THE 41ST ANNUAL TECHNICAL CONFERENCE

REIMAGINING THE GEOSCIENCES

SEPT 7 - 10, 2022 HOUSTON, TEXAS

EAR-0946527 EAR-1640556
EAR-1146813 EAR-1723859
EAR-1250159 EAR-1836331
EAR-1446451 EAR-1935782
EAR-2146758 EAR-2231597

National Science Foundation awards supported 497 unique student participants 842 times since 2009;

64% of all participants are employed in the national Geosciences workforce (a sector of critical national need) or still in Geosciences educational programs;

36% of participants progressed to advanced academic training in the Geosciences disciplines;

Geoscience disciplines represented this year include environmental geoscience, geophysics, hydrology, planetary geology, neotectonics, paleoclimatology, structural geology, global tectonics;

A record number of students (>160) expressed interest to participate in this virtual conference;

Student participants to the 41st Annual Technical Conference of the National Association of Black Geoscientists are supported by the National Science Foundation (#EAR-2231597).

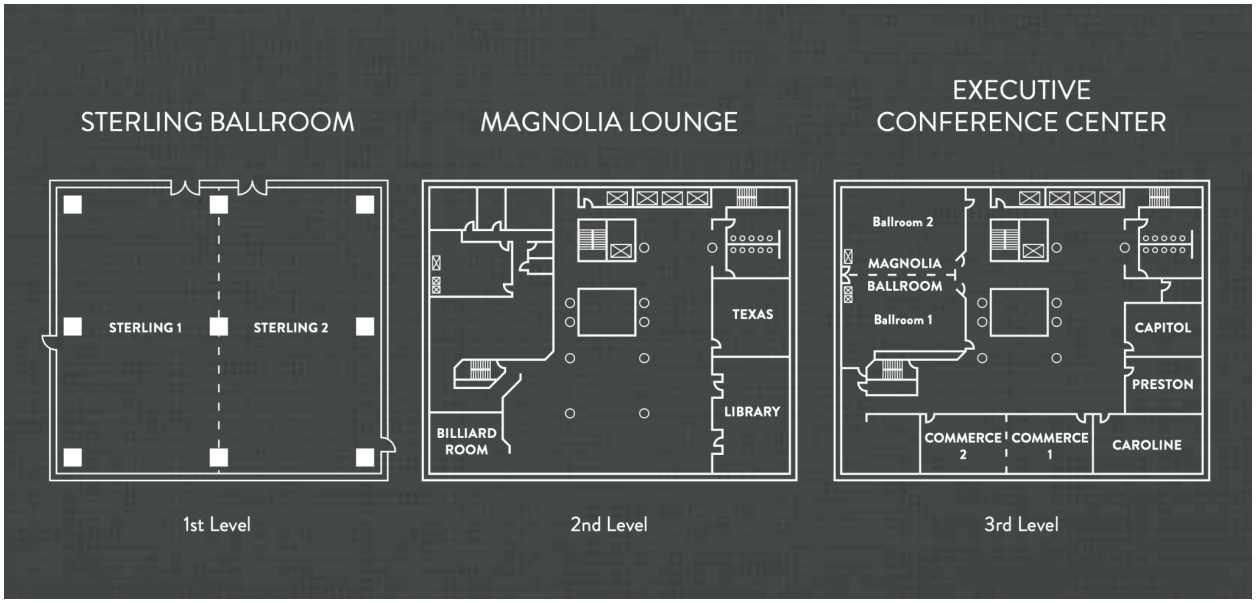
Thank you for supporting our participants!


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™

Welcome to the beautiful Magnolia Hotel in Houston, Texas!

Magnolia Signature Restaurant: The Lounge

- **Open Daily: 7:00am - 11:00am / 4:00pm - 11:00pm**
- **Breakfast: 7am - 11am**
- **Monday - Friday: Breakfast Menu**
- **Saturday & Sunday: Breakfast Buffet**
- **Dinner: 5pm - 10pm**
- **Bar: 4pm - 11pm (Dinner menu available from 5pm-10pm only)**



We will have light refreshments available for breakfast outside the Magnolia Ballroom on Thursday and Friday morning.

Zoom Meeting Etiquette

Mute your microphone. To help keep background noise to a minimum, make sure you mute your microphone when you are not speaking.

Be mindful of 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. You can make it easier to focus on the meeting by turning off notifications, closing or minimizing running apps, and muting your smartphone.

Avoid multitasking. You'll retain the discussion better if you refrain from replying to emails or text messages during the meeting and wait to work on that PowerPoint presentation until after the meeting ends.

Prepare materials in advance. If you will be sharing content during the meeting, make sure you have the files and/or links ready to go before the meeting begins.

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Letter from the President

On behalf of the conference planning committee, organization leadership and membership, we are happy to welcome you to the 41st Annual Conference of the National Association of Black Geoscientists (NABG), "Reimagining the Geosciences." We are even more thrilled that this is our first in-person conference since we convened at the University of Arkansas in 2019.

For the past two years, we have experienced the conference in a virtual format. As we reflect upon 2020 and 2021, we are proud of what we were able to accomplish virtually. We continued to deliver on our commitments of networking, professional development, and broadening our technical expertise. The NABG was also able to reach geoscientists internationally who took advantage of the virtual event. However, there is something special about this organization and being able to interact with our peers, colleagues, mentors, and friends face to face.

As we return to an in-person conference, we hope to deliver an event that reinvigorates your passion and energy for the Geosciences and NABG! The past few years have brought forth new challenges and experiences for us all, but we remain steadfast in our pursuit to build community, further our knowledge, and facilitate advancement of the geosciences of tomorrow.

Whether you are joining us in Houston or virtually, you can look forward to sessions showcasing the work of students and professionals, workshops focused on career opportunities and professional development, plus opportunities to build new relationships and reunite with old friends. There is no question that being a part of this conference will present you with an opportunity to further your pursuits in the Geosciences.

Sincerely,
Tramond Baisden
NABG President

It is with great pleasure that I would like to welcome you all to the National Association of Black Geoscientists' 41st Annual Technical Conference in the radiant city of Houston, Texas. Words are not enough to express my gratitude and appreciation for you taking the time to join us for what promises to be an inspiring and educationally productive conference.

Our theme for this year, "Reimagining the Geosciences," proactively and insightfully navigates through the challenging waters of the fast-paced and evolving transitions that the global society has been experiencing since 2020. Our plan is to expand on last year's pertinent discussion by re-envisaging the geoscientists' role in a much broader spectrum of earth-science opportunities. It is overt that to successfully survive the emergent challenges of the future, geoscientists must strategically anticipate them by acquiring supplementary training, utilizing foundational scientific knowledge, and proactively organizing their career paths. For those and many other reasons, we are taking the time this year to, together, "Reimagine the Geosciences."

The conference will follow a hybrid meeting format that will allow the virtual and in-person participation of our members and supporters. To truly emphasize our organization's commitment to health and protection amidst the global pandemic, the NABG Conference Planning Committee is enforcing a series of Covid-19 protocols. We ask that each individual, please, be committed to follow the established practices.

The conference agenda consists of a robust technical program covering a spectrum of geoscience disciplines and topics. We have constructed a program with industry-diverse panelists, exhibitors and a keynote speaker to bolster us in pragmatically re-envision the geosciences to ensure the success of us all, Geoscientists. We encourage you to take every opportunity you have to network with students, educators, industry partners, government and non-profit agencies, sponsors and supporters. Our field trip this year will be led by Dr. Khan Shubab and will investigate the active faults and subsidence in the Greater Houston area. We will observe the geological structures in the Long Point Fault at Moorhead Drive, the Piney Fault at Pecanwood, and the Baytown Nature Center.

Welcome to Houston! I am truly pleased that you have chosen to join us this year for what promises to be an inspiring, informative, and memorable conference. We hope to see you all again next year.

Sincerely,
Dalila de Jesus
NABG 2022 Conference Chair

The Birth of the National Association of Black Geoscientists

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

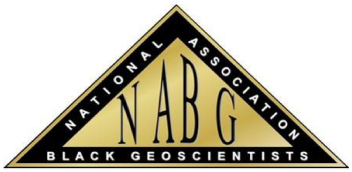
objectives should be, who should compose the membership, should the organization incorporate, etc. At times, it seemed as though the discussions were endless.

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 1981 Charter Members in Attendance at the First Annual Technical Conference



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.

NABG National Officers

President	Tramond Baisden	Shell
Vice President	Janelle Sherman	EDEN
Secretary	Dreadnaught Stubbs	ExxonMobil
Assistant Secretary	Karena Gill	University of Alabama
Treasurer	Dada Olamide	Carbonvert
Assistant Treasurer	Rocio Castillo	ExxonMobil
Parliamentarian	Sherilyn Williams-Stroud	University of Illinois / Illinois Geological Survey
Member at Large (Professional)	Quentin Stubbs	NOAA
Member at Large (Student)	Chven Mitchell	Purdue University
Previous President	Jerome Murphy	ExxonMobil

Advisory Board

Dr. Stephen K. Boss	University of Arkansas
Mr. Michael J. Carroll	Hunt Oil – Retired
Dr. Isaac J. Crumbly	Fort Valley State University
Dr. David Padgett	Tennessee State University
Ms. Rachel Dunn	TATNET
Ms. Zelma Maine-Jackson	State of Washington – Ecology
Ms. Carolyn Jones	Mariner Energy – Retired
Dr. John Leftwich	Haliburton – Retired
Ms. Nicole Scott	ExxonMobil
Mr. Reginal Spiller	Azimuth Energy
Dr. Marilyn Suiter	National Science Foundation
Dr. Wesley Ward	US Geological Survey – Retired
Mr. Elijah White	ExxonMobil- Retired
Mr. Darryl Willis	Microsoft
Mr. Ken Yarbrough	Osyka Exploration – Retired

NABG Extended Leadership Group - National Committee Chairpersons

Scholarship Committee	**Roxanne Lamb**
Outreach Committee	**Wes Ward**
Young Professionals	**Janelle Sherman**
Membership	**Elizabeth Watkins**
Technical Programs	**Dada Olamide** **Steve Boss**
Conference IT	**Tramond Baisden** **Pete Hargrove**
Webmasters	**Tramond Baisden** **Leiaka Welcome**
Advertisement	**Quentin Stubbs**

Regional Coordinators

Eastern Region	**Ibrahim Goodwin**
Western Region	**Zelma Maine-Jackson**

VANDERBILT UNIVERSITY

EARTH AND ENVIRONMENTAL SCIENCES | GRADUATE STUDIES | NASHVILLE, TENNESSEE

The M.S. to Ph.D. Pathway in Earth and Environmental Sciences is generally a five-year program and includes full funding. EES accepts Ph.D. applicants directly from undergraduate study as well as applicants who have already completed a M.S. degree in the field. Note that all students without an M.S. degree will earn the M.S. as part of the Ph.D. curriculum.

ALL PHD STUDENTS ARE GUARANTEED A GENEROUS 12-MONTH STIPEND, AS WELL AS FULL TUITION AND HEALTH INSURANCE FOR A PERIOD OF FIVE YEARS.

APPLICATION DEADLINE JANUARY 1ST | $20 APPLICATION FEE | GRE NOT REQUIRED

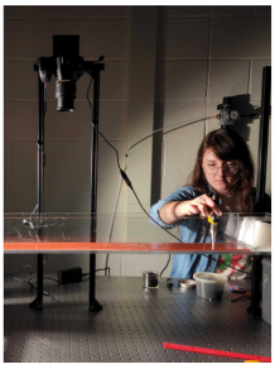
WE HAVE ACTIVE RESEARCH SITES ON ALL 7 CONTINENTS

BROAD RESEARCH AREAS

- Geochemistry
- Paleoecology and Paleontology
- Paleoclimates
- Atmospheric Science
- Sedimentary Systems
- Coastal and Deltaic Processes
- Igneous Petrology
- Volcanic Systems
- Conservation Biology
- Coupled Human-Natural Systems
- Hydrology and Water Resources

Faculty, staff, and students of the Department of Earth and Environmental Sciences are committed to the principles of a diverse and inclusive academic community. We value all backgrounds and perspectives, particularly as they contribute to our shared goals for quality research, education, and professional development.

Our program actively fosters an inclusive environment and has established several new programs with this aim – these include a Vanderbilt chapter of *Association for Women Geoscientists*, a new partnership with Tennessee State University called *Earth Horizons* that builds geoscience career pathways for minority students, and our faculty leaders hosting an *Earth Educators' Rendezvous* workshop to broaden participation of underrepresented minorities in the geosciences. These department level activities are complemented by college level efforts through the *Russell G. Hamilton Graduate Leadership Institute*.



HTTPS://AS.VANDERBILT.EDU/EARTH-ENVIRONMENTAL-SCIENCES/

Congratulations to our 2022

National Association of Black Geoscientists Scholarship Recipients!

Candidate	**Institution**	**Academic Level**
Faisal Adams	Virginia Tech	PhD
Joshua Ademilola	Oklahoma State University	PhD
Tolulope Q. Agbaje	Kansas State University	Graduate
Damilola Ajewole	Baylor University	PhD
Oluwaseun Joseph Akomolafe	Kansas State University	Graduate
Kolawole Arowoogun	Georgia State University	PhD
Abiodun Emmanuel Ayo-Bali	University of Pittsburgh	Undergraduate
John Chibundu Akudike	Texas Tech	Graduate
Ahmed Ali Mohamed El Manharawy	Missouri University of Science and Technology	PhD
Chinyere Eunice Eme	Kansas State University	Graduate
Valentine Chijoke Ezennubia	Oklahoma State University	Graduate
Victor Fakeye	Oklahoma State University	Graduate
Olubukola Adedotun Ishola	Oklahoma State University	PhD

Ademide Mabadeje	University of Texas	PhD
Chukwuma Mgbenu	Missouri University of Science and Technology	PhD
Erdoo Mongol	Missouri University of Science and Technology	PhD
Olanrewaju Muili	Georgia State University	Graduate
Damilola Ola	Midwestern State University	Graduate
Oyowande Ojo	Oklahoma State University	PhD
Oghalomeno Evih Ononeme	Oklahoma State University	PhD
Olusola Emmanuel Oyewumi	Bowling Green University	Graduate
Wiltany C. Rolle	Midwestern State University	Graduate
Silas Adeoluwa Samuel	Oklahoma State University	PhD
Oluseun Adetola Sanuade	Oklahoma State University	PhD
Christophe Wakamya Simbo	Colorado State University	PhD

Keynote Speaker

Dr. Reginald Archer

Associate Professor
Department of Agricultural and Environmental Sciences
Tennessee State University

Dr. Reginald Archer, an associate professor of Applied GIS in the Department of Agricultural and Environmental Sciences at Tennessee State University (TSU), seeks to put TSU on everyone's map with his research and teachings in Geographic Information Systems/Science (GIS) & Remote Sensing.

He applies GIS to analyze spatial data and uses the "science of where" to conduct research, specifically environmental change related to sustainability, public health, hazards, vulnerability, disaster recovery and environmental justice. He teaches multiple courses related to geospatial applications for undergraduates and graduates. He directs the Geospatial Research and Analysis Lab (GRaAL) and the GIS certificate program at TSU. He also leads graduate independent study courses and undergraduate capstone/senior project courses.

Dr. Archer actively engages in campus wide activities to increase STEM participation, is a Lifetime Member of the National Society of Black Engineers (NSBE) and a TSU Chapter advisor, as well as an advisor for Minorities in Agriculture, Natural Resources and Related Sciences (MANNRS) chapter. He is also an active member (1st Vice President (2022)) of the National Association of Geoscience Teachers (NAGT) and of the HBCU Geosciences working group. Dr. Archer is dedicated to increasing the number of underrepresented students in STEM and regularly participates as a mentor in programs such as Tennessee Achieves, and STEM-related summer camps.

Dr. Archer earned his Ph.D. in Geography from the University of California, Santa Barbara. He earned his M.S. in Civil Engineering and his B.S. in Surveying and Mapping from the University of Florida.

Workshops and Panel Discussions

ExxonMobil Workshop

Rocio Castillo
Development and Production Geoscientist at ExxonMobil
Fort Valley State University – BS Mathematics
University of Nevada Las Vegas – BS Geology
Hobbies: Dancing and being a social butterfly

Libby Felts
Exploration Geoscientist at ExxonMobil, Subsurface Assessment Specialist
BA Earth and Planetary Sciences, Harvard University, 2014
MSc Petroleum Geoscience, Imperial College London, 2016
Favorite Things: Cake, Queso, Rowing, Hiking, Teaching

Jerome Murphy
Former NABG President
Geoscience Supervisor for the ExxonMobil Deepwater Guyana
VP - Houston Chapter of ExxonMobil Black Employee Success Team (BEST)
Fort Valley State University - B.S. Chemistry
University of Oklahoma - B.S. Geology & M.S. Petroleum Geology
Hobbies: Spending time with family, working out

Kimbra Quezergue
ExxonMobil Geoscientist- Upstream Development and Production
B.S and M.S. in Geology at Texas A&M
Worked mostly Deepwater assets in the Gulf of Mexico and Guyana.
Currently located in Houston, TX
Hobbies: Baking, Traveling and Movies/TV

Dreadnaught Stubbs
Development Geoscientist at ExxonMobil
Ohio University B.S. - U-Pb Analyses of Detrital Zircons
Ohio University M.S. - Sequence Stratigraphy & Paleo Climate
Hobbies: Working out and playing with his dog (Chief)

Five Pillars of Success Panel

The Five Pillars of Success - Respect, Listening, Hearing, Sharing, and Promoting. This interactive workshop is centered on equipping its participants to successfully: navigate workplace challenges, learn to advocate for yourself and others, and contribute to a positive work environment for all.

Janelle Sherman, NABG Vice President

Janelle is an established geoscience integrator with 6 years of industry experience at a supermajor oil company. A successful exploration geologist, Janelle was the lead interpreter for the Haimara-1 deepwater discovery in the Guyana Basin, one of the largest discoveries in the industry at the time of discovery. In addition to her exploration success, Janelle was the operations geologist for several unconventional wells in the Midland Basin, and her executed wells consistently broke time to total depth records, safely and ahead of schedule. Janelle has a valuable and diverse geoscience background with expertise in geochemistry, environmental hydrogeology, and fluid transport. Janelle holds a B.S. in Geology from Wayne State University in her hometown, Detroit, Michigan, and a M.S. in Geology from the University of Arkansas. She currently serves as the Vice President of the National Association of Black Geoscientists.

Roxanne Lamb, USGS, Project Manager

Roxanne Lamb, USGS employee for 30+ in areas of science, communications, training and diversity. Currently the Project Manager for the Geospatial Platform program and a member of the USGS' Environmental Justice Team. Roxanne's enthusiasm for leadership, training and diversity in the geosciences has afforded her the opportunity to engage in the decision-making processes for Federal government agencies that produce, maintain, or use science and spatial data either directly or indirectly in the fulfillment of their mission. Roxanne holds a B.S in Geology from Elizabeth City State University, MBA (Human Resource Management) from Strayer University and a multitude of Federal certifications from Defense Acquisition University, Office of Management and Budget, Federal Acquisition University and Project Management Institute. Roxanne has been a member of NABG her entire career.

Future of Geosciences Panel

Geological sources of energy are abundant, but also need to be utilized in ways that are sustainable in terms of resource supply and distribution, and environmental impact. Recent supply chain disruption and geopolitical events have further exacerbated the need for capital allocation in all forms of energy and more importantly low carbon energy sources. Our path to net-zero and affordable energy can only be achieved through the decarbonization of existing low cost/high carbon intensity sources like fossil fuels, coupled with investments and advancements of high cost/low carbon intensity sources such as green hydrogen, geothermal energy and other non-traditional sources. Even with increasing global efforts to transition to alternative sources of energy such as solar, geothermal, hydrothermal, and new nuclear power technologies, fossil fuels remain the dominant geological energy source. As such, oil and gas companies have contributed to the creation of a geologic workforce highly skilled in subsurface interpretation and analysis. Many individuals who initiated their careers in that industry and in other related industries are now seeking to find opportunity in the global net transition to alternative energy sources.

This session is planned to include conversations on the current energy mix, energy security, funding the transition and more importantly on how our skillsets as geoscientists will be an integral part of the path to decarbonization and the path to a low-cost energy transition.

Olamide Dada - Panel Moderator

Olamide Dada, CFA serves as the Director of Finance & Planning for Carbonvert Inc. He has over ten years of experience in asset valuation, technical risk analysis and financial modeling. Dada started his career at BHP Billiton ("BHP") where he worked on different projects, including Asset Valuation, Reserve estimation and Reservoir modeling. Dada was a part of BHP's unconventional asset divestment team, involving the $10 billion US Lower 48 asset sale to BP. Most recently, Dada worked for a private equity-backed natural gas company in a business development and project valuation capacity. Dada holds a B.S. in Geology from the University of Oklahoma and a Master of Science in Petroleum Geology from the University of Louisiana. He is a CFA charter holder and an active member of CFA society of Houston.

Yanet Cuddus - Schlumberger- USL Marketing Manager for Digital & Integration Division

In her current role, she is responsible for strategic marketing for the USL Independant market for all business lines, particularly involving the digitization and decarbonization of the energy industry. Previously, Yanet was a Service Delivery Manager for Geophysics managing a diverse team responsible for technology delivery and consulting. She graduated with a B.S. in Environmental Systems & Modeling and a M.S.in Geophysics from the University of Houston.

Quentin Stubbs - Regional Navigation Manager Texas for NOAA

He has served as a Geographer and Regulatory Specialist with the Army Corps of Engineers in Galveston, TX, where he managed projects and applications related to dredging, aquatic structures, hydrographic surveying, and GIS/remote sensing. He also has 6 years of experience as a Geographer with the US Geological Survey - Chesapeake Bay Program in Annapolis, MD. He holds a Ph.D. in Geographical Sciences from UMD - College Park, a MPA from Columbia University, and a BBA from Mercer University. He looks forward to maintaining productive relationships between NOAA, USACE, USCG, pilots and the community. His areas of concentration are land use/land cover change, natural hazards, and environmental justice.

Gerald Smith, Enerflex, Business Development Lead

Gerald Smith has worked in the energy arena throughout his entire career, first as an Electrical Engineer, next as an energy investor for Energy Financial Services (EFS) – a $15B principal investment fund under the GE Capital umbrella that allocates capital across the energy spectrum, as a CFO of a blockchain startup that focused in reducing the friction of transactions in the oil field, and leading Business Development efforts for Enerflex's Energy Transition group. Gerald obtained his Engineering degree from Louisiana State University, Professional Engineering license in the state of Texas and MBA from Johnson at Cornell. As the Business Development lead for Enerflex's Energy Transition group, Gerald originates investment opportunities in four key verticals: CCUS, Hydrogen, Electrification, & Renewable Natural Gas. Most of his time involves supporting CCUS as it dovetails well with Enerflex's core business, which is building modular systems for gas compression and processing. Gerald engages with emitters across the US to develop capture systems while bringing in various stakeholders (tax equity, EPCs, debt providers, midstream companies, pore space owners) to monetize IRS 45Q incentives.

Jerome Murphy, ExxonMobil, Geoscience Supervisor

Jerome has served as the President of the National Association of Black Geoscientists for the past 6 years. He currently serves as the Vice President of the Houston Chapter of ExxonMobil Black Employee Success Team (BEST). Jerome is the geoscience supervisor for the ExxonMobil Deepwater Guyana. He earned his B.S in chemistry from the Fort Valley State University, a B.S in Geology and M.S in Petroleum Geology from the University of Oklahoma.

Career Outside Academia - AGU

Join a panel of geoscience professionals to learn more about the different types of careers outside of academia. Discover the difference between geoscience and non-geoscience skills and how these can help one to transition into careers outside of academia.

Finding and Applying for Jobs - GSA, NCAR

Resumes, Cover letters, USAJobs, and Job exploration

Join Marissa Vara and Matt Dawson for a hands-on workshop on preparing resumes/CVs, cover letters, cold emails, and USAJobs applications, as well as getting tips on job exploration.

Environmental Justice – A Growing Field of Study - USGS

The newly established USGS Environmental Justice Team is working to support environmental issues that impact underrepresented communities using the critical science studies affiliated with the USGS regionally and Nationally.

Federal Career Opportunities through USGS

Not only do you need a solid resume, but you also need to understand how to navigate the process for employment from application submission to responding to position questions and the required documentation. A high-level overview and the hiring appointments available in the USGS.

NABG 2022 Full Conference Agenda

*Denotes in-person only session

ALL EVENTS CENTRAL STANDARD TIME (GMT -5)

Wednesday, 7 September		
1:00-5:00 PM Commerce Ballroom	Exxon Mobil Workshop*	Invited Students Only
6:00-8:00PM Outside Magnolia	Welcome Reception/Check-in*	Note: Business Casual Attire
Thursday, 8 September		
7:00-8:00 AM Outside Magnolia	Check-in & Breakfast	
8:00-8:10 AM Magnolia Ballroom	Conference Welcome and Opening Remarks	
8:10-8:40 AM Magnolia Ballroom	Organization Introductions	
8:40-10:00 AM Magnolia Ballroom	Future of Geosciences Panel	Yanet Cuddus, Quentin Stubbs Gerald Smith, Jerome Murphy
10:00-10:10 AM	Break	
10:10-10:25 AM Magnolia Ballroom	Guleed Ali	THE DESCENT INTO THE LAST ICE AGE AND THE EMERGENCE OF A WETTER CLIMATE IN THE MONO BASIN OF THE WESTERN USA
10:25-10:40 AM Magnolia Ballroom	Erdoo Mongol	ASSESSING HOLOCENE VEGETATIONAL DYNAMICS IN THE NORTHERN NEOTROPICS: A 9,500-YEAR PALYNOLOGICAL RECORD FROM LAKE IZABAL, EASTERN GUATEMALA

10:40-10:55 AM Magnolia Ballroom	Mark Irby-Gill	WHAT FACTORS INFLUENCE THE CLOUD-DRIVEN COOLING AND HEATING OF EARTH?
10:55-11:10 AM Magnolia Ballroom	Isheka S. Orr	CHARACTERIZING HUMAN HEALTH RISKS FROM FECAL COLIFORM EXPOSURE IN URBAN WATERWAYS IN INDIANAPOLIS DUE TO STORMWATER RUNOFF
11:10-11:25 AM	Break	
11:25-11:55 AM Magnolia Lounge	Lunch Served	
11:55-12:55 PM Magnolia Lounge	Keynote Luncheon	Dr. Reginald Archer
1:00-1:15 PM Magnolia Ballroom	Folashade Ojo	ENGINEERING AND CHEMICAL CHARACTERISATION OF NATURAL BITUMEN RESOURCES FROM NIGERIA
1:15-1:30 PM Magnolia Ballroom	Asenath Kwagalakwe	INVESTIGATING MELT GENERATION BENEATH THE NORTHERN WESTERN BRANCH OF THE EAST AFRICAN RIFT SYSTEM USING 3D GEODYNAMIC MODELING WITH ASPECT
1:30-1:45 PM Magnolia Ballroom	Emoni Lewis	2022 GEOPATHS SUMMER INTERNSHIP PROGRAM IN GEOPHYSICAL TECHNIQUES (RESISTIVITY)
1:45-2:00 PM Magnolia Ballroom	Faisal T. Adams	UNDERSTANDING THE GROWTH OF ALUMINUM NANOMINERALS ON CALCITE IN SIMULATED ACID MINE DRAINAGE
2:00 PM	Break	
2:05-3:20 PM Commerce & Mag	Poster Session*	
3:25-4:25 PM Magnolia Ballroom	Careers Outside Academia	Sponsored by AGU

4:25-5:00 PM Outside Magnolia	Visit Exhibitor Booths/Networking*	
5:00-5:15 PM	Break	
5:15-6:45 PM Magnolia Ballroom	Student Resume Workshop*	Sponsored by GSA and UCAR
Friday, September 9		
7:00-8:00 AM Outside Magnolia	Breakfast/Registration	Outside Ballroom
8:00-8:05 AM Magnolia Ballroom	Conference Welcome and Opening Remarks	
8:05-8:20 AM Magnolia Ballroom	Champagne Cunningham	PRELIMINARY RESULTS OF MICROCYSTIN AND SAXITOXIN PRESERVATION IN FOSSIL MOLLUSKS OF THE LATE CRETACEOUS COON CREEK FORMATION
8:20-8:35 AM Magnolia Ballroom	Keiana Mazzio	USING GEOPHYSICAL RESISTIVITY METHOD AS TRAINING FOR URM STEM MAJORS OF FORT VALLEY STATE UNIVERSITY
8:35-8:50 AM Magnolia Ballroom	Safiya Alpheus	CONSTRAINING THE CONTROLS ON BAR PRESERVATION IN BRAIDED RIVERS
8:50-9:05 AM Magnolia Ballroom	Ayanna St. Rose	MULTI-TROPHIC BIODIVERSITY INCREASES WITH INCREASING STRUCTURAL COMPLEXITY OF FOREST CANOPY
9:05-9:35 AM	Break	Visit Exhibitor Booths
9:35-10:15 AM Magnolia Ballroom	USGS - Environmental Justice	
10:15-11:30AM Magnolia Ballroom	Five Pillars of Success	
11:35-11:50 AM Magnolia Ballroom	NSF - Critical Minerals	

11:50 - 1:15 PM	Lunch on your own	
1:15-1:30 PM Magnolia Ballroom	Maria Gorret Nabuwembo	IMPROVING ACCESS TO WATER AND SANITATION FACILITIES IN THE INFORMAL SETTLEMENTS OF KAMPALA
1:30-1:45 PM Magnolia Ballroom	Chelsea Randle	THE TSU WETLAND PROVIDES RESEARCH AND EDUCATION VALUE
1:45-2:00 PM Magnolia Ballroom	Chelsea McDonald	ALLIANCE BUILDING OFFSHORE TO ADVANCE RESILIENCE AND DIVERSITY: THE ALL-ABOARD MODEL
2:00-2:15 PM	Break	
2:15-3:15 PM Commerce & Mag	Poster Session*	
3:20-4:20 Magnolia Ballroom	USGS Careers Workshop	
4:20-4:30 PM Magnolia Ballroom	Scholarships, Poster Awards, and Closing	Roxanne Lamb
4:45-5:45 PM	Business Meeting	E-Board Only
Saturday, September 10		
7:00-8:00 AM	Breakfast	
8:00-12:00 PM	Fieldtrip	Dr. Shuhab Khan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Poster Sessions

THREE MILLION YEAR OLD PLANKTONIC FORAMINIFERA; ENVIRONMENTAL DRIVERS WITHIN THEIR BIOGEOGRAPHIC RANGE

Sharif Coker, A. Kar (Mentor)
Fort Valley State University

DIRECT AIR CAPTURE: LARGE SCALE MAP DATABASING FOR THE EXPANSION OF CO_2 EMISSION POLICY

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Stanford University

ECOLOGY & ECHOLOCATION ABILITIES IN PARAPONTOPORIA

Joyce Sanks [1,2,3] and R. Racicot [1,2]
[1] Department of Earth & Environmental Sciences, Vanderbilt University; [2] Department of Biological Sciences, Vanderbilt University; [3] The SyBBURE Searle Undergraduate Research Program, Vanderbilt University

MODELED EVA TRAVERSES INTO PERMANENTLY SHADOWED REGIONS NEAR THE RIDGE BETWEEN SHACKLETON AND HENSON CRATERS

Mason, Kashuana[1], A. Goodwin[2], E. Peña-Asensio[3,4], J. Sutherland[5,6], P. Tripathi[7], V.T. Bickel[8] and, D. A. Kring [9] , [1]The University of Manchester, United Kingdom, [2] Texas A&M University, USA,[3] Autonomous University of Barcelona, Spain, [4] Institute of Space Science (IEEC-CSIC), Spain, [5] Institut Laue-Langevin, France, [6] TU Berlin, Germany, [7] Indian Institute of Technology Roorkee, Indian, [8] ETH Zurich, Switzerland, [9] Lunar and Planetary Institute, USRA, USA

ALLIANCE BUILDING OFFSHORE TO ADVANCE RESILIENCE AND DIVERSITY: THE All-ABOARD MODEL

McDonald, Chelsea[1], R. Bryant[2];
[1]Texas A&M University, [2]Wesleyan University

EVOLUTION OF MARINE SEDIMENTS ALONG THE SHALLOW MEGATHRUST

Emory Mckenzie, M. French, S. Williams
Rice University

HOTSPOT FOR BUILDING COLLAPSE DUE TO LAND SUBSIDENCE IN THE COASTAL CITY OF LAGOS, WEST AFRICA

Leonard Ohenhen and M. Shirzaei
Virginia Tech

REGIONAL CORRELATION AND DEPOSITIONAL HISTORY USING WELL LOG AND CORE DATA OF THE GENESEO BURKET FROM THE POSEIDON 8M WELL, WESTMORELAND COUNTY PA, USA

Spencer Williams, Timothy Carr,
West Virginia University

HYDROGEOLOGICAL INVESTIGATION OF INLAND FRESHWATER LENS DEVELOPMENT AND ITS IMPACT ON DUNE MIGRATION

Yonesha Donaldson[1] , D. F. Richards IV [1] , S. Becker [1] , A. Milewski [1] , A. Parsekian [2] , M. Elliot [2] , D. Bustos [3] , and P. Martinez [3]
[1] Water Resources and Remote Sensing Laboratory, University of Georgia; [2] Geology and Geophysics, University of Wyoming; [3] National Park Service, White Sands National Park

2022 GEOPATH SUMMER TRAINING PROGRAM IN STEM AT FORT VALLEY STATE UNIVERSITY: A GROUND-PENETRATING RADAR SURVEY OF FORT VALLEY STATE UNIVERSITY'S CAMPUS

Henderson, J.[1], Wilson, A.[1], **Williams, J.[1]**, Robinson, T.[2], Holmes, T.[1], and Kar, A.[1]
[1]Fort Valley State University, [2] University of South Florida

Vs $_{30}$ **SITE CHARACTERIZATION IN THE HAYWARD HILLS, SAN LEANDRO, CALIFORNIA, USING MULTIPLE METHODS**

Samuel, Delton Catchings, R.D., Goldman, MR., Chan, J.H., Criley, C.J., Gomez, A.J, Pina, A.R.
U.S. Geological Survey, Earthquake Science Center, P.O. Box 158, Moffett Field, California 94035

Conference Exhibitors

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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!

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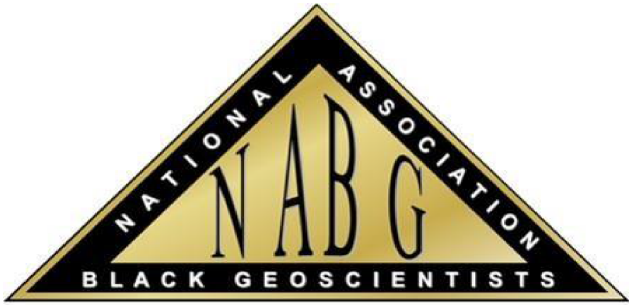

Thank you for attending and supporting the 41st Annual Technical Conference of the National Association of Black Geoscientists

Adams, Faisal T. [1], S. Paulus[2], F. M. Michel[1,2]

[1]Department of Geosciences, Virginia Tech, Blacksburg, VA

[2]Division of Nanoscience, Academy of Integrated Science, Virginia Tech, Blacksburg, VA

UNDERSTANDING THE GROWTH OF ALUMINUM NANOMINERALS ON CALCITE IN SIMULATED ACID MINE DRAINAGE

Acid mine drainage (AMD) is a widespread and persistent problem, affecting soil and water quality, and natural ecosystems where it occurs. Methods to remediate AMD-impacted water include a passive treatment approach where rocks containing carbonate minerals, such as limestone, are used to remove acidity and induce the precipitation of dissolved cations and anions. Unfortunately, the precipitated metal oxides form coatings on the carbonate mineral surfaces, restricting ion diffusion and effectively shutting down the treatment process. In the present study, we investigate how solution chemistry affects the coating formation process by reacting simulated AMD (Al(NO3)3) with crushed calcite (CaCO3) in custom-designed and fabricated mixed flow reactors equipped with continuous pH monitoring. With these, we can replicate field conditions in the lab under well controlled parameters. We analyze the mineral coating using powder x-ray diffraction, and dissolved ions with Inductively Coupled Plasma Atomic Emission Spectrometry. Our results show an initial increase in pH and Ca concentration, while Al decreases when the surface is newly exposed and fresh. With time, a reversed trend is observed as less Ca is released and pH decreases, indicating formation of the surface coatings. The rate of coating formation is 27 to 33% slower in Al(NO3)3 compared to reported values for a simulated AMD of Al2(SO4)3, which highlights the role of anions in the growth of these coatings. Understanding the fundamental processes taking place in this system should aid in better designs of passive AMD treatment systems.

Ali, Guleed [1,2], K. Lin[3,4], S. Hemming[5,6], S. Cox[6], P. Ruprecht[7], S. Zimmerman[8,] S. Stine[9], and X. Wang[3,4]

[1]Berkeley Geochronology Center; [2]University of California, Berkeley; [3]Earth Observatory of Singapore; [4]Nanyang Technological University; [5]Columbia University; [6]Lamont-Doherty Earth Observatory; [7]University of Nevada, Reno; [8]Center for Accelerator Mass Spectrometry, Lawrence Livermore National Laboratory; [9]retired

THE DESCENT INTO THE LAST ICE AGE AND THE EMERGENCE OF A WETTER CLIMATE IN THE MONO BASIN OF THE WESTERN USA

At present, the western USA is arid, but geologic studies show evidence of past wetness. The timing of these wetter conditions reveals a close association with glacial conditions. This association has led to the hypothesis of a causal link between glacial climate and regional wetness, but poor age control on the onset of regional wetness thwarts a test of this hypothesis. Here we determine the start of the most recent interval of persistent wetness in the Mono Basin, east-central California. The most recent emergence of persistent wetness in the Mono Basin is stratigraphically correlated with the depositional age of Ash 19—a rhyolitic ash bed that represents the oldest tephra of the Wilson Creek Formation and one of the earliest-known products of explosive volcanic activity from the Mono Craters. We constrain the depositional age of Ash 19 by using the U/Th disequilibrium dating method to date carbonates that are younger and older than Ash 19. Our U/Th dating results show that Ash 19 was deposited before the formation of a cross-cutting carbonate bed dated to 69.2 ± 0.3 ka but after an underlying carbonate tufa dated to 67.4 ± 3.5 ka, which suggests that the start of wetness in the Mono Basin was contemporary with the inception of the Last Glaciation—the beginning of Marine Isotope Stage 4—at ca. 70 ka. This finding corroborates the hypothesis of a link between glacial climate and regional wetness.

Alpheus, Safiya and E. Hajek
Department of Geosciences, The Pennsylvania State University, University Park, PA 16801

CONSTRAINING THE CONTROLS ON BAR PRESERVATION IN BRAIDED RIVERS

The fluvial stratigraphic record is an important resource for understanding and reconstructing the history of Earth's surface environments. Feedbacks between flow and sediment transport control the shape, scale, form, and movement of channels and their bar deposits. Fingerprints of these dynamic movements are recorded in sedimentary deposits, providing a lens through which we can reconstruct formative flow conditions from ancient river systems. Observations of bar deposits in active rivers from satellite imagery highlight the dynamic nature of bars in braided systems. In these systems, bar deposits grow and decay in response to channel thread movements (e.g. thread-confluence, splitting, translation and widening). A limited understanding of how these movements are preserved in the stratigraphic record complicates our ability to apply theoretical and deterministic reconstructive approaches to ancient, braided channel fills, as their influence on bar preservation is less well-constrained. Here we aim to connect plan-view channel-thread movements to trends in stratigraphic preservation of braided river bars, to help fill this knowledge gap. We use a numerical model to simulate the evolution of a braided river under constant water- and sediment-supply conditions and investigate controls on bar preservation. Using the geometry and architecture of model deposits, we explore the fingerprint of channel morphodynamics on braided channel fills with an emphasis on observations that can be replicated in ancient outcrops. We document characteristic preservation dynamics that connect channel-thread kinematics to specific stratigraphic products. Our results describe the range of variability persistent in braided channel fills. They help geologists to contextualize the degree to which the architecture of these deposits reflects changing flow and sediment supply conditions, and the stratigraphic measurements most useful for interpreting signals of past landscape change. Finally, this work contributes to our understanding of the sensitivity of river systems to changes in discharge and sediment supply, proving useful for assessing flooding risks in floodplain areas.

Boudreaux, Trinity C. Scott-Buechler, R. Jackson
Stanford University

DIRECT AIR CAPTURE: LARGE SCALE MAP DATABASING FOR THE EXPANSION OF CO_2 EMISSION POLICY

Current efforts by global leaders have not been enough to substantially counter the future of a global temperature increase by 1.5 degrees. It is recognized that urgent action is necessary, and one of the most effective steps that need to be taken is instituting carbon dioxide removal (CDR) technologies into American climate action plans. Much of the research on CDR technology, specifically direct air capture (DAC), lacks the structured policy needed to begin its widespread use in the United States. This research project looks at the discrepancies in the US policy approach to CDR deployment. In identifying those discrepancies, there's the ability to find additional optimal regions that could be eligible for deployment through legislative action plans. The regions that would best support DAC technology deployment were better identified using ArcGIS. The map would now be an addition to databases used for creating climate policies that combat the current escalation of climate change. As there is a lack of expatiated databasing for the purpose of policy, this research is an expansion of the colloquial information needed for potential policy. Results included culminating the most eligible land-use regions and identifying the sustained restricted lands, both legally and ethically. The eligible regions were found by creating categories for data building: geology, transportation infrastructure, land use availability, and demographics. These categories account for the logistical, ethical, and legal aspects needed in making legislation regarding the expansion of DAC technologies. These eligible regions encompass potential transition plants, aquifer storage sites, and DAC plants that would be supported by policy action plans.

Coker, Sharif A. Kar (Mentor)
Fort Valley State University

THREE MILLION YEAR OLD PLANKTONIC FORAMINIFERA; ENVIRONMENTAL DRIVERS WITHIN THEIR BIOGEOGRAPHIC RANGE

Climate change poses an imminent threat to the future of ecosystems on land and in the oceans. Deciphering ecological patterns and environmental drivers across ancient climatic perturbations enhances our understanding of extinction risk associated with an increase in global mean temperature during the next century. This study investigates biogeographic ranges of 19 extant species of planktonic foraminifera across the Piacenzian Age (~3.6–2.6 Ma). The planktonic foraminifera exhibit the most complete species-level fossil record of any known phylogenetic group. Their global distributions, and readily preserved calcareous skeletons which record a biogeochemical fingerprint of seawater chemistry, signify the single greatest archive known to science for understanding ancient patterns in paleoceanography, biogeography, and evolution. We apply this incomparable biological record to the Piacenzian and investigate the relationship with environmental variables such as δ^{18} O, δ^{13} C, temperature, and CO 2. We subset species occurrences and climate parameters into ten 100 kyr time bins to determine the relationship between biogeographic range and global climatic conditions, which was tested using a generalized least squares regression (GLS) model. Furthermore, all species were assigned to their documented morphological and ecological functional groups to assess the relationship between climate dynamics and ecological niche. Based on the results of GLS modelling, 12 species show the strongest correlation with δ^{18} O and temperature, 5 species show the strongest correlation with δ^{18} O and δ^{13} C, and 2 species show the strongest correlation with δ^{18} O, δ^{13} C, and temperature. Ocean temperatures are the greatest driver for planktonic foraminiferal diversity in the modern ocean, and our results suggest that many extant species which existed during the Piacenzian responded in tandem with global changes in ocean temperature and ice volume. Our results show that foraminiferal ranges contracted and shifted towards higher latitudes across the mid-Pliocene Warm Period, and we predict that similar habitat changes may be expected as anthropogenic forcing continues driving the Earth towards Pliocene-like levels of warmth, and beyond.

Cunningham, Champagne [1,2] , T. Byl [1,2] , M. Gibson [3] , Mike Bradley[2] , Neil Kelley[4] , J. S. Trail[5]

[1]Tennessee State University, Ag and Environmental Sciences, 3500 John A Merritt Blvd, Nashville, TN 37209; [2] U.S. Geological Survey, 640 Grassmere Park, Suite 10, Nashville, TN 37211; [3] Department of Agriculture, Geosciences, & Natural Resources, 208-B Johnson EPS, Martin, TN 38238; [4] Vanderbilt University, Department of Earth and Environmental Sciences Vanderbilt University 5726 Stevenson Science Center Nashville TN 37235, Nashville, TN 37240; [5] U.S. Geological Survey, 926A National Center, 12201 Sunrise Valley Drive, Reston, VA 20192

PRELIMINARY RESULTS OF MICROCYSTIN AND SAXITOXIN PRESERVATION IN FOSSIL MOLLUSKS OF THE LATE CRETACEOUS COON CREEK FORMATION

The Upper Cretaceous Coon Creek Formation (CCF) of Western Tennessee is recognized for its pristine preservation of an abundant and diverse biota of invertebrates, vertebrates, and rare plants. The fossils are approximately 70-million years old and represent marine organisms that lived during the late Cretaceous period when the Gulf of Mexico extended into Tennessee. One of the taphonomic mysteries of the CCF is how multiple mosasaur specimens died and were buried within the same small area of seafloor. The pristine nature of preservation of the CCF fauna opens the opportunity to discover geochemical evidence of potential kill mechanisms, for example, the presence of saxitoxins (SXT) or microcystin (MT) produced by harmful algal blooms. Previous studies have shown that cyanobacteria and dinoflagellates were common in Cretaceous sediments; these are known to produce toxins that cause red tides and harmful algal blooms. There are many recent reports of MT and SXT occurrence in marine settings, with a recent publication reporting cyanotoxins in 4,700 year old Florida sediments. Several taxa of mollusks (oyster, mollusk, gastropod, cephalopod) collected from the CCF with enclosing sediment, and younger overlying soils were analyzed to determine the occurrence and survivability of MT and SXT within the CCF fossils. Results from the Enzyme Linked Immunosorbent Assay (ELISA) analysis found greater than 10 micrograms/gram (ug/g) of MT and over 7ug/g SXT in the bivalve fossils, mollusk Pterotrigonia and oyster Exogyra. Sediment levels of MT and SXT in overlying sediments were negligible, indicating that the fossils were not contaminated by terrestrial cyanobacteria release of MT and CCF. Our preliminary study demonstrates the presence of MT and SXT in the CCF fossil shells and potential evidence of harmful algal blooms in the Cretaceous period, as preserved in the fossil record of the CCF based on the concentration levels.

Donaldson, Yonesha [1] , D. F. Richards IV [1] , S. Becker [1] , A. Milewski [1] , A. Parsekian [2] , M. Elliot [2] , D. Bustos [3] , and P. Martinez [3]

[1]Water Resources and Remote Sensing Laboratory, University of Georgia, Athens GA 30601; [2] Geology and Geophysics, University of Wyoming, Laramie, WY 82071; [3] National Park Service, White Sands National Park, Alamogordo, NM 88002

HYDROGEOLOGICAL INVESTIGATION OF INLAND FRESHWATER LENS DEVELOPMENT AND ITS IMPACT ON DUNE MIGRATION

Inland freshwater lenses (IFLs) are renewable water resources that develop in arid lands due to the upward force exerted by the shallow and saline host aquifer, providing fresh water for societal and ecological uses. In arid regions of the Southwest US, shallow groundwater chemistry and IFL development play a crucial role in dune morphology, transition, and stabilization. At White Sands National Park in New Mexico, the world's largest gypsum dune field, airborne remote sensing and near-surface geophysical techniques are used to understand the hydrogeological control on dunes; movement. Spatial difference LiDAR and in-situ conductivity, total dissolved solids, and salinity results show that barchan dunes overlying saline groundwater move at a faster rate, at an average rate of 7.65 m/yr from 2007-2010, compared to the more stabilized parabolic dunes surrounded by fresher water, at an average rate of 2.25 m/yr. In addition to groundwater salinity, dunes stability and migration are a function of aeolian processes, vegetation health, and rainfall occurrences. Focusing on the latter, time-lapse electrical resistivity was utilized in the field to further investigate water input and groundwater flow controls on parabolic dune migration and IFL recharge during precipitation events. We conclude that the timing, magnitude, and soil properties determine groundwater movement in the shallow subsurface in arid lands. This research aims to understand IFLs global occurrence and development in arid environments with the growing need for freshwater resources.

Henderson, J.[1], Wilson, A.[1], Williams, J.[1], Robinson, T.[2], Holmes, T.[1], and Kar, A.[1]
[1]Fort Valley State University, [2]University of South Florida

2022 GEOPATH SUMMER TRAINING PROGRAM IN STEM AT FORT VALLEY STATE UNIVERSITY: A GROUND-PENETRATING RADAR SURVEY OF FORT VALLEY STATE UNIVERSITY'S CAMPUS

The present study utilized GPR (Ground Penetrating Radar) to survey an area of interest at Fort Valley State University. Ground Penetrating Radar (GPR) is a geophysical method that uses radar pulses to image the subsurface. It is a non-intrusive method of surveying underground utilities. The reason for this survey was to determine what objects or large masses are under the areas defined as survey 1 and survey 2. The data found would give insight into the objects of masses found under the ground at the two locations surveyed. The areas of survey 1 was a grid of 26 x 90m and 28 x 52m for survey 2. Once done the data received was then interpreted in EKKO Projects software to give an image of the data that was collected. The data shown in EKKO Projects displayed hyperbolas or objects that reflected the radio waves back as an upside down "U" in the software. The GPR data revealed that there were different objects located under the areas of survey 1 and survey 2. A comparison of data to the utilities map for Fort Valley State University campus indicated that most of the hyperbolas were in fact underground pipes, electrical lines and trees.

Irby-Gill , Mark [1,2], Michael Diamond[3,4], Jake Gristey[3,4] (University Corporation for Atmospheric Research [1](UCAR), Boulder, CO, [2]Red Rocks Community College, Lakewood, CO, Cooperative Institute for Research in Environmental Sciences (CIRES), Boulder, CO, [4]NOAA Chemical Sciences Laboratory, Boulder, CO)

WHAT FACTORS INFLUENCE THE CLOUD-DRIVEN COOLING AND HEATING OF EARTH?

As the planet warms, it becomes more urgent to understand the mechanisms that drive the Earth's temperature. The Earth regulates its temperature by reflecting and emitting heat back into space. Clouds can cool the Earth by blocking the sun's heat or warm the earth by blocking heat from escaping to space. While clouds are known to impact the climate, there is still a need to understand historic and future cloud changes and how different cloud types and properties affect Earth's warming or cooling. Cloud types are determined by the thickness of the cloud and how high the cloud forms in the atmosphere. This study investigates how much each cloud type warms or cools Earth, here measured by the cloud radiative effect (CRE) of each cloud type. Using satellite datasets that report the incoming and outgoing heat energy by cloud type, the connection between CRE, cloud cover and cloud type, and how pollutants affect this relationship is explored. While all clouds reflect sunlight and block heat energy, they do so in unequal amounts. Stratocumulus clouds have a large net cooling effect, Cumulonimbus have a smaller net cooling effect, and Cirrus clouds contribute a net warming effect. When the presence of pollutants is explored the relative position of cloud versus aerosol must be considered to ensure that it is actual cloud- aerosol interaction being measured. To understand the net effect of cloud-driven climate change, future work must also consider the relative abundance of cloud types and pollutants.

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INVESTIGATING MELT GENERATION BENEATH THE NORTHERN WESTERN BRANCH OF THE EAST AFRICAN RIFT SYSTEM USING 3D GEODYNAMIC MODELING WITH ASPECT

The northern Western Branch of the East African Rift System includes both magma-rich and magma poor rifts. The Albertine-Rhino graben in the north has no surface expression of magmatism and is considered a magma-poor rift, but the areas around Lake George and the Edward region in the south exhibit volcanism and are thus magma-rich. In this work, we investigate sources of melt for the northern Western Branch. We model Lithospheric Modulated Convection (LMC) using the 3D finite element code ASPECT. We create three regional models of a rigid lithosphere based on LITHO1.0, Afonso et al. (2022), and Fishwick (2010, updated) with an underlying convecting sub-lithospheric mantle. The regional model extends in latitude, longitude, and depth with dimensions of 1332 by 1554 by 660 km, respectively. We solve the Stokes equations using the extended Boussinesq approximation for an incompressible fluid, which considers the effects of adiabatic heating and frictional heating. We incorporate latent heating so that we can test for melt generation from LMC in the sublithospheric mantle. The results indicate that LMC does not generate significant melt beneath the Albertine-Rhino Graben for any of the lithospheric thickness models, but under plume temperature conditions there is melt beneath the Lakes George and Edward region. These findings imply that a sublithospheric melt source is likely not the weakening mechanism allowing the Albertine-Rhino Graben to rift, which hints that pre-existing structures may play a dominant role in the rift formation of the Albertine-Rhino Graben. Furthermore, a plume or plume materials may exist beneath the Lakes George and Edward region, generating melt that feeds local volcanism. These results provide a better understanding of the sources of melt beneath the northern Western Branch.

Lewis, Emoni[1], Mazzio, K.[1], Murphy, E.[1], Williams, J.[1], Wilson, A.[1], Henderson, J.[1], Robinson, T.[2], Holmes, T.[1], and Kar, A.[1]

[1]Fort Valley State University and [2]University of South Florida

2022 GEOPATHS SUMMER INTERNSHIP PROGRAM IN GEOPHYSICAL TECHNIQUES (RESISTIVITY)

This study is a part of a National Science Foundation sponsored summer program for undergraduate STEM majors attending Fort Valley State University. In this program we got hands-on experience using high tech equipment. Active geophysical sensors transmit a signal into the earth and record a returned signal that contains information on the physical and chemical properties of the earth. This project introduced summer training interns at Fort Valley State University to the basics of geophysical data acquisition using two techniques that record variations in the electrical conductivity of the earth: [1] electrical imaging (El), and [2] electromagnetic (EM) conductivity mapping. Electrical imaging is a galvanic geophysical approach whereby electrical contact with the earth is made directly via electrodes (typically metal stakes) that are inserted into the ground. Electromagnetic conductivity mapping is a non-contact (EM) technique for measuring electrical conductivity. This study consisted of determining the presence of various objects and large masses that may be located beneath a grassy area located on Fort Valley State University's campus. The resistivity survey shows the levels of conductivity in the surveyed area as well as the amount of liquid saturating the surrounding dirt. Fifty-six electrodes were planted in a straight line with 1.5-meter distance between them. Once planted, a resistivity cable was wrapped around each electrode and a current was sent through each electrode for 45 minutes. The data received was then analyzed with state-of-the-art software to provide detailed imaging of the data that was collected. The resistivity data indicates that there was a large boulder-like mass in one image and three smaller masses in the other. Differences in the imaging demonstrates difference in detail when comparing the two methods.

Mason, Kashuana[1], A. Goodwin[2], E. Peña-Asensio[3,4], J. Sutherland[5,6], P. Tripathi[7], V.T. Bickel[8] and, D. A. Kring [9] , [1]The University of Manchester, United Kingdom, [2] Texas A&M University, USA,[3] Autonomous University of Barcelona, Spain, [4] Institute of Space Science (IEEC-CSIC), Spain, [5] Institut Laue-Langevin, France, [6] TU Berlin, Germany, [7] Indian Institute of Technology Roorkee, Indian, [8] ETH Zurich, Switzerland, [9] Lunar and Planetary Institute, USRA, USA

MODELED EVA TRAVERSES INTO PERMANENTLY SHADOWED REGIONS NEAR THE RIDGE BETWEEN SHACKLETON AND HENSON CRATERS

Advances from robotic missions, modeling, and sample re-evaluation in the 50 years since humans landed on the Moon raise new questions about the lunar environment, water and other volatiles, impact processes, tectonics, and planetary volcanism. Permanently shadowed regions (PSRs) on the Moon are found inside topographic depressions and are expected to host near-surface water ice in quantities that may help sustain future human exploration activities. Water ice may be used for crew consumables, radiation shielding, and deriving rocket propellant. It may also provide a record of volatiles accreted to the Earth-Moon system and their processing within the lunar interior. Access to PSRs remains challenging due to the terrain, however, in this project, we generate and investigate traverses between a subset of PSRs and potential landing sites near Shackleton crater rim and the ridge between Shackleton and Henson craters in the south polar region of the Moon. Our algorithm prioritizes cumulative slope and distance traveled to evaluate the optimum accessibility alongside encountered illumination, temperature, and other environmental factors. Automated traverses were tested and validated through manual geologic mapping. We found that the automated traverse algorithm quickly assesses a large number of traverse options, providing a good baseline for more detailed studies of selected extravehicular (EVA) traverses. We found 522 PSRs, 95% of which are accessible from the rims of their bounding craters. We also found that 34 PSRs within a 2 km radial distance limit of a lander were accessible within two hours of an eight-hour EVA.

Massey, Jordon and T. Halihan
Oklahoma State University

Field evaluation of controls on pseudokarst development – heterogeneity effects

In sandstones the hydrologic flow characteristics are controlled by the degree of heterogeneity in the medium. Many sandstones represent complex compositions, often occurring in sequences with highly variable grain sizes. The variability in grain size controls development of interconnected pore spaces and discontinuities ultimately leading to the formation of preferential fluid migration pathways. Current observations of sandstone pseudokarst in the field only depict its occurrence as being a result of preferential pathways developed along fractures and faults. However, in sandstones containing higher percentages of silt and clay sized particles, the spatial distribution of clay sized particles may have a larger control on preferential flow path development than other features. During this study we delineate the accumulation of a claypan along a hill slope and observe the influence on hydrologic flow, resulting pseudokarst landforms along the slope face. Using electrical resistivity imaging, we identify the spatial distribution of the large scale clay unit and demonstrate the claypan confines flow generating discrete flow paths. Hydrologic data also demonstrates the presence of constrictions. The buildup of hydraulic pressure causes the development of springs and sinkholes at the surface through piping. This study demonstrates the importance of hydrologic heterogeneities along the sediment removal flowpath for pseudokarst formation. This differs from much of the literature that focuses on the initial release of particles from the rock matrix as the control on pseudokarst development.

Mazzio, K., Wilson, A.[1], Robinson, T.[2], Holmes, T.[1], and Kar, A[1].
Fort Valley State University[1] and University of South Florida[2]

USING GEOPHYSICAL RESISTIVITY METHOD AS TRAINING FOR URM STEM MAJORS OF FORT VALLEY STATE UNIVERSITY

Near surface geophysical measurements are performed by moving sensors across the Earth's surface. Active geophysical sensors transmit a signal into the earth and record a returned signal that contains information on the physical and chemical properties of the earth. This project introduced summer training interns at Fort Valley State University to the basics of geophysical data acquisition using two techniques that record variations in the electrical conductivity of the earth are electrical imaging (EI), and electromagnetic (EM) conductivity mapping. Electrical imaging is a galvanic geophysical approach whereby electrical contact with the earth is made directly via electrodes (typically metal stakes) that are inserted into the ground. EM conductivity mapping is a non-contact technique for measuring electrical conductivity are described. This study consisted of determining the presence of various objects of varying masses that may be located beneath a grassy area of Fort Valley State University's campus. The analyzed data provided a representation of conductivity and saturation in the surveyed area. Using the SuperStingTM with SwiftTM automatic and IP system, 56 electrodes were planted in a straight line with 1.5-meter distance between them. Once planted, a resistivity cable was wrapped around each electrode and an electromagnetic current was sent through each electrode for 45 minutes. The data received was then analyzed in ResIPy software to provide detailed imaging of the data that was collected. The data shown in ResIPy is displayed in the "DIPOLE-DIPOLE" and "WEINER" forms. The resistivity data indicates that there was a large boulder-like mass, in one image and three smaller masses in the other. Differences in the imaging demonstrate differences in detail when comparing the two resistivity methods.
In this NSF sponsored summer program, other than the hands-on experience with the resistivity geophysical method, the interns were also trained with Ground Penetrating Radar (GPR) techniques. Moreover they had opportunity to learn how to code with Python and Linux and explore Geoscience career pathways and end the summer with a service learning project.

McDonald, Chelsea[1], R. Bryant[2];
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ALLIANCE BUILDING OFFSHORE TO ADVANCE RESILIENCE AND DIVERSITY: THE All-ABOARD MODEL

Geoscientists have a unique responsibility to cultivate diversity among our ranks because access to understanding, appreciating and stewarding the Earth we all share must not be limited by social inequities. In geoscience, curiosity and inquiry are often sparked, fueled and sustained by experiences in the field or at sea. Unfortunately, field experiences can (1) be isolating or even dangerous for members of historically excluded groups, (2) have a reputation for perpetuating harm in the form of harassment, hazing, and assault, and (3) perpetuate toxic training environments by promoting ableism. However, the potential exists for field experiences to be transformative in a myriad of positive ways, including their unique potential for cultivating leadership, resilience, and intergenerational/interinstitutional networks of geoscientists. Alliance Building Offshore to Advance Resilience and Diversity (All-ABOARD) is a program designed to aid in community building and developing a shared understanding of key topics including inclusive science identity, vision and values, strategic priorities, and brave leadership. Using social media, we documented the journey of all our participants as they went on a week-long retreat attending workshops to advance on-campus diversity, equity, and inclusion goals. We found that many of the participants wanted to gain insight on how to promote DEI efforts in their institutions but didn't know where to start. Some, through their own experiences, also wanted to ensure that future generations didn't experience the same trials they had to go through. We conclude that action needs to be taken to reshape the environment in the field of geosciences. Through programs like All-ABOARD we can equip the next generation with the tools to combat social injustices to ensure that there will be more diversity in the geosciences. It also highlights the importance of outreach through social media to provide people outside our scope with the resources they need to promote DEI efforts and call everyone to action against social injustices.

McKenzie, Emory, M. French, S. Williams
Rice University

EVOLUTION OF MARINE SEDIMENTS ALONG THE SHALLOW MEGATHRUST

Along the subduction megathrust, the transition to seismogenic slip occurs at 100 to 150 C and the region updip hosts diverse modes of fault slip. This transition is thought to occur due to evolving material properties that result in rock strength and physical properties that promote seismicity but are poorly understood. The Sestola-Vidiciatico Tectonic Unit (SVTU) has been interpreted to represent an ancient analog of an erosive plate boundary shear zone at conditions near the up-dip limit of the seismogenic zone, up to ~150 C and ~5 km vertical depth. The SVTU accommodated the early Miocene convergence between the subducting Adriatic plate and within a meter scale shear zone with lateral and down-dip variations in lithology and deformation structures. With progressive burial and lithification near the basal decollement, deformation evolved from heterogeneous to homogeneous. Above the basal contact of the SVTU, there are multiple horizons of localized deformation that suggest an upward migration of the basal decollement. The location and occurrence of these horizons are assumed to be governed by local changes in rock strength. We study samples within and adjacent to the basal decollement from paleotemperatures between ~90 and ~150 C to investigate the compositional and textural changes experienced by marine sediments during deformation and diagenesis. We then infer how these may control changes in rock strength and localization near the up-dip limit of the seismogenic zone.

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ASSESSING HOLOCENE VEGETATIONAL DYNAMICS IN THE NORTHERN NEOTROPICS: A 9,500-YEAR PALYNOLOGICAL RECORD FROM LAKE IZABAL, EASTERN GUATEMALA

The role of plants in providing fundamental services to humans and the entire ecosystem cannot be overemphasized. Yet, anthropogenic and climatic forcing continues to threaten forest resilience at millennia to centennial time scales. This study is based on palynological analysis of a 7.6 m-long Lake Izabal core dated 9,500 cal yr BP based on extrapolation of eleven radiocarbon dates, comprising of ten terrestrial wood fragments and one mollusk fragment in the sediments. Pollen relative abundances reveal discrete patterns in the distribution of disturbance and forest taxa through time. We evaluated the changes in vegetation patterns at spatial and temporal scales across major anthropogenic and climatic cycles. The vegetation responses from our records have been contrasted with other proxy records within the northern Neotropics to assess the regional factors that drive variability in vegetation patterns. Interpretations from this work provide clues in developing best scientific and societal approaches for conservation and for protecting plant habitats.

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IMPROVING ACCESS TO WATER AND SANITATION FACILITIES IN THE INFORMAL SETTLEMENTS OF KAMPALA

Access to clean water and sanitation is a necessity essential to the dignity and safety of all people. However, many people in informal settlements still lack access to safe drinking water and safely managed sanitation services. The inadequacy leads to severe outbreaks of fatal diseases like cholera, malaria etc. Several Non-Governmental Organizations have started up different initiatives to improve access to water and sanitation facilities in Nakawa division. Actogether Uganda in its programs has tried to improve access to safe drinking water and provided security lights that has reduced sexual harassment cases of women in the area. Kampala Slum Transformation Initiative assessed the water and sanitation hygiene situation in Nakawa division to determine the level of service delivery. The objective of their assessment was to establish the current status of Water, Sanitation and Hygiene (WASH) and Knowledge, Attitudes and Practices (KAP) around water and sanitation using questionnaires. The data collected through the questionnaires contained valuable information about the status of water and sanitation facilities in informal settlements. However, it focused so much on people's perception and lacked geographical attributes and could not be used to assess their distribution on ground. Availability of up-to-date geo-spatial data will not only improve the quality and speed at which urban authorities make decisions but also enable them to determine areas with the highest priority and establish new water facilities in those areas. With a vision where all city residents have equal access to basic services, improving access to water and sanitation facilities can be expedited with the help of GIS. GIS together with other open-source data collection tools have been used to collect geospatial data of water and sanitation facilities, Physical data was collected on water and sanitation facilities that included toilets, water sources such as community taps, boreholes, wells, springs, with focus on the state of functionality, ownership of facility, amount charged at each facility among others. An analysis of collected data in GIS together with an MCDA method is used to assess the spatial distribution of existing facilities. This is aimed to enable adequate and equitable provision of water and sanitation facilities for the residents in the informal settlements.

Ohenhen, Leonard and M. Shirzaei
Virginia Tech

HOTSPOT FOR BUILDING COLLAPSE DUE TO LAND SUBSIDENCE IN THE COASTAL CITY OF LAGOS, WEST AFRICA

Every year incidents of building collapse claim many lives and cause enormous financial losses around the world, which are often blamed on low-quality materials, non-compliance with standards, lack of oversight, and failure to enforce building codes. Subsidence, the lowering of land elevation, affects most megacities worldwide and may result in severe damage to infrastructure. The risk to infrastructure from subsidence is primarily due to spatially uneven settlements over the extent of the structure. This inhomogeneous spatial subsidence causes an angular distortion, which may lead to the tilting, cracking, deformation, and failure of a building. Here, we highlight the role of land subsidence in triggering unprecedented collapses in the city of Lagos, Nigeria, which has reported over 200 casualties during 152 building failures since 2005. We used acquisitions from radar satellites for 2017 – 2021 and provided data that unequivocally link subsidence to foundation damage and high building failure risk in the region. We estimate that an area of 71 km 2 and ~3500 buildings are exposed to a high to very high risk of collapse.

Differential land subsidence can trigger building collapse, and the data presented here will enable authorities to create adequate building codes and standards and devise mitigation strategies.

Ojo, Folashade and O. Ademila
Women in Geosciences, Adekunle Ajasin University, Nigeria

ENGINEERING AND CHEMICAL CHARACTERISATION OF NATURAL BITUMEN RESOURCES FROM NIGERIA

Engineering and chemical properties of bitumen in Agbabu were evaluated for their suitability in road pavement construction. Raw samples of natural bitumen were collected in Agbagbu, Mile 2 and Mulekangbo, Ondo State, Nigeria. The engineering properties analysis involves bitumen penetration, flash and fire points, water content, loss on heating and specific gravity. Chemical evaluation includes analysis of heavy metals by the use of Atomic Absorption Spectroscopy (AAS) and analysis of Poly Aromatic Hydrocarbons (PAHs) using Gas Chromatography/Mass Spectrometer (GCMS). Agbabu and Mulekangbo bitumen samples fall within 200/300 penetration grade, classified as temperature susceptible bitumen, while samples of Mile 2 fall within 100/150 penetration grade, classified as conventional paving bitumen. Thus, Agbabu and Mulekangbo bitumen can be used in temperate regions of the world, while Mile 2 bitumen can best be applied in tropics, after upgrading by modifiers. The results of AAS indicate a high concentration of iron in the samples in the decreasing order of Fe<Zn<Cu<Mn<Pb<Ni. For Agbabu bitumen sample, the concentration indicates Fe (509mg/kg), Cu (14mg/kg), Pb (1mg/kg), Ni, Cd, and Mn are negligible, Mile 2 bitumen sample indicates Fe (8605 mg/kg), Zn (36mg/kg), Cu (35 mg/kg), Mn (27 mg/kg), Ni and Cd are negligible; for Mulekangbo bitumen sample: Fe (8905 mg/kg), Zn (48 mg/kg), Cu (39mg/kg), Mn (37 mg/kg), Pb (7 mg/kg), Ni (1 mg/kg) and Cd is negligible. Metals like Pb, Ni, Cd, even though present in small concentration can cause environmental hazard. GCMS analysis revealed high percentage of PAHs such as chrysene, Pyrene, Fluorene, Phenanthrene and Anthracene in Mulekangbo can be carcinogenic and mutagenic, thus exposure to these compounds can pose health/environmental risks. This study recommends clean technology during refining process to remove hazardous PAHs from the bitumen to prevent human and environmental health challenges during utilization.

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CHARACTERIZING HUMAN HEALTH RISKS FROM FECAL COLIFORM EXPOSURE IN URBAN WATERWAYS IN INDIANAPOLIS DUE TO STORMWATER RUNOFF

Combined Sewage Overflow (CSO) Systems collect domestic sewage, industrial waste, and rainwater into a combined system. Indianapolis, like many cities in the US, has an outdated and undersized CSO system that can result in raw sewage released into waterways after as little as ¼" of rainfall. A major stormwater infrastructure upgrade is currently underway to mitigate this issue, but in the meantime, local waterways suffer the burden of frequent pathogenic bacterial input from sewage. We hypothesize that a significant proportion of the fecal coliform present in urban waterways in Indianapolis is human-related E. Coli along with associated fecal pathogens that persist in waterways well after CSO outflow events. Our research looks at how different climatic variables influence fecal coliform density in urban waterways. Additionally, we will use 16s rRNA sequencing technology to characterize and quantify the microbial community present at the taxa and species levels. The information collected may help to identify the different animal sources and potential toxicity of these pathogens and human health risks associated with this urban waterway affected by CSO input. Current data shows that there is an increase in the fecal coliform levels present in the Pleasant Run Waterway after CSO overflow events. This data can be used to inform waterway recovery trajectories in the future, an outcome that will benefit the hundreds of other cities around the US undergoing similar conversions.

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THE TSU WETLAND PROVIDES RESEARCH AND EDUCATION VALUE

Tennessee State University is an HBCU and a land grant college in Nashville, TN. The Cumberland River borders the campus' sizable research farm which has a 30-acre wetland and has served as the subject of numerous graduate and undergraduate research projects for over 20 years. Urban water resource issues are brought about by human-induced environmental factors, such as the degradation of water quality and significant changes to biogeochemical cycles. The wetland was valued for water quality and ecosystem services. The studies first focused on urban storm runoff and water quality influenced by wetland processes. The project list extended as the wetland developed and now includes research on aquatic ecology and hydrology. A current study is focusing on harmful algal blooms that have occurred in the wetland the past 5 summers. This summer, incoming freshmen were given the chance to learn about wetlands and engage in real research through a bridge program called Summer Apprentice Program. The five students engaged in three weeks of research with assistance from faculty members and undergraduates in order to learn and be exposed to earth and environmental sciences. Students gained knowledge on safe water sample collection techniques as well as how to investigate aquatic plants, quantify microcystin algal toxin, capture and measure turtles, and assess field factors. The students learned how aquatic plants are different from terrestrial plants, that snail shells provide a solid historical record of algal toxin, and that wetlands have significance for biodiversity and water quality.

Samuel, Delton Catchings, R.D., Goldman, MR., Chan, J.H., Criley, C.J., Gomez, A.J, and Pina, A.R. U.S. Geological Survey, Earthquake Science Center, P.O. Box 158, Moffett Field, California 94035

Vs $_{30}$ Site Characterization in the Hayward Hills, San Leandro, California, Using Multiple Methods

We evaluated Vs30 near a strong-motion recording site (SLR; 37.718014, -122.096655) at Lake Chabot Regional Park in San Leandro, California, using data recorded on a 120-m-long linear array of 60 nodal seismometers with 2 m spacing and co-located seismic sources, generated with a hammer and plate combination. Compressional and Rayleigh waves were generated by vertically striking an aluminum plate, and shear- and Love waves were generated by horizontally striking an aluminum block tethered to the ground. Two-dimensional shear-wave velocity (Vs) models were developed using refraction tomography on S waves and the Multi-Channel Analysis of Surface Waves (MASW) method on Rayleigh and Love waves. Vs30 was evaluated along the entire length of the seismic profile, and we find it ranges from 489 to 840 m/s. For the seismometer nearest to the strong-motion recording site, Vs_{30} estimates are ~682 m/s from S-wave refraction tomography, ~682 m/s from Rayleigh-wave MASW and ~759 m/s from Love-wave. All measurements indicate that the site has a NEHRP classification of Class C (soft rock), consistent with expectations of local lithology (Jurassic shale, sandstones, conglomerates and limestones). We also developed Vp, Vp/Vs ratio and Poisson's ratio models along the seismic profile. Vp ranges from 500 m/s to 4500 m/s, with groundwater (1500 m/s) inferred at about 13m depth. Vs along the profile ranges from 300 m/s to 1500 m/s, Vp/Vs ratios range from about 2.0 to 2.5 and Poisson's ratios range from 0.30 to 0.42. Rayleigh wave and topographic tomography models are similar; however, Love wave MASW tomographic models differ.

Sanks, Joyce [1,2,3] and Rachel Racicot [1,2]

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ECOLOGY & ECHOLOCATION ABILITIES IN PARAPONTOPORIA

Analyses of the cetacean (whale and dolphin) inner ear provide glimpses into the ecology and evolution of extinct and extant groups. The paleoecology of the odontocete (toothed whale) group, Parapontoporia, is primarily marine with depositional context also suggesting freshwater tolerance. As an extinct relative of the exclusively riverine Lipotes vexillifer, Parapontoporia provides insight into a transition from marine to freshwater environments. High-resolution X-ray CT scans (~3 microns or less) of three individual specimens from two species, P. sternbergi and P. pacifica, were acquired. Digital endocasts of the inner ear labyrinths were extracted non-destructively using the software VGStudioMax v. 3.5.2. Nine measurements of the cochlea including secondary bony lamina length, semicircular canal length, height, width, and fenestra cochleae surface area were added to an existing dataset covering 103 terrestrial and aquatic artiodactyls. These measurements were then subjected to a Principal Component Analysis (PCA) to interpret hearing sensitivities among other artiodactyls. From an analysis of the specimens, Parapontoporia was not likely to have been a narrow-band high frequency (NBHF) echolocator, and differences in cochlear length demonstrate intraspecific and interspecific variation. The semicircular canals were measured for comparison with previous work, highlighting a longer lateral canal, as expected compared with other odontocetes. Studying the inner ear of Parapontoporia will help inform on the ‘river dolphin’ transitions from marine to riverine environments.

St. Rose , Ayanna and K. Naithani
University of Arkansas

Multi-Trophic Biodiversity Increases with Increasing Structural Complexity of Forest Canopy

Understanding the effects of forest canopy structural complexity on multi-trophic diversity is critical for conserving biodiversity and managing land sustainably. But multi-trophic diversity is often ignored when making decisions about land management due to lack of cost- and time-effective methods to evaluate it. Here, we explored a new method based on widely available remote sensing data to quantify canopy structural complexity and its relationships with multi-trophic biodiversity at landscape scale using 32 forested sites of the National Ecological Observatory Network. We investigated the influence of vertical and horizontal structural complexity of forest canopy on multi-trophic (primary producers (plants), herbivores (beetles), and omnivores (birds)) diversity in 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 show that species richness and diversity across all trophic levels generally increase with increasing vertical and horizontal structural complexity with highest diversity at intermediate levels of structural complexity, but these relationships differ across different forest types (deciduous, mixed, and evergreen). Our results highlight the importance of maintaining structural complexity in forest canopies for conserving multi-trophic biodiversity.

The wetland studies provided a variety of experiences that influenced their opinion of environmental sciences and choice of majors. Some students preferred outside activities, others felt more comfortable in the lab. But everyone concurred that it was a fantastic, eye-opening experience. Several students changed their majors to environmental sciences as a result of the experience learning. We continue to do research at the wetland while also giving students a chance to learn about earth and environmental sciences. This program shaped incoming students; laboratory skills and strengthened their research experience. Experiential learning has facilitated important advancements in curriculum development and reform, teaching students who have learning challenges, comprehending individual differences and learning preferences, and customizing teaching strategies to meet the requirements of specific students. This program provided students with valuable hands-on experience, skill development, field and lab work, and the opportunity to network with student peers, faculty and U.S. Geological Survey professionals.

Williams, Spencer, T. Carr
West Virginia University

REGIONAL CORRELATION AND DEPOSITIONAL HISTORY USING WELL LOG AND CORE DATA OF THE GENESEO BURKET FROM THE POSEIDON 8M WELL, WESTMORELAND COUNTY PA, USA

Natural gas producers have invested billions of dollars in Pennsylvania and West Virginia to establish significant gas production from the Devonian Marcellus Shale and the deeper Ordovician Utica-Point Pleasant interval. In addition, commercial gas production has been reported from several other Devonian shale units in the Appalachian region, including the Rhinestreet, Levanna, and Geneseo-Burket. The Marcellus Shale is the largest natural gas play in the United States. The Marcellus is located directly under the Mahantango and Tully Limestone formations with a gross thickness of organic-rich shale in the subsurface from less than 10 feet in eastern Ohio to around 100 feet in north-central West Virginia and several hundred feet in central and northeastern Pennsylvania. The Geneseo-Burket shale is similar to the Marcellus as one of the most highly radioactive and organic-rich of the Devonian shale units, yet little is known of the stratigraphic distribution, depositional history, and gas production. In the future, the Geneseo-Burket could be an explicit exploration target. The main objective of this research is to examine the geologic characteristics of the Geneseo-Burket shale that will ultimately allow an assessment of the depositional history, the stratigraphic distribution across the basin and ultimately the potential for hydrocarbon resources.

This study uses several well logs to conduct a petrophysical evaluation of the Geneseo-Burket shale, primarily located in West Virginia and Pennsylvania. The contact of the Geneseo-Burket shale is examined with the underlying Tully Limestone and the overlying contact with the Lodi Limestone and organic-lean Penn Yan Shale. These contacts are compared to a similar and more widely examined stratigraphy located deeper in the subsurface between the organic-rich Marcellus Shale and the overlying organic-lean Mahantango Shale and underlying Onondaga Limestone. In this research we find that in the Poseidon 8M well, the organic-rich Geneseo-Burket shale is similar in mineralogy to that of the Marcellus Shale, and may be the result of geochemical changes in the water column.

Field Trip Guide

Active Faults & Subsidence in Houston, Texas

Dr. Shuhab Khan - Professor of Geology

University of Houston

Numerous growth faults are known, mapped, and active in the Gulf Coast region. In the greater Houston area, groundwater and hydrocarbon withdrawals during the 20th and 21st centuries resulted in up to 3 m of subsidence along these faults. The NABG 2022 Annual Field Trip will visit several locations in the Houston area where active subsidence along growth faults is evident. The field trip ends at the Baytown Nature Center where a 20th century community was abandoned due to subsidence and severe flooding following Hurricane Alicia (1983).

Dr. Shuhab Khan is a geology professor and advisor at the University of Houston, Texas, within the Department of Earth and Atmospheric Sciences. He earned his doctorate degree at the University of Texas, Dallas, in 2001. He uses quantitative remote sensing and geophysical tools for tectonic studies. His research involves field observations, geomorphic and structural measurements, application of LiDAR, satellite radar interferometry (InSAR), GPS and geochemistry to a wide variety of Earth Science problems.

Field Trip Stops: 1. Moorhead Drive, Houston, TX 77055; 2. Pecanwood Lane, Hedwig Village, TX 77024; 3. Baytown Nature Center, Baytown, TX 77523

FULL TRIP GUIDE IS AVAILABLE HERE