seismology, and learnt coding languages such as Python and Linux. Through a week-long course, students were also introduced to different geoscience related careers; visited Georgia Tech campus where they interacted with faculty and graduate students. The interns explore Stone Mountain on a field trip learning about the geological history of this igneous rock. The information gained from visiting Stone Mountain was shared with middle school summer academy where the interns taught the younger students how to identify minerals and rocks in hand specimen. These experiences increase both student engagement and retention in the STEM and in geoscience pipeline and equips the students with job-related and computing skills upon graduation. This project introduced summer interns to the basics of geophysical data acquisition using techniques that record variations in the electrical conductivity of the earth to image the shallow subsurface of the earth. Electrical imaging is a galvanic geophysical approach whereby electrical contact with the earth is made via electrodes (typically metal stakes) that are inserted into the ground. Two resistivity surveys were conducted on a rectangular open space south of the Academic Classroom Building (ACL) and Wildcat Commons dorm buildings 4 and 5. Line A ran 110 meters with 56 electrodes in a North-South straight-line orientation from the western side of WC 4 (0 m) and ending on the western side of ACL (110 m). Line B ran 110 meters in a diagonal line (NE-SW) with NE end near ACL marked 0 m. This study focuses on Line B. The two lines A and B intersect at 43 m (Line A) and 98 m (Line B) from their origins respectively. The SuperSting TM with Swift TM automatic and IP system survey was manually set up by individually hammering 56 electrodes, 2-meters apart, in a straightened and measured line. Two electric resistivity tomography (ERT) cables were then attached to each electrode from both ends, meeting in the middle where they were attached to a resistivity meter. The system was attached to 2 Die Hard platinum batteries with 750Amps. Once planted, a resistivity cable was wrapped around each electrode and an elec-

tromagnetic current was sent through each electrode for 45 minutes using a Dipole-Dipole method. The data received was then analyzed in ResIPy software to provide detailed imaging of the data that was collected. Resistivity surveys cannot detect small objects such as pipes or utilities, however it can detect large boulder sized masses. The data indicates the possibility of the presence of two medium sized masses identified by high resistivity values as compared to the materials surrounding them.

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GEOSCIENCES UNITED ONBOARD THE JOIDES RESOLUTION: EARTH AND OCEAN SCIENCE COLLABORATIVE LEARNING OPPORTUNITIES WITH THE INTERNATIONAL OCEAN DISCOVERY PROGRAM

Student learning opportunities associated with the International Ocean Discovery Program (IODP) vessel, the JOIDES Resolution (JR), allow diverse undergraduate students to experience science at sea. One such program, the JR Academy, was held in February 2023 for the first time since 2019. As two of the ten student participants in the JR Academy expedition that sailed from Heraklion, Greece to Tarragona, Spain, we gained first-hand knowledge of the importance of scientific ocean drilling to learn more about the Earth and the changes that have occurred over time. Through the study of deep ocean cores, we understood in greater detail the wide variety of tools used on the JR to collect evidence from marine sediments, microfossils, and chemical proxies to interpret past ocean and climate history. We were also introduced to the range of skills needed for effective science communication through a partnership with the NASA Astrobiology program. Gaining a deeper appreciation for the JR Academy and the NSF-funded partnering programs, STEMSEAS (STEM Student Experiences Aboard Ships) and A-STEP (Ambassadors for STEM Training to Enhance Participation), provided Academy students with knowledge and influence in a range of fields and disciplines. Furthermore, we were inspired by the truly international scope of the JR and the ship's crew, technicians, and staff who were hired from all over the world. This opportunity to gain perspectives on how diversity, equity and inclusion in STEM can work on a global scale was invaluable. This presentation will present the structure and lessons learned from JR Academy through the lens of student experiences.

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CHARACTERIZING MESERVE GLACIER FLOW PATTERNS THROUGH THE PROVENANCE OF MORAINE TILLS

Glacial flow of the Antarctic Ice Sheet can both greatly impact the topography of the Antarctic continent and provide valuable information about the Antarctic Ice Sheet's relationship with global climate. The McMurdo Dry Valleys (MDV) are part of the 2% of Antarctica that is not covered by snow and ice, though glaciers previously moved through these areas, carving away bedrock and leaving behind till, glacially deposited sediment. Deposits in the MDV preserve at least 15 million years of glacial history, spanning multiple glacial events and sources. This project utilizes the exposure of the McMurdo Dry Valleys and the opportunity to complete field work to collect and analyze till, bedrock, and ice samples to determine an age profile of the area. Samples were collected from five different overarching sites and varying subloca-

tions from each. This abstract focuses on the 11 sample sites from Meserve Glacier area. We chose our sites ahead of time based on pre-existing literature and satellite imagery, allowing us to fine tune the choices in the field. At each sample site, we dug pits ⩽25cm deep, then sampled in a T-shape, beginning with a wide, shallow cut at the top of the pit and digging deeper with a narrow focus. This allowed us to collect an overview of upper layers of moraine sediment including aeolian and colluvium, as well as dirt that had most likely been undisturbed since the glacier had deposited it. Grain size (*a*), carbon content (*b*), and major elements (*c*) of till deposits and bedrock have been quantified. The Malvern Mastersizer 3000 calculates the size and distribution of sample particles through laser diffraction. Comparing the grain size of samples of different relative ages based on distance from the glacier foot, provides information about how the sediments may erode through transport or deposition. Loss-on-ignition of samples provided data about carbon content, and sample geochemistry was analyzed using an XRF. Preliminary data suggests no direct relation between carbon loss on ignition or grain size for the samples from Meserve Glacier till deposits. Rb vs Sr and Zr vs Ba plots suggest similar sources for the samples, which is consistent with the impression that the Meserve Glacier was the main source of the tills. We hope that further analysis of detrital zircon grains in the LA-ICP-MS will provide further information on source and characteristics of these tills that may differentiate them from other sites in the McMurdo Dry Valleys.

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INCREASING DIVERSITY IN THE GEOSCIENCES THROUGH COMMUNITY PROJECTS: RESEARCHING HARMFUL ALGAL BLOOMS IN URBAN ENVIRONMENTS

The geosciences are one of the least diverse of all the science and technology disciplines. Many agencies and university programs are trying to address this problem through scholarships and recruitment. These programs are helpful, but another avenue that would help recruiting is to conduct more earth and environmental studies in under-represented communities. Going into these communities with the intent of conducting research, but also connecting with individuals, would make people aware of the value and importance of geoscientists, as well as potential environmental hazards that could be affecting their community. One example of this is developing a program that would support studying harmful algal blooms (HABs) in urban environments. In a literature survey, we found numerous national, regional, and state programs that targeted HABs in rural and suburban waterways and only 1 that targeted urban waterbodies. More often than not, the urban water was not monitored, but was under the constant general assumption of being unclean water. The objective of those large monitoring programs was to determine the occurrence and distribution of HABs on large scales. That is a worthy goal but preselects for non-urban lakes and ponds. Tennessee State University (TSU), in partnership with Tom Byl, US Geological Survey, is conducting a preliminary study of HABs urban ponds in Nashville, TN. We found high concentrations of microcystin (greater than 5 micrograms per liter) in wetlands draining a historically black neighborhood. After finding this, we are conducting more monitoring in more urban lakes and streams in neighborhoods of Nashville. Part of our motivation was based on the fact that neighborhood youth play and consume fish from these waters. We also felt it was an excellent opportunity to connect with under-represented communities and talk with them about water quality issues in their neighborhood, as well as the broad concept of geoscience. TSU is uniquely qualified for this outreach and HAB study as an urban Historically Black University. We are currently collaborating with Metro Parks and have numerous sites throughout Nashville that we are temporally sampling and observing.

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SIMULATING EARTHQUAKES USING HIGH-PERFORMANCE COMPUTING

Earthquakes are one of the most devastating and deadly natural disasters to affect people. With decades of recording earthquakes and centuries of lives lost, there are still many aspects we do not understand. The most major being how to predict an earthquake. Compared to other sciences like biology, chemistry, and plant science, seismology is still relatively young in comparison. The research is aimed to see if running containers on Frontera with multiple nodes will hinder its performance or will the increased number of nodes will maintain or improve in effectiveness or accuracy. Not only did the research test the effectiveness but also observed if using the High-Performance Computing Frontera allows for visualization and running of simulations. A container is a software unit used to package applications and all their dependencies into an isolated environment, allowing it to run across different architectures and operating systems with little to no issues. The data was analyzed to see if the effectiveness of the container did falter when using multiple computing nodes. As well as see if the accuracy remained the same or noticing any significant improvements when we increased the number of computing nodes. We test our hypothesis by running our container on Frontera using an increasing number of computing nodes. First, we need to access the High-Performance Computing system through the Texas Advanced Computing Center tap portal, then navigate through the terminal to gain access to a jupyter notebook steering the earthquake simulations and begin gathering data. Once we gathered all the data needed, we input it into an application called Paraview to get a three-dimensional image of the earth Kaikoura. To up the scale of the data gathered we would submit a job requesting access to more computing nodes on Frontera.

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CONTINENTAL WEATHERING ACROSS THE END-PERMIAN MASS EXTINCTION

About 252 million years ago, 80-90% of marine species and 70% of land species were decimated during the end-Permian mass extinction event (EPME). Massive amount of CO2 released from magma outpoured during the Siberian Trap (ST) volcanism is postulated to be the trigger of this event. The impacts of the ST volcanism on the EPME and the subsequent recovery are still debated despite decades of research on the topic. The role of silicate weathering to sequester CO2 from the atmosphere following the EPME has not been quantitatively assessed. Here, lithium isotopes (δ7 Li), a proxy for silicate weathering, are used to test the hypothesis that silicate weathering rate is outpaced by volcanic CO2 emission following the EPME. Samples used in this study spanning the EPME were obtained from the Finnmark and Trøndelag Platforms in Norway and Dajiang and Waili Sections in South China. The Finnmark δ7 Li data show an increase from

19‰ to 24‰ postulated and were interpreted as decreasing silicate weathering rate before the EPME. This is followed by a decrease from 24‰ to 18‰ following the EPME as the weathering intensity increased. A dynamic lithium cycle box model suggests that the decreased δ7 Li values following the EPME is consistent with a three- to four-fold increase in weathering rate following the EPME, likely due to elevated pCO2 and temperatures. Continued CO2 outgassing from the ST volcanism may have exceeded the rate of carbon sequestration facilitated by silicate weathering, leading to long-term warming in the Early Triassic.

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ESTIMATING THE ELECTRICAL RESISTIVITY OF THE UPPER MANTLE WITH THE VERY BROADBAND RHEOLOGY CALCULATOR (VBRc)

The electrical resistivity of Earth's subsurface varies by over five orders of magnitude across chemical and physical properties. Parameters that impact this response are mineral composition, temperature, pressure, melt fraction, and volatile content (e.g., Naif et al., 2021). Furthermore, the geometry of the mantle space will greatly influence the bulk resistivity depending on the interconnectivity of the conductive phases (Glover, 2010). The thermodynamic state of a given mantle regime will affect the in-situ response from Magnetotelluric surveys. In 2020, the "Very Broadband Rheology calculator" (VBRc) software was released for calculating rheological properties of an olivine mantle from seismic observations given an array of thermodynamic state variables using laboratory-derived constitutive models (Havlin et al., 2020). To further the scope of the VBRc, we include methods for calculating electrical resistivity for various applicable thermodynamic states, including mineral composition, hydration state, melt fraction, and melt composition. This includes the melting and volatile partitioning for a range of geophysical mixing models. The objective is to yield an updated calculator capable of incorporating pertinent seismic and resistivity models to constrain observations related to the geophysical anomalies observed in the upper mantle (Kawakatsu and Utada, 2017).

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MODELING FLUID PRESSURE PROPAGATION INTO BASEMENT ROCKS DURING MANAGED AQUIFER RECHARGE IN THE VIRGINIA COASTAL PLAIN AQUIFER

Coastal aquifers are under increasing threat due to excessive groundwater withdrawal, resulting in freshwater depletion, seawater intrusion, and land subsidence. To address these issues, the Sustainable Water Initiative for Tomorrow (SWIFT) Research Center in Suffolk, Virginia, has been testing managed aquifer recharge (MAR) in the Potomac Aquifer of the Virginia Coastal Plain Aquifer (VCPA) since 2018. However, the extent to which pressure propagates into the basement and its potential for inducing microseismicity during this MAR operation remain unknown. To support MAR research at the SWIFT Research Center, a numerical groundwater model was developed. This model reproduced the subsurface geology, groundwater salinity, fluid pressure, and temperature of the site before MAR in 2018. The model then reproduced

SWIFT's four years of aquifer recharge from 2018 to 2022, and the model results were compared with hydraulic head measurements from a nearby monitoring well cluster. After a reasonable fit to the monitoring wells was achieved, the model was used to predict the fluid pressure changes under different injection rates of 1 million and 2 million gallons per day (GPD), thus providing valuable insights into MAR operations at permitted and anticipated rates. The injection rate at which an average of ~40 KPa of fluid pressure, capable of inducing microseismicity, would reach the basement was analyzed. Lastly, to quantify the effects of this permeability uncertainty in the basement, stochastically generated and spatially correlated permeability distributions are used to create 50 ensemble models to simulate the various injection rates. Thus, this study implies that an injection rate of about 2 million GPD at a constant rate is capable of driving fluid pressure of ~40 KPa into the upper basement, irrespective of permeability uncertainty within the basement, which shows subtle changes to fluid pressure.

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INFLUENCE OF MINERALOGY ON THE ELECTRICAL CONDUCTIVITY OFVOLCANIC ASH

Volcanic ash is a crucial charge carrier within electrostatically charged eruption columns and plumes. Understanding the electrical properties of volcanic ash is therefore essential for comprehending volcanic lightning, ash impacts on atmospheric conditions, and the hazards posed by ash, particularly on electrical infrastructure such as transformers. Despite the abundance of evidence regarding ash-induced flashover, empirical data on the electrical properties of volcanic ash are limited. This study focuses on investigating the contribution and influence of individual igneous minerals in both dry and suspended aqueous states on the electrical conductivity of ash samples. The investigation was carried out using dry mineral powders (albite, labradorite, apatite, hornblende and augite) and aqueous mineral suspensions with concentrations of 10mg/L in deionized water. The resistance of five aliquots of each mineral or suspension was measured for approximately 20 minutes at temperatures ranging from 20.4 °C -25.9 °C and relative humidity ranging from 25.1% - 53.0%. The measured resistance values were then converted into volume resistivity and subsequently into volume conductivity using the parameters of the experimental test cell. We created plots showing the average conductivity values of five aliquots for both the dry mineral ash and the mineral suspension as a function of time. The research reveals variations in conductivity among the different minerals. In the case of dry mineral samples, apatite showed the lowest average conductivity (~10-9 S/m), whereas albite exhibited the highest average conductivity (10-6– 10-7 S/m) over a 20-minute duration. However, when suspended in water, albite retained the average conductivity (10-6– 10-7 S/m) making it the lowest average conductivity among all the other mineral suspensions (conductivity ~10-5 S/m) despite using the same concentration values for each of the mineral suspension and subjecting them to the same physical conditions. Because the grain size distribution is consistent for all the ash samples, we hypothesize that differences in conductivity are a function of the chemical composition, with Ca and other chemical contents in other minerals correlating negatively and Na content in Albite correlating positively with electrical conductivity. The slow dispersal or dissolution of Albite in deionized water unlike other minerals may also contribute to the low average conductivity observed. These findings suggest that the percentage of albite in rocks may have effects (though minimal, depending on other physical and intrinsic factors) on the bulk electrical conductivity of the rock. This knowledge could be valuable in geophysical surveys where material resistivity or conductivity is of interest. Overall, this study provides further information on the electrical properties of volcanic ash, shedding light on its potential impact on electrical transmission systems following eruptions. Understanding these properties is crucial for better assessing volcanic hazards and improving our knowledge of volcanic plume dynamics and atmospheric interactions.

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CAN EAST AFRICAN RIFT BASALTS SEQUESTER CO 2? CASE STUDY OF THE KENYA RIFT

Basalts have demonstrated a higher potential for efficiently and permanently sequestering anthropogenic CO_2 compared to sedimentary formations. The sequestration occurs through mineral carbonation, which is facilitated by the abundance of divalent minerals in basalts, making them ideal geological hosts for CO_2 storage. Such solutions are urgently needed to limit the CO_2 levels in the atmosphere and mitigate against climate change especially for stationary industrial sources which are increasing exponentially. Carbon Capture and Storage (CCS) projects worldwide are in various stages of development, primarily concentrated in America and Europe. We carried out the first review on the suitability of continental basalts found within the East African Rift for mineral carbonation. These basalts possess advantageous characteristics, being close to stationary CO_2 sources, thus minimizing the high costs associated with transportation to distant locations. Our review identified approximately 19 basalt groups of Miocene to Recent age (23.02 to 0.01 Ma) in the Kenya Rift, with thickness ranging from a few meters to 1500 m. To determine potential CO_2 sequestration sites, we assessed four key parameters: water availability, subsurface temperature, permeability, porosity of the target formation, and accessibility to geothermal systems. The basalts contain essential minerals like calcic plagioclase, iron oxides, and clinopyroxenes that provide the required divalent elements for carbonation and porosity values ranging between 1-30%. Based on our assessment, we ranked the suitability of regions in the Kenyan Rift as follows: central Kenya Rift > northern Kenya Rift > southern Kenya Rift. We also discussed the environmental and financial challenges associated with CO_2 sequestration in the Kenya Rift basalts, along with potential mitigation options. Challenges include dealing with toxic and corrosive gases from geothermal systems, potential leakages through faults and fractures, induced seismicity, and economic costs. This knowledge is crucial for identifying areas that require more site-specific assessments and modeling for CCS projects, aiming to locate carbon sequestration sites that can contribute to mitigating climate change.

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ISOTOPIC TRACERS IN UNDERSTANDING GROUNDWATER CONTAMINATION

Groundwater contamination poses a significant threat to human health and ecosystems worldwide. Understanding the sources, transport mechanisms, and fate of contaminants in groundwater systems is crucial for effective management and remediation strategies. Isotopic tracers have emerged as powerful tools for unraveling the complexities of groundwater contamination. This paper provides a comprehensive review of the applications of isotopic tracers in understanding groundwater contamination. The review encompasses a wide range of studies that utilize isotopic tracers to investigate various aspects of groundwater contamination. It explores the principles and methodologies of different isotopic tracers, including stable isotopes (such as δ^{18O}, δ^{2H}) and radioisotopes (such as ^3H, ^14C), highlighting their utility in differentiating natural and anthropogenic sources of contamination. These tracers offer valuable insights into the

origin and pathways of contaminants, enabling researchers to identify pollution sources with a high degree of accuracy. The paper discusses the use of isotopic tracers in quantifying groundwater recharge rates, which is crucial for understanding the movement and spread of contaminants. By tracing isotopic compositions in groundwater, researchers can estimate the time it takes for water to infiltrate into aquifers, providing valuable information for contaminant transport modeling and risk assessment. Furthermore, the review addresses the application of isotopic tracers in determining residence times of contaminants in groundwater. Isotopic techniques allow for the estimation of the time that water or contaminants spend within an aquifer, providing insights into the persistence and potential for long-term contamination. The integration of isotopic tracers with numerical models and other monitoring techniques is also explored in the review. By combining isotopic data with hydrological models, researchers can improve their understanding of contamination dynamics, simulate pollutant transport scenarios, and assess the effectiveness of remediation strategies. In addition, the paper highlights specific applications of isotopic tracers in groundwater contamination associated with agricultural practices. It discusses the use of isotopic fingerprints, particularly stable nitrogen isotopes (such as δ^{15N}), in identifying the sources and fate of contaminants originating from animal agriculture. Understanding the contribution of agricultural activities to groundwater contamination is vital for implementing appropriate mitigation measures and sustainable farming practices. Overall, this comprehensive review underscores the significant contributions of isotopic tracers in advancing our understanding of groundwater contamination. By providing valuable information about pollution sources, transport pathways, residence times, and degradation processes, isotopic tracers enhance our ability to develop effective management strategies and guide decision-making for the protection of water resources and human welfare. Continued research and application of isotopic tracers will play a crucial role in addressing the challenges posed by groundwater contamination and ensuring the sustainability of our water supplies.

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UNLOCKING SUBSURFACE RESERVOIR INSIGHTS: GEOSPATIAL GEOSTATISTICAL MODELING AND DATA SCIENCE APPROACH

Recent studies have shown that vertical and lateral variation of specific reservoir properties control the distribution of sweet-spots but are not necessarily obvious. Predictive modeling using geospatial geostatistical methods coupled with Data Science has shown a practical approach for predicting subsurface reservoir properties in the presence of sparse and missing data, while delineating sweet spots for well placement within a given formation. This case study employs the FAIR principle for research data management coupled with Geospatial Geostatistical methods that can reproduce the variability and spatial continuity of key subsurface attributes. The study integrates available data obtained from geophysical well logs to predict the reservoir properties of the Utica/Point Pleasant Formation located in the Appalachian Basin in Ohio. Uncertainty assessment was performed using conditional simulation methods for both categorical and continuous variables. Sequential Indicator Simulation (SIS) was used to assess the uncertainty of lithology distributions and Turning Bands Simulation (TBS) for petrophysical properties. From the analysis thus far, certain characteristics can be observed; the Utica Formation consists mainly of low porosity, high Vclay, and low TOC shale, while the Point Pleasant Formation consists mainly of higher porosity, lower Vclay, higher TOC, with interbedded siliciclastic and carbonaceous shales. The study emphasizes the usefulness of geospatial geostatistical methods coupled with data science to identify key reservoir properties, their spatial geometries, and their space of uncertainty in the presence of sparse and missing data.

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USING HISTORICAL AND REFLECTIVE NARRATIVES TO CREATE AWARENESSABOUT THE DEVELOPMENT OF SCIENTIFIC THEORIES

Research in STEM education has identified existential gaps in students' understanding of the conduct of science, especially the development of scientific theories. In higher education, curriculums lack explicit instructional activities that promote students learning of how scientific knowledge/theories evolve. Learning about the nature of science issues in the geosciences is not only helpful in understanding science concepts but is crucial in promoting awareness about diversity, equity, and inclusion (DEI) issues and interest in the geoscience field. In this presentation, we report on how we used explicit, historical, and reflective narratives based on Alfred Wegener's account in the plate tectonics theory in an introductory geoscience course to teach about the development of scientific theories and the often-misunderstood tentativeness of science theories. We measured the influence of the lesson on students' awareness and knowledge about the nature of science using SUSSI instrument and reflective essays pre-and-post the intervention. The analysis of reflections, utilizing both deductive and inductive analysis revealed that explicit instruction through historical context enabled students to gain a deeper understanding of how society and culture influence science what science is done and accepted. Pre-and-post SUSSI results also indicated gains in students' nature of science knowledge related to the development of scientific theories. These findings suggest that geoscience educators should adopt an explicit and reflective approach when teaching about issues related to the nature of science.

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GRAIN COORDINATION NUMBERS, GRAUNULAR TEXTURE FROM MICRO-X-RAY TOMOGRAPHY OF ANGULAR SEDIMENTS: VELOCITY PREDICTION USING HERTZ-MINDLIN THEORY.

Although numerous studies have been conducted to investigate seismic wave velocities in unconsolidated sand using both theoretical models and empirical methods, the microscopic impact of grain size, shape and especially sorting in angular unconsolidated sand remains unclear. Grain size and sorting are sedimentological properties that can be tied directly to their environmental mode of deposition, and which may be related to seismic velocity. Coordination number (CN) is one of the critical parameters in rock physics models but, is poorly understood in natural sandy sediments. In theoretical models, CN is generally calculated using idealized spherical grains which are not representative of natural sediment characteristics. Previous works suggest lower coordination numbers in angular sediments as compared to well-rounded sediments. However, poorly sorted angular samples are expected to have relatively higher coordination numbers and low porosity as compared to well-sorted angular samples. To understand the influence of grain texture on CN and porosity to predict seismic velocities, we examine six cases of angular unconsolidated crushed quartz sediments with grain sizes ranging from 1mm to 0.031mm (0 to 5 on the phi scale). Our initial results analyzing in-house legacy data show a significant increase in coordination numbers with decreasing grain size. We will use x-ray computed tomographic imaging and 3D image analysis to estimate and statistically characterize microstructural parameters such as porosity, coordination number, volume, and surface area. We can validate our results via Hertz-Mindlin contact theory (HMT) estimations. HMT

can quantitatively predict the seismic velocity of each grain size as a function of porosity, coordination number, and effective pressure and facilitate comparison with previous empirical.

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STRONG GEOSCIENTISTS AT MSIS-STRENGTHENING TRAINEESHIP AND RESEARCH OPPORTUNITIES FOR NEXT GENERATION GEOSCIENTISTS AT MSIS

I am a third-year undergraduate student attending the Fort Valley State University pursuing a Minor in Geosciences. I was introduced to the world of Geosciences when I enrolled in an introductory geoscience course and met my mentor who was teaching the course. With his encouragement I enrolled in a second geoscience class on Climate Change which increased my knowledge and interest in the Geosciences field. I ultimately applied and was accepted for a summer internship program at the University of Texas Austin. The internship program is titled, "The Strengthening Training and Research Opportunities for Next Generation (STRONG) Geoscientists at Minority Serving Institutions (MSIs) Summer Institute on Inclusive Research Mentoring and Inclusive Communication of Science" and is funded by the National Science Foundation. This program paired STEM students from MSIs with early career scientists as their mentors who are committed to students from MSIs thriving in geoscience graduate programs. Through the STRONG MIS program at UT Austin, I learned things I didn't have the opportunity of learning coming from a rural HBCU. One thing I learned is that there are people that look like me in the Geoscience field that have their Masters and PhDs in the field. The program also taught me many skills including running a virtual machine through R Linux and creating maps by code through Python. Each of these programs gave a glimpse of what scientists use in their research daily and will give me an advantage in the workplace. Students used their skills acquired during the program to create a map of their design to show how deep coding could be. The STRONG programmed paired students up with mentors with similar backgrounds with some already having post graduate degrees and some still pursuing their graduate degrees. Ultimately, this program gave students real opportunities to learn from people that have already walked the path and allow the students to streamline to a path to success. The STRONG program also introduced visiting mentors to give students different perspectives and gave workshops to grant them even more skills and to share their experiences. Having this internship opportunity has made me eager to learn more as a scientist. It also connected me to scientists and people that look like me be so amazing as there is a lack of diversity in the geosciences. This internship has ignited in me the passion for my deep love of this planet I had from childhood and pursue geosciences to learn and address problems and uncertainties arising due to the changing climate of the earth and how it affects the marginalized communities in areas I grew up and currently live.

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EXPRESSION OF OAE-2 IN THE WEST AFRICAN BENUE TROUGH

Organic carbon-rich shales deposited under anoxic conditions have been found globally during the Oceanic Anoxic Event 2 (OAE-2) at the Cenomanian – Turonian boundary (~93.5 Ma). The anoxia has been postulated to have been triggered by eruption of submarine Large Igneous Province. Although, OAE 2 oc-

currence has been global, local structural and paleogeographic variations have strong impact on the evolution of anoxia across the globe. Here, we present data from a new site from the west African Upper Benue Trough, a cretaceous rift basin that formed from the separation of Africa and South America during the Mesozoic and was part of a transcontinental seaway that connected the Atlantic Ocean to the paleo Tethys during the Cenomanian marine transgression. The OAE 2 deposits within the Benue trough is a 3 m black shales interval of the Pindiga Formation. Carbon isotope analysis shows a 3‰ δ 13 C positive excursion characteristic of the OAE 2 interval and conclusively showing for the first-time evidence of OAE 2 interval within the basin. We also measured trace and redox sensitive elements to further understand the development of anoxia within the Benue Trough.

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PSYCHOSOCIAL PREDICTORS OF STUDENT PERSISTENCE IN SCIENCE: FINDINGS OF BLACK STEM & SCIENCE EDUCATION STUDENTS IN A SUMMER INTERNSHIP PROGRAM AT A HBCU

This study is a part of a summer internship that trains African American STEM majors and pre-service teachers majoring in middle grades science education of a Historically Black Colleges and Universities, Fort Valley State University (FVSU) located in Middle Georgia with high tech hands-on geophysical equipment and techniques. This program, GEOPaths Summer Internship Program is funded by the NSF and provided students with training in Ground Penetrating Radar and Resistivity Method to visualize the shallow subsurface of the earth. The interns were also involved in various other activities throughout the summer. Through a weeklong course, students were also introduced to different geoscience-related activities which included Resistivity methods to visualize the shallow subsurface of the earth, introduction to seismology, and learnt coding languages such as Python and Linux. The interns explored Stone Mountain on a field trip learning about the geological history of this igneous rock. The information gained from visiting Stone Mountain was shared with the middle school summer academy where the interns taught the younger students how to identify minerals and rocks in hand specimen. visited the Georgia Tech campus where they interacted with faculty and graduate students. These experiences increase both student engagement and retention in STEM and in geoscience. The interns also take a pre-survey on the first day of the program and a post-survey on their last day. Psychosocial predictors of science persistence are assessments designed to tap changes in students' science self-efficacy, science identity, science career expectations, and perceptions of belongingness to the science community after participating in a program. Here we present analysis of data collected from summer participation of six STEM majors in the summer of 2022. Students responded to the same items on the pre- survey and the post-survey using a scale that ranged from 1 (strongly disagree) to 5 (strongly agree). Wilcoxon Matched-Paired Signed Ranks Tests were conducted to examine changes in students' responses from pre-survey to post-survey. Although gains on items within all the scales did not reach statistical significance, when pre-survey and post-survey differed, the differences in items in three scales (science self-efficacy, science identity, and belongingness to science community) were in the hoped-for direction. Importantly, the chances of obtaining statistically significant differences are impacted by the small sample size (n = 6). Pre-survey responses are relatively high for all questions, leaving less room for growth (e.g., a ceiling effect), particularly for the self-efficacy and career expectations questions. This is not unexpected for a self-selecting group of students interested in participating in a summer research training program. Importantly, growth in key areas of science identity and community are seen in the data. Students shared their intended majors with two-thirds of students indicating that they plan to major in either chemistry or biology and the remaining two students indicating other STEM-

adjacent fields. Half of the participants noted that there had not been any changes to their intended major because of the summer research training program. Two students responded that there had been changes to their major as a result of the summer research training program, with one indicating an interest in studying climate change in the geosciences, and one indicating an interest in minoring in geosciences. One respondent indicated that they are considering a minor that complements their intended field of study (not a geoscience minor). In the post- survey, students were asked what STEM classes they are planning to take in the upcoming academic year. All students reported that they plan to take at least one STEM course, and, of those, three students reported planning to take two courses, and one plans to take three courses over the upcoming academic year. Students were also asked how likely they were to pursue a geoscience minor because of the summer research training program, on a scale from “Definitely not” to “Definitely.” Four of the six participants answered “possibly” to “definitely” to pursing a geoscience minor) after participating in the summer research training program. Thus, initial findings are encouraging to note that the program is being successful in retaining students in STEM, and in particular a group of students (black) that are highly underrepresented in STEM and particularly in geosciences.

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THE INFLUENCE OF MULTISCALE STREAMBED TOPOGRAPHY ON HYPORHEIC ZONE PROCESSES ALONG RIVER CORRIDORS

The hyporheic zone serves as a crucial regulator of interactions between surface water and groundwater systems in river corridors, facilitating vital nutrient cycling and biogeochemical transformation processes that promote natural purification in rivers. This study investigates the role of streambed topography in influencing key hyporheic zone processes, including residence time distribution, penetration intensity, mixing index, and dilution ratio within the streambed, and explores their implications for biogeochemical transformation along river corridors. To achieve this, a two-stage computational simulation using COMSOL multiphysics was employed to analyze various natural streambed topography scenarios encompassing different gradients, profile curvatures, and pool-riffle sequences under varying flow conditions. In the first stage, coupled turbulent flow (stream) and Darcy flow (porous media) simulations were conducted along the diverse streambed topography scenarios. The second stage involved tracking solute transport within the hyporheic zone using the "transport of diluted species in porous media" module to estimate residence time distribution. Our findings reveal that streambed topography significantly influences residence time distribution, with pool-riffle sequence amplitude, frequency, and streambed steepness playing pivotal roles in determining the degree of biogeochemical transformation along river corridors. Furthermore, the penetration intensity of hyporheic flux is constrained by in-stream turbulence, showing pronounced effects in high- frequency deep pool-riffle scenarios. Additionally, the slope curvature of the streambed was found to impact penetration intensity and residence time distribution along river corridors. Overall, this research highlights the significance of considering streambed topography in understanding and managing hyporheic zone processes, contributing to our understanding of river ecosystem dynamics and natural purification processes.

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RECONSTRUCTING FIRE USING MACROSCOPIC CHARCOAL ABUNDANCES IN PLIOCENE FLUVIOLACUSTRINE SEDIMENTS IN THE TERUEL BASIN, SPAIN

Mediterranean-type climates (MTCs) have long been of interest to scientists due to high biodiversity and unusual precipitation regime. MTCs are unique in that precipitation mostly occurs during the winter (in some locations spring and fall months) and the summers are typically dry. On the Iberian Peninsula the MTC may have developed during the Pliocene when pollen records showed a gradual shift from mostly subtropical vegetation to dominance of drought tolerant taxa during global cooling. Projected future climate changes pose a risk as winter climatic shift from subtropical to MTCs can give us more insight into the future climate and ecosystems of the Mediterranean Basin. Paleoclimate studies can provide insight into how global warming might affect the Iberian climate. Charcoal records can be useful indicators of fire regimes along with pollen and hydroclimate proxies might help us understand climate-ecosystem relationships. Here we present charcoal abundances over the Mid-Pliocene -Early Pleistocene period in samples of fluvial and lacustrine sediments retrieved from the Villabla Alta section, Teruel Basin, in the Iberian Peninsula. We found that there is a gradual increase in the charcoal count leading up to the M2 glaciation 3.3 million years ago which suggests increasing fire activity during this time. As a result, we hypothesize that an increase in charcoal counts coinciding with global cooling could indicate decreased summer rainfall, consistent with long-term vegetation change and our own unpublished paleosol carbonate oxygen isotope data. It is also possible that global cooling resulted in an increase in Iberian winter rainfall, denser vegetation, more fuel, and thus greater fire activity, but it is not clear that woody vegetation density was winter rainfall-limited at this time. Therefore, we favor the interpretation that intensified summer drought increased east-central Iberian fire activity during Pliocene global cooling at approximately the same time that drought-tolerant vegetation was gradually replacing subtropical ecosystems.

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BEING *STRONG* IN THE GEOSCIENCES

In the Geosciences there is a need for more minority participation. According to AGI (2019), 44% of undergraduate geoscience students and 46% of graduate geoscience students were women. In 2019, underrepresented minorities earned 15.7% of geoscience bachelor's degrees, 10% of geoscience master's degrees, and 6.7% of geoscience doctorates. Funded by the National Science Foundation GEOPaths program at Fort Valley State University (FVSU), an HBCU in rural Georgia was created in 2020 with two main goals. (1) To Increase the number of first-year undergraduate African American students who are introduced to geoscience; and (2) Establish new multi-year, academic-year, and summer geoscience opportunities for undergraduate students of FVSU. The GEOPAths program has made a huge impact where in the three years of the grant over 1000 mostly African American college students enrolled in Chemistry labs were introduced to Geosciences using peer-reviewed Geophysics Learning Modules. Geoscience and Chemistry faculty at FVSU also actively recruited STEM students to participate in the GEOPAths program. Had it not been for this intervention and initiative these students, including me, would not have been introduced to Geosciences in the first place. As part of the GEOPAths program, I participated in a University of Texas, Austin's science communication internship, "The Strengthening Training and Research Opportunities for

the Next Generation (STRONG) Geoscientists at Minority Serving Institutions (MSIs)" which is also funded by the National Science Foundation. Science communication encompasses a wide range of activities that connect science and society. Common goals of science communication include informing non-experts about scientific findings, raising public awareness of and interest in science, influencing people's attitudes and behaviors, informing public policy, and engaging with diverse communities to address societal problems. The STRONG program paired STEM students from minority-serving institutions with early career scientists who met the students where they were and mentored them in geoscience. A key component in the STRONG program is the formation of a podcast that lets minority student's voices be heard. To meet the unprecedented challenges of the future that ensue due to the changing climate of the earth, communication in geosciences is vital. One way to communicate stories in science to the public is through podcasts. A podcast is a digital audio file that one can listen to on the internet or a mobile device. The STRONG interns learned from grad students how to create, edit, record, and post their podcasts on to the platform Buzz sprout where it can be later uploaded to Apple Music or Spotify. The podcast was used to teach students from minority-serving institutions ways that they can communicate research with the public outside geosciences. Overall, exposing geoscience to more minorities and teaching them how to communicate will enable them to voice injustices and demand equity and access to marginalized communities. Science communication needs to emphasize that to achieve equity for marginalized communities, especially in terms of environmental justice arising from problems such as climate change, increasing the social relevance of scientific findings is vital. By participating in the GEOPAths and the STRONG programs I recommend science in particular geoscience communication must include the concerns and insights of marginalized communities that encourage collective action to address equity concerns to achieve a healthier society for all.

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A ROCK VOLUMETRIC ESTIMATE OF REE BEARING UNDERCLAY DEPOSITS IN THE EASTERN MIDDLE ANTHRACITE FIELD OF LUZERNE COUNTY, PENNSYLVANIA

The project is focused on identifying potential for Rare Earth Element exploitation from underclay deposits associated with the anthracite coal measures of eastern Pennsylvania. Historically underclays have been regarded as waste material of no value. However, potentially economical concentrations of REE's in underclay deposits could change the status of these deposits to exploitable REE reserves. The investigation seeks to answer, "what is the estimated geometric rock volume of the underclay containing REE?" The study area is in an existing surface coal mine located near the former Eckley Miners Village Coal operation in Foster Township, Luzerne County, in the eastern part of Pennsylvania. Located in the Valley and Ridge province, the general geology of the Eastern Middle Anthracite Field (EMAF) is a series of alternating synclines and anticlines that trend northeast to southwest. The layered underclay zones between coal beds, and layers of differing sandstone in this area have been shown from previous work to contain significant REE such as Iridium, Rhodium, and Neodymium which are among the most important and valuable REE's. Stratigraphic zones of interest for this study were identified by previous work. To estimate the rock volume of REE-bearing underclay, the study will utilize 6 existing conventional cores and a measured exposure of underclay strata in the high wall of the mine. Plans are underway to do gamma logging of cores so that subsurface correlations can be tied back to the high wall face. Data synthesis will involve geologic interpretation of the cores, construction of subsurface cross sections with core log correlation to determine the thickness of the underclay zones.

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UNRAVELING THE INFLUENCE OF STRUCTURAL COMPLEXITY, ENVIRONMENTAL, AND GEOGRAPHIC FACTORS ON MULTI-TROPHIC BIODIVERSITY IN FORESTED LANDSCAPES

Understanding the relationship between structural complexity and multi-trophic diversity is crucial for effective land management and biodiversity conservation. However, current methods for evaluating multi-trophic diversity can be costly and time-consuming, leading to its often-overlooked role in land management decisions. Here, we 1) developed a multi-trophic diversity index, 2) explored a new method to quantify structural complexity based on widely available remote sensing data, and 3) investigated the relationship between structural complexity and multi-trophic biodiversity (bird, beetle, and land plants) at the landscape scale. We conducted our study using data collected from 34 forested sites of the National Ecological Observatory Network from 2013 to 2022. We studied the influence of vertical (rugosity, maximum canopy height, mean maximum canopy height, entropy, and vertical structural complexity), horizontal (cover fraction, deep-gap fraction, rumple, and vegetative area index), and terrain (slope, mean elevation, terrain roughness, and topographic ruggedness index) structural complexity of forest canopy on multi-trophic (primary producers (plants), herbivores (beetles), and omnivores (birds)) diversity in 34 forested ecosystems. We used plant presence, beetle pitfall trap, and bird count data to calculate species richness and species diversity, and high-density LiDAR data to calculate structural complexity metrics of forest canopy. Our results indicate that multi-trophic species richness and diversity across all trophic levels generally increase with increasing vertical, horizontal, and terrain structural complexity, with the highest diversity observed at intermediate levels of structural complexity. However, we also found that these relationships differ across deciduous, mixed, and evergreen forests.

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PALEOECOLOGY AND CLIMATIC CYCLICITY IN THE KERIO VALLEY BASIN, KENYA

The results of the palynological studies of Neogene lacustrine deposits penetrated by Cheptuket-1 well in the Kerio Valley Basin (KVB), Central Kenya, are presented. Palynomorphs were analyzed with the aim of understanding climate cycling and modelling biofacies responses to changes in the depositional system in the rift basin. The subsurface successions penetrated by the 3083-m-deep Cheptuket-1 well were subdivided into three distinct units based on wireline signatures, and physical and microscope examinations. Unit 1 is composed of the Uasin Gishu Phonolites overlain by the fluvio-lacustrine Ngorora Formation of unit 2 and capped by the Ewalel phonolites of unit 3. Palynomorph diversity in the studied well was low and poorly preserved. Based on the presence of *Acalypha sp*. (Euphorbiaceae), a late Miocene indicator in the Ngorora Formation, as well as an assemblage of Tortonian tropical grassland and tropical savannah biome, the Ngorora Formation was assigned an Upper Miocene age (Tortonian), denoting an older age for the underlying Uasin Gishu Formation and Muruyur bed, which was assigned a mid-Miocene age (Seravallian) based on the presence of Seravallian tropical evergreen forest and tropical semi-deciduous vegetation assemblage in the Muruyur beds. From the detrended correspondence analysis (DCA), nine clustered groups (A-I) were established to define ecological distributions and affinities of the recovered palynoflora of Cheptuket-1 well. These ecological affinities were used to infer water variability and interpret climatic trends in the KVB. By fitting a sinusoidal model to the water variability groups, four climatic wet-to-dry cycles were established with each cycle having a wet phase capped by a dry phase. While cycle 1 showed

no clearly defined climatically driven cyclicity due to the interference of volcanics and tectonism, the inverse relationship of the wet and dry phase indicators observed in cycles 2, 3 and 4, show distinctively defined climate-related cyclicities. The predominance of the grassland, savanna, and dry woodland megabiomes in cycles 2, 3 and 4, confirms the expansion of tropical savanna in the KVB by the Tortonian. The biome pattern of the Tortonian Ngorora Lake regime reflects a cooler and drier environment than that of the Serravallian Muruyur lake regime, where the warm evergreen broadleaf and mixed forest continued to be replaced by cooler and drier biomes. This research has advanced our understanding of using palynomorphs for tracking climatic changes through Miocene in the KVB, and its extension to other African rift basins is envisaged.

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PRELIMINARY INVESTIGATION OF THE CHILEAN PATAGONIAN COMMON ERA ENVIRONMENTAL AND CLIMATIC CONDITIONS USING SCANNING X-RAY FLUORESCENCE ANALYSIS OF LATE HOLOCENE LACUSTRINE RECORDS

The megadrought occurring in Central Chile since 2010 is affecting more than 10 million people, impacting water resources, and shifting ecosystems. The southern-hemisphere westerly winds (SWW) are the strongest time-averaged oceanic winds on Earth and hit continental landmasses only in southern South America, delivering moisture for the region's winter rains and providing snowpack and fresh water to the entire west coast of southern South America. These winds play a significant role in shaping the climate and weather patterns of the southern hemisphere and are an essential factor in the transport of heat and moisture around the globe. Previous studies and current wind observations show a strong positive correlation between the north-south movement of the SWW and precipitation on the seaward side of the Chilean Patagonia. Given the sparse spatial coverage of accurate meteorological stations recording localized modern climate information (such as precipitation and temperature) in the Chilean region, it is critical to find other avenues to investigate past climate variability and the mechanisms affecting the region to better predict future change. In addition, there are currently only a few high-resolution paleo-reconstructions of Chilean hydroclimate, with tree-ring and pollen datasets being the primary records. Here we present and discuss results from the preliminary study of five lakes in Chilean Patagonia using scanning X-ray Fluorescence. These lakes (Lago Verde Tolhuaca, Lago Frio, Lago San Pedro, Lago NN Tantauco, and Lago Esponja) are spread across a wide latitude and elevation range, allowing variation in climate and environmental changes to track differences in SWW intensity and volcanic activity during the last 2000 years. These data lay the groundwork for the reconstruction of the Chilean regional paleoclimate using high-resolution techniques to elucidate the relationship between rainfall, temperature, changing vegetation regimes, and SWW intensity in the region.

White, Lisa D.[1], Cooper, Sharon K. [2], Lewis, Jonathan C.[3], Burrell, Shondricka J.[4]

1. University of California, Berkeley, Museum of Paleontology, Berkeley
2. Columbia University, Lamont Doherty Earth Observatory
3. Indiana University of Pennsylvania, Department of Geography, Geology, Environment, and Planning
4. Morgan State University, Department of Advanced Studies, Leadership & Policy,

DEVELOPING COLLABORATIVE ALLIANCES TO BRING HBCU STUDENTS TO SEA: THE STEMSEAS-HBCU PARTNERSHIP PROGRAM

The STEMSEAS (STEM Student Experiences Aboard Ships) program is designed to increase the number and diversity of undergraduate students who participate in seagoing science and who ultimately enter the fields of Earth and ocean sciences. Since the program's inception in 2016, we noticed that we were not getting as many student applications from Historically Black Colleges and Universities (HBCUs) as we had anticipated based on program design. To address this shortfall in applications we leveraged NSF supplemental funds to engage influential thought leaders in a seagoing experience. Our goal was to build partnerships that enable more HBCU students to go to sea with support from faculty serving as expedition mentors. With this goal in mind, we invited faculty from Morgan State University, Coppin State University, Savannah State University, Tennessee State University, Morehouse College, Florida Agricultural and Mechanical University, and the founder of SuperGirls Shine Foundation (SGSF) to participate in a 9-day expedition on the R/V Neil Armstrong from Woods Hole, MA to Pensacola, FL on January 2-11, 2023. During the expedition our objectives were to facilitate faculty having experiences similar to what students do aboard STEMSEAS expeditions, and to spend time collaborating and moving us closer to our goal of broader participation in Earth and ocean science. We not only sought to strengthen connections between HBCUs and STEMSEAS, but also to build meaningful connections with SGSF, which encourages primarily Black and Latina girls in STEM fields in the Houston area. Doing this entailed discussing various mechanisms to connect students with seagoing science and enabling HBCU faculty to act as seagoing science mentors, both on their home campuses but also as future STEMSEAS instructors. Following the expedition, STEMSEAS leaders visited Baltimore, Houston, and Atlanta to engage in discussions of innovative, impactful, and sustainable mechanisms to engage historically excluded young people in Earth and ocean science. During the summer of 2023 the project also supported the travel of several of these thought leaders to subsequent meetings and conferences for continued discussions. The January expedition and the follow-up initiatives all hold promise to enhance our efforts to bring more HBCU students to sea.

Williams, Spencer and Ortiz, Joseph
Department of Earth Sciences, Kent State University

EMPLOYNG REMOTE SENSING TECHNIQUES TO UNDERSTAND SEASONAL CHANGES IN WATER QUALITY – MUSKINGUM CONSERVATORY WATERSHED DISTRICT (MCWD)

The Muskingum Watershed Conservancy District (MWCD) encompasses several reservoirs in Northeast Ohio. In addition to its flood reduction benefits, it provides recreational activities such as boating, fishing and camping which widely contributes to the local economy. As of 2014 the MWCD has seen a rise in toxic harmful algae bloom (HAB) occurrences. Increased use of synthetic fertilizer, livestock waste, pesticides containing nitrogen and phosphorous along with global climate change has caused nutrient oversaturation and heightened phosphorous load in local reservoirs leading to an influx of seasonal algae growth. Additionally, as the result of extensive coal mining, the region has experienced the effects of acid mine drainage (AMD). If left untreated, these anthropogenic catalysts can have severe consequences for aquatic ecosystems and local tourism. The effect that these processes have on the environment confirm that early warning procedures and advanced water quality monitoring systems are essential in today's climate. To address this, we have applied a Varimax-rotated principal component analysis (VPCA) to satellite imagery from Sentinel-2 A/B MSI using a Google Earth Engine Python API combined with ground truth surveying of our field collection data to validate our remote sensing analysis. Our technique involves unsupervised classification methods that extract six components from spectral images to be identified by a spectral library. The method precisely pinpoints spectral reflectance data on water pixels and allows us to unmix the signal and identify the components of various algae, suspended sediment, and semi-submerged surface vegetation. Employing Google Earth Engine (GEE) components generated by the Kent State VPCA method, validated by our field data will allow us to distinguish suspended sediment from cyanobacteria, diatoms, and other algae. At the conclusion of this research, we will showcase an improved technique for monitoring the proliferation of algal blooms and recognizing changes in water quality over time.

USEFUL INFORMATION | Registration, Mobility & Access

Registration

The NABG registration desk will be open on Wednesday September 27th at 5pm in the lobby inside the AGU conference center.

Attendees will be provided with name badges, lanyard, WiFi password and conference materials. Please see anyone at the registration desk to request any information. Registration has closed and there is no onsite registration.

List of Local Restaurants Near Hotel/ Conference Center (see pg. 79)

The Churchill Hotel near Embassy Row

1914 Connecticut Ave NW Washington, DC 20009

View Churchill Hotel Near Embassy Row on Google Map

Tel. 202.797.2000

Fax. 202.462.0944 | www.thechurchillhotel.com |

Airports

Three airports are located in the Washington, D.C. metropolitan area:

- Reagan Washington National Airport (DCA) ~06 miles
- Washington Dulles International Airport (IAD) ~27 miles
- Baltimore Washington International Airport (BWI) ~33 miles

Metro access to the Churchill Hotel

The metro is accessible from Ronald Reagan National Airport to the Churchill hotel by taking the Red Line to Dupont Circle Metro Station.

You may utilize the Washington Metropolitan Area Transit Authority (WMATA) online trip planner for assistance with planning your trip by clicking on the following link Trip Planner | WMATA. [1]

Taxi Service

- Ronald Reagan Washington National Airport taxi service is on a first-come, first-served basis. Taxi drivers are licensed, obtain safety inspections, and have received customer service training. Estimated taxi cost to the meeting venue is approximately $30 one way. For more information click here. [2]
- Washington Flyer taxi service offers transportation services from Washington Dulles International Airport exclusively with 24-hour service to and from the airport. Estimated taxi cost to the meeting venue is approximately $70 one way. For more information click here. [3]
- BWI Airport Taxi offers taxi transportation services from the Baltimore Washington International Airport and has taxicabs stationed at the airport 24-hours a day ready to serve your transportation needs. Estimated taxi cost to the meeting venue is approximately $80-$90 one way. For more information click here. [4]

App-Based Ride Service

- Ronald Reagan National Airport app-based rides with Lyft and Uber are approximately $20-$27 one way. Use your smartphone to select the pickup zone and coordinate directly with the driver. Green flags located outside on the outer terminal curb designate the appropriate pick-up loading zones. For more details on Ronald Reagan National Airport Ride App information, **click here.** [5]
- Baltimore Washington International Airport app-based rides with Lyft or Uber are approximately $70 one way. Pickup and drop off areas for Uber and Lyft are located at the terminal curbs on the Departures/Ticketing Level of all terminals. For more details on BWI Airport Ride App information, **click here.** [6]
- Dulles International Airport app-based rides with Lyft and Uber cost approximately $48-$54 one way. A dedicated pick-up curb for Uber and Lyft is located on the ground level outside of Baggage Claim. The area is accessible via doors 2, 4, or 6. For more details on Dulles Airport Ride App information, **click here.** [7]

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(1) wmata.com/schedules/trip-planner/
(2) flyreagan.com/parking-transportation/taxi-service
(3) lydulles.com/parking-transportation/washington-flyer-taxi-service
(4) bwiairporttaxi.com/
(5) flyreagan.com/parking-transportation/ground-transportation
(6) bwiairport.com/to-from-bwi/transportation/app-based-ride-services
(7) flydulles.com/parking-transportation/ground-transportation

USEFUL INFORMATION - DIRECTIONS

Directions from Churchill to AGU Conference Center

Imagery ©2023 Airbus, CNES / Airbus, Commonwealth of Virginia, District of Columbia (DC GIS), Maxar Technologies, Sanborn, U.S. Geological Survey, USDA/FPAC/GEO, Map data ©2023

Directions from The Churchill Hotel Near Embassy Row
1914 Connecticut Ave NW, Washington, DC 20009

↑ Head south toward Connecticut Ave NW
~ 0.2 mi

↰ Turn left onto Florida Ave NW

Destination will be on the right
223 ft

Arrive at Agu Conference Center
2000 Florida Ave NW #7, Washington, DC 20009

USEFUL INFORMATION - PARKING

Parking near Churchill and AGU

Parking near the AGU Conference Center ranges from $13 - $20 per day. The most convenient parking garage near AGU Conference Center is located at the Universal Building on 1825 Connecticut Avenue and accessible from two points: Universal North, accessed from 2012 T Street, NW, across from the side entrance of the Washington Hilton or Universal South, accessed from Florida Avenue, NW, across from the front entrance of AGU.

There is also a small PMI garage with limited space around the corner from AGU, at 2001 S Street. There is street parking available for those who are resourceful; most spots are metered and/or have residential restrictions. See map:

The Dupont Circle Metro Station (Red Line) is **the closest Metro Station to AGU Conference Center, located approximately three blocks north (~6 minute walk).**

USEFUL INFORMATION - DINING

List of Local Restaurants Near Hotel/ Conference Center

BUSINESS NAME	ADDRESS	WEBSITE	CUISINE	TYPE	PRICE	Black-Owned	Distance from Conference	Needs Reservation	
Banana Leaves Asian Resturant	2020 Florida Ave NW, Washington, DC 20009	https://www.mybananaleaves.com/	Asian	Reataurant	$$		On location	Y	
Bistrot Du Coin	1738 Connecticut Ave NW, Washington, DC 20009	https://www.bistrotducoin.com/	French	Reataurant	$$		On location	Y	
Alero Resturant	1724 Connecticut Ave NW, Washington, DC 20009	http://www.alerorestaurant.com/home-2	Mexican	Reataurant	$$		<0.5mi	Y	
Board Room	1737 Connecticut Ave NW, Washington, DC 20009	http://boardroomdc.com/	Pub	Bar	$		<0.5mi		
Lauriol Plaza	1835 18th St NW, Washington, DC 20009	http://www.lauriolplaza.com/	Tex-Mex	Reataurant	$$		<0.5mi	Y	
Anju	1805 18th St NW, Washington, DC 20009	https://www.anjurestaurant.com/	Korean	Reataurant	$$	Yes	<0.5mi	N	Y
Keren Cafe & Restaurant	1780 Florida Ave NW, Washington, DC 20009	https://themenustar4.com/webspace/menus.php?code=orderkerencafeandrestaurant.com	Eritrean	Reataurant	$	Yes	<0.5mi	N	
Henry's Soul Cafe	1704 U St NW, Washington, DC 20009	https://www.henryssoulcafe.com/	Soul	Cafe	$$	Yes	0.5mi	Y	
Lucky Buns	2000 18th St NW, Washington, DC 20009	https://www.luckyburns.com/	Multi-Cultural	Reataurant	$$		<0.5mi	N	
VEGZ	2120 18th St NW BSMT, Washington, DC 20009	http://www.vegz.us/	Indian Vegetarian/Vegan	Reataurant	$		0.5mi	N	
The Green Zone	2226 18th St NW, Washington, DC 20009	http://www.thegreenzonedc.com/	Cocktails	Bar	$		0.5mi	N	
Sushi Ogawa	2100 Connecticut Ave NW #100, Washington, DC 20008	http://www.sushiogawadc.com/	Sushi	Reataurant	$$$		<0.5mi	N	
Dolcezza Gelato and Coffee	1704 Connecticut Ave NW, Washington, DC 20009	http://dolcezzagelato.com/	Coffee	Coffee shop	$$		<0.5mi	N	
Larry's Lounge	1836 18th St NW, Washington, DC 20009	N/A	Bar	Bar	$		<0.5mi	N	
La Tomate	1701 Connecticut Avenue N.W, Washington, DC 20009	http://www.latomatebistro.com/	French-Italian	Bistro	$$		<0.5mi	Y	
Souvlaki	1917 18th St NW, Washington, DC 20009	https://www.yoursouvlaki.com/location/your-souvlaki-dupont-circle-washington-dc/	Greek	Reataurant	$$$		<0.5mi	N	
Jolt 'N Bolt Coffee & Tea House	1918 18th St NW, Washington, DC 20009	http://joltnboltcoffee.com/	Coffee	Coffee Shop	$		<0.5mi		
Bar Charley	1825 18th St NW, Washington, DC 20009	http://www.barcharley.com/	American	Reataurant	$$		<0.5mi		
McClellan's Retreat	2031 Florida Ave NW, Washington, DC 20009	http://mcclellansretreat.com/	Bar	Bar	$$		On location		
Annabelle	2132 Florida Ave NW, Washington, DC 20008	https://annabelledc.com/	American	Reataurant	$$$		<0.5mi		
Universal Doughnut Shop	2012 T St NW, Washington, DC 20009	http://places.singleplatform.com/universal-doughnut-shop/menu?ref=google	Breakfast	Cafe	$		<0.5mi		
Thaiphoon	2011 S St NW, Washington, DC 20009	http://www.thaiphoondupont.com/	Thai	Reataurant	$$		On location	Y	
Bukom Cafe	2442 18th St NW, Washington, DC 20009	http://www.bukom.com/	West African	Reataurant	$	Yes	<1mi	Y	
Yerevan Cafe	2204 18th St NW, Washington, DC 20009	http://yerevandc.com/	Armenian	Cafe	$$		0.5mi		
Rise Bakery	2409 18th St NW, Washington, DC 20009	http://www.riseglutenfree.com/	Gluten Free Bakery	Bakery	$$		0.5mi		
El Tamarindo	1785 Florida AVE NW, Washington, DC 20009	https://www.eltamarindodc.com/	Salvadoran, Mexican	Restaurant	$$			10+, $5/person	
Interactive Map for Local Eateries	https://www.google.com/maps/d/u/0/viewer?mid=1bvbBSlfI3BrepQDyI1H0IN-_kZxpCXQ								