“NAVIGATING THE UNKNOWN”
39TH ANNUAL
TECHNICAL CONFERENCE

THE NATIONAL ASSOCIATION OF BLACK GEOSCIENTISTS
10-11 September 2020
National Science Foundation awards supported over 400 unique student participants almost 700 times since 2009;

38% of participants are employed in the national Geosciences workforce, a sector of critical national need;

33% 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 (>70) expressed interest to participate in this virtual conference;

Student participants to the 39th Annual Technical Conference of the National Association of Black Geoscientists supported by National Science Foundation (#EAR-1935782).

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™
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 multi-tasking. 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.

Be ready for poll questions. There will be periodic audience polling to gain input from attendees.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welcome from NABG President</td>
<td>6</td>
</tr>
<tr>
<td>Notes from 2020 Conference Chair</td>
<td>7</td>
</tr>
<tr>
<td>The Birth of the NABG</td>
<td>8</td>
</tr>
<tr>
<td>NABG Leadership</td>
<td>10</td>
</tr>
<tr>
<td>2020 Scholarship Recipients</td>
<td>12</td>
</tr>
<tr>
<td>Keynote Speaker</td>
<td>13</td>
</tr>
<tr>
<td>Conference Agenda</td>
<td>14</td>
</tr>
<tr>
<td>Speaker Biographies and Session Descriptions</td>
<td>16</td>
</tr>
<tr>
<td>Abstracts</td>
<td>23</td>
</tr>
<tr>
<td>Sponsors and Exhibitors</td>
<td>34</td>
</tr>
</tbody>
</table>
Letter from the President

On behalf of the conference planning committee, organization leadership and membership, it is with great pleasure that I welcome you to the 39th annual conference of the National Association of Black Geoscientists (NABG). In the face of a global pandemic and social unrest affecting all of us, our conference planning committee has worked to create a virtual forum to ensure that we continue to remain connected.

Since its inception, NABG has collaborated with entities in academia, industry and government. These relationships have always been a key part of the NABG’s DNA and will be no different at this year’s virtual conference. As in previous years, there will be representatives present from various aspects of the Geosciences. Having a broad base of membership has allowed NABG to continue to progress, evolve and flourish as an organization over its 39 year history. This year’s theme “Navigating the Unknown” is directed towards not only the scientific challenges that lie before us, but it also addresses some of the social and other unforeseen challenging situations that lie just beyond the horizon. Not only is the nation battling Covid-19, businesses are in shambles, jobs are scarce to non-existent, and the country is plagued by a derisive political situation in an election year.

We have chosen to maintain some degree of normalcy by doing what we do as well as or better than any other organization… we bring you home. This is where you are yourself. This is where you share the scientific you as well as the whole you. The organization’s desire is to reach students, young professionals, experienced professionals and retirees and connect them so they can help each other along their journey.

Whether you are a student, technical professional, professor or researcher, there is no question that being a part of this virtual conference will present you with an opportunity to further your career pursuits in the Geosciences. I am truly pleased that you have chosen to join us this year for what promises to be a unique and challenging conference.

Sincerely,
H. Jerome Murphy President of NABG
Geoscience Resource Advisor
ExxonMobil
The NABG Conference Planning Committee has been hard at work to insure that this year’s conference is as rewarding as all of our conferences. The NABG welcomes Students, Educators, Industry Partners, Government Agencies, and additional Sponsors and Supporters to the 39th Annual Technology Conference of the National Association of Black Geoscientists “Navigating the Unknown”. Today we find ourselves in an obscure and uncertain world. There are a multitude of factors that we just cannot control. However, we can shift our energy, remain determined, demonstrate persistence, and work to create value where there appears to be none.

This year’s conference may not follow our normal intended pathway, but it can still get us to where we want to go. The journey to our destination will lead us through a virtual meeting format that will still allow the distribution of scientific knowledge, the dissemination of key information, networking, and peer and mentor contact. This is definitely not a time for the NABG to relax. The planning committee knows from experience that nothing will fall into place unless you work on it, and that today’s issues are not the end of the line. Things will get better because we will continue forge ahead in the right direction.

Let’s not forget we are still confronted with topical situations related to Sustainability, Carbon Sequestration, Induced Seismicity, Natural Hazards, Water Usage and Draught, as well as other environmental concerns. There are still scientific issues that need attention and resolution. The geoscience workforce is still shrinking due to large scale retirements, attrition, and other factors. The NABG has to continue being a voice that expounds on the expanse and dynamic range of our profession and its relationship to all of the sciences. The planning committee is committed to work against the intrinsic factors that would cause a disproportionate loss of underrepresented geoscientists during the tough times.

So let’s stay close, continue to connect with one another, navigate this bumpy road together, and prop each other up when we have the opportunity. This conference is important when you choose to participate.

Best Regards,
Michael J. Carroll
NABG 2020 Conference Chair
Board Member
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

<table>
<thead>
<tr>
<th>Role</th>
<th>Name</th>
<th>Institution</th>
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<tbody>
<tr>
<td>President</td>
<td>Jerome Murphy</td>
<td>ExxonMobil</td>
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<tr>
<td>Vice President</td>
<td>Chris Burrell</td>
<td>Ecolab</td>
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<tr>
<td>Secretary</td>
<td>Tomieka Searcy</td>
<td>BP</td>
</tr>
<tr>
<td>Treasurer</td>
<td>Shaun Washington</td>
<td>BHP Billiton</td>
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<tr>
<td>Parliamentarian</td>
<td>Tarik Bob</td>
<td>Texas A &amp; M</td>
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<tr>
<td>Member at Large</td>
<td>Roxanne Lamb</td>
<td>US Geological Survey</td>
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<tr>
<td>Member at Large</td>
<td>Ashanti Johnson</td>
<td>University of Texas</td>
</tr>
<tr>
<td>Assistant Secretary</td>
<td>Leiaka Welcome</td>
<td>Colorado School of Mines</td>
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<tr>
<td>Assistant Treasurer</td>
<td>Cherie Lee</td>
<td>BP</td>
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<tr>
<td>Previous President</td>
<td>Michael Carroll</td>
<td>Hunt Oil - Retired</td>
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</tbody>
</table>

# Advisory Board

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
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<tbody>
<tr>
<td>Dr. Stephen K. Boss</td>
<td>University of Arkansas</td>
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<tr>
<td>Mr. Michael J. Carroll</td>
<td>Hunt Oil – Retired</td>
</tr>
<tr>
<td>Dr. Isaac J. Crumbly</td>
<td>Fort Valley State University</td>
</tr>
<tr>
<td>Dr. David Padgett</td>
<td>Tennessee State University</td>
</tr>
<tr>
<td>MS. Rachel Dunn</td>
<td>TATNET</td>
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<tr>
<td>Ms. Carolyn Jones</td>
<td>Mariner Energy – Retired</td>
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<tr>
<td>Dr. David Padgett</td>
<td>Tennessee State University</td>
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<tr>
<td>Dr. John Leftwich</td>
<td>Haliburton – Retired</td>
</tr>
<tr>
<td>Ms. Nicole Scott</td>
<td>ExxonMobil</td>
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<tr>
<td>Mr. Reginal Spiller</td>
<td>Azimuth Energy</td>
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<tr>
<td>Dr. Marilyn Suiter</td>
<td>National Science Foundation</td>
</tr>
<tr>
<td>Dr. Wesley Ward</td>
<td>US Geological Survey – Retired</td>
</tr>
<tr>
<td>Mr. Elijah White</td>
<td>ExxonMobil- Retired</td>
</tr>
<tr>
<td>Mr. Darryl Willis</td>
<td>Microsoft</td>
</tr>
<tr>
<td>Mr. Ken Yarbrough</td>
<td>Osyka Exploration – Retired</td>
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**NABG Extended Leadership Group National Committee Chairpersons**

<table>
<thead>
<tr>
<th>Role</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020 Annual Conference</td>
<td>Michael Carroll</td>
</tr>
<tr>
<td>Scholarship Committee</td>
<td>Roxanne Lamb</td>
</tr>
<tr>
<td>Outreach Committee</td>
<td>Nicole Scott</td>
</tr>
<tr>
<td>Young Professionals</td>
<td>Janelle Sherman</td>
</tr>
<tr>
<td>Membership</td>
<td>Elizabeth Watkins</td>
</tr>
<tr>
<td>Technical Programs</td>
<td>Steve Boss</td>
</tr>
<tr>
<td>Fundraising</td>
<td>Steve Boss and Michael Carroll</td>
</tr>
<tr>
<td>Webmasters</td>
<td>Tomieka Searcy and Judy Wilson</td>
</tr>
</tbody>
</table>

**Regional Coordinators**

<table>
<thead>
<tr>
<th>Region</th>
<th>Name</th>
</tr>
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<tbody>
<tr>
<td>Eastern Region</td>
<td>Ibrahim Goodwin</td>
</tr>
<tr>
<td>Western Region</td>
<td>Zelma Maine-Jackson</td>
</tr>
</tbody>
</table>
Congratulations to our 2020 National Association of Black Geoscientists scholarship recipients!

<table>
<thead>
<tr>
<th>Candidate</th>
<th>University or College</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elijah Olusola Adeniyo</td>
<td>Montana State University</td>
</tr>
<tr>
<td>Barnabas Adeyemi</td>
<td>Kansas State University</td>
</tr>
<tr>
<td>Adedoyin Adeyilola</td>
<td>Central Michigan University</td>
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<tr>
<td>Adeniyi Ajobiwe</td>
<td>University of Kansas</td>
</tr>
<tr>
<td>Abiodun Emmanuel Ayo-Bali</td>
<td>University of Texas at El Paso</td>
</tr>
<tr>
<td>Dalila Armanda de Jesus</td>
<td>University of Oklahoma</td>
</tr>
<tr>
<td>Olajide A. Disu</td>
<td>Georgia State University</td>
</tr>
<tr>
<td>Olubukola Adedotun Ishola</td>
<td>Oklahoma State University</td>
</tr>
<tr>
<td>Christa Koki</td>
<td>Georgia State University</td>
</tr>
<tr>
<td>Jasmine Renee Nelson</td>
<td>University of Texas at Austin</td>
</tr>
<tr>
<td>Oluwatosin Obe</td>
<td>Middle TN State University</td>
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<tr>
<td>Uruowhe Bernard Oghenefejiro</td>
<td>Georgia State University</td>
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<tr>
<td>Oyewande Ojo</td>
<td>Oklahoma State University</td>
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<tr>
<td>Pauline Adaobi Onema</td>
<td>Lincoln University</td>
</tr>
<tr>
<td>Tobi Ore</td>
<td>West Virginia University</td>
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<tr>
<td>Christophe Wakamya Simbo</td>
<td>Colorado State University</td>
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<tr>
<td>Wesmond Cavenaugh Williams</td>
<td>Midwestern State University</td>
</tr>
<tr>
<td>Kierra Wilk</td>
<td>Rensselaer Polytechnic Institute</td>
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</table>
NABG 2020 Conference Keynote Speaker

**A. Wesley Ward, JR.; Ph. D.**

Dr. Ward was born in Chicago, IL, and is a retired Federal Senior Executive, who achieved his primary life goals and now continues, through executive leadership, to help individuals and organizations attain their goals.

He is currently serving as chair of the Board of Trustees of the Geological Society of America Foundation, from 2016-2021. He has been a part of the foundation since 2011 and will serve until 2022. His immediate past positions include being the U. S. Geological Survey Regional Geologist, Western United States (Senior Executive Service), from 2003 to 2008. During that time Dr. Ward oversaw all Federal geologic activities in nine western states and collaborated with other federal, state, tribal, and local agencies in program development and resource sharing. His accomplishments include establishing a fully integrated Science Center in Tucson, Arizona, developing and leading a new multi-agency, multidisciplinary research in Climate, Oceans, and Geologic Hazards programs. In addition he developed successful collaborative projects with universities, state agencies, other federal agencies, Native American Tribes, and various interest groups such as the Desert Managers Group and Southwest Strategy.

From 1996 to 2003 he was the Astrogeology Program Chief of the Planetary Geology Program, U. S. Geological Survey, tasked with overseeing national multi-million-dollar science operations, cartography and image-processing programs within the NASA Solar System Exploration Program. Dr. Ward successfully rebuilt lagging programs with post-docs and outside hires, increased agency participation in planetary missions, served as Geology Team Leader on Mars Pathfinder Mission (1996-97), increased program funding, designed and built a new research center, museum, and library. From 1994 to 96 he was the Flagstaff Science Center Chief Scientist, where in addition to other responsibilities he served as the Southwest Region Coordinator for Minority Participation in the Earth Sciences.

He is a U.S. Army veteran who served in the Air-defense Artillery (1967-70). An Expert rifleman and Qualified Missile-man, he is a recipient of the Vietnam-era Service Ribbon and Good Conduct Medal. His formal education includes a Geological Sciences Ph. D. in Geomorphology and Planetary Geology obtained from the University of Washington in 1978. His Master of Science Degree also from the University of Washington involved a concentration in volcanism. He received his Bachelor of Science Degree in Geology, with a minor in Biology from Washington State University in 1973.

Dr. Ward has been a leader or member of 40 national and international advisory boards, scientific symposia, and educational television programs (Discovery Channel, Japanese TV) since 1979. He has been a member of over two dozen community or regional arts and sciences boards of directors since 1980. In addition, he has been a member of several national professional societies since 1973, often serving as an officer or committee chair. He has been the recipient of sixteen major professional awards for leadership, and personal and scientific achievements.
# NABG 2020 Full Conference Agenda

**Thursday, 10 September 2020**  
**Central Daylight Time**  
*All sessions are virtual*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session Details</th>
<th>Speaker(s)</th>
</tr>
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<tbody>
<tr>
<td>11:00 AM-11:15 AM</td>
<td>Conference Welcome and Opening Remarks</td>
<td>Jerome Murphy</td>
</tr>
<tr>
<td>11:15 AM – 11:30 AM</td>
<td>Conference Logistics</td>
<td>Tramond Baisden</td>
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</tbody>
</table>
| 11:30 AM -12:00 PM | National Science Foundation                         | Luciana Astiz  
|                  |                                                       | Lina Patino  
|                  |                                                       | Brandon Jones                      |
| 12:00 PM – 12:40 PM | Panel Discussion Navigating the Unknown          | Sherilyn Williams-Stroud  
|                  |                                                       | Elijah White  
|                  |                                                       | Lisa White  
|                  |                                                       | Eleanor Snow                       |
| 12:40 PM – 1:00 PM | Lunch Break                                         |                                   |
| 1:00 PM – 2:00 PM | Exhibitor Showcase                                   |                                   |
| 2:00 PM – 2:15 PM | Break                                                |                                   |
| 2:15 PM – 2:55 PM | Panel Discussion Leadership Science Agencies        | Torry A. Johnson  
|                  |                                                       | Dave Applegate  
<p>|                  |                                                       | Noel D. Blackburn                  |
| 2:55 PM – 3:55 PM | Poster Session                                       |                                   |
| 3:55 PM – 4:05 PM | Closing Remarks and Reminder of Friday Schedule     | Michael Carroll                   |
| 4:30 PM – 5:30 PM | Virtual Happy Hour                                   |                                   |</p>
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<thead>
<tr>
<th>Time</th>
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<td>10:30 AM-10:40 AM</td>
<td>Conference Logistics</td>
<td>Dada Olamide</td>
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<tr>
<td>10:40 AM – 11:00 AM</td>
<td>No Time for Silence</td>
<td>Lisa White</td>
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<tr>
<td>11:00 AM - 12:00 PM</td>
<td>Poster Session</td>
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<tr>
<td>12:00 PM – 12:30 PM</td>
<td>BP: Interview and Resume Skills</td>
<td>Rebecca Wright</td>
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<tr>
<td>12:30 PM – 1:00 PM</td>
<td>Lunch Break</td>
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<tr>
<td>1:00 PM – 2:00 PM</td>
<td>Challenges Confronting Geosciences Graduates</td>
<td>NABG</td>
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<tr>
<td>2:00 PM – 2:15 PM</td>
<td>Break</td>
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<tr>
<td>2:15 PM – 3:00 PM</td>
<td>Keynote Address</td>
<td>A. Wesley Ward Jr.</td>
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<tr>
<td>3:00 PM – 3:10 PM</td>
<td>Poster Awards</td>
<td>Steve Boss</td>
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<td>Jerome Murphy</td>
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<tr>
<td>3:10 PM – 3:20 PM</td>
<td>Scholarship Announcements</td>
<td>Roxanne Lamb</td>
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<td></td>
<td>Jerome Murphy</td>
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<tr>
<td>3:20 PM – 3:30 PM</td>
<td>Technical Wrap Up and Closing</td>
<td>Jerome Murphy</td>
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<td>Michael Carroll</td>
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National Science Foundation Opportunities

The National Science Foundation (NSF) is an independent federal agency created by Congress in 1950 "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense…” Dr. Lina Patino and Dr. Luciana Astiz will provide an overview of NSF programs, especially those that are based in the Geosciences and the Education and Human Resources Directorates, particularly those programs that provide funding opportunities for early career scientists and students. In addition, we will discuss the review criteria and characteristics of successful proposals. Finally, we share information about opportunities for students and scientists to join NSF for temporary and permanent job opportunities. Several program directors will be available to address questions from the audience.

Panel Discussion: “Navigating the Unknown”

The conversation will be directed towards sharing the experience and insights of professionals that have demonstrated a focus and commitment to success. The values related to that type of focus is what is required of our young scientists because of the circumstances that they face today. Each of the panelists has worked through issues during the course of their respective careers and can shed insight on navigating unsure situations.

Elijah White, Jr. - Retired
Vice President - Geoscience
ExxonMobil Upstream Research Company

Elijah White, Jr. retired March 1, 2019 after a 35+ year career with ExxonMobil. A native of Wilson, North Carolina, Mr. White earned his Bachelor of Science in Geology from Elizabeth City State...
University in 1981 and a Master’s of Science in Geology from The University of North Carolina in 1984 before joining the company in Houston as a research geoscientist.

After an original assignment in the Research Company, Elijah moved to Exxon’s Exploration Company where he served as the technical team lead in the Asia Pacific Project. Since then he has served in ExxonMobil’s Exploration Company, Development Company, Production Company and Upstream Research Center in a variety of individual contributor and leadership roles, including Exploration Vice-President for the Africa Region, Geoscience Vice-President of the Production Company and most recently as the Geoscience Vice-President for the Upstream Research Company.

As geoscience vice president of ExxonMobil Upstream Research Company, Elijah lead the Corporation’s worldwide geoscience research function and the application of differentiating and proprietary technology in support of ExxonMobil’s global upstream operations.

Elijah is a member of the American Association of Petroleum Geologists, the National Association of Black Geoscientists, the Executive Leadership Council, and Sigma Pi Phi Fraternity. He currently serves on the board of Inspiration Ranch and is the Co-Chair of a Board Advisory Committee for the School of Arts and Sciences at the University of North Carolina. He most recently served on the UNC Arts and Sciences Foundation Advisory Board, The Texas A&M Energy Institute External Advisory Board, as well as a Trustee of the ExxonMobil Foundation. Within ExxonMobil he is a past president of the Black Employee Success Team. He also was a board member for 3 years for the United Cerebral Palsy of Greater Houston.

Lisa D. White—Museum of Paleontology,
University of California, Berkeley

Dr. Lisa D. White is Director of Education at the Museum of Paleontology at the University of California, Berkeley. Past positions held include Professor of Geosciences at San Francisco State University, Geosciences Department Chair, and Associate Dean of the College of Science and Engineering at San Francisco State University. Dr. White has extensive experience with science education programs for underrepresented students and she is active in efforts to increase diversity in the geosciences. A micropaleontologist by training and Fellow of the California Academy of Sciences and the Geological Society of America, Dr. White was the inaugural recipient of the GSA Bromery Award for Minorities. As Chair of the American Geophysical Union Diversity and Inclusion Advisory Committee, Dr. White works to create a culture that embraces diversity and respect in the advancement of Earth and space sciences. As the education director at the Museum of Paleontology, she develops and disseminates learning materials on evolution and the fossil record, virtual geological field experiences, and the nature and process of science. Dr. White holds degrees from San Francisco State University (B.A. in Geology) and the University of California at Santa Cruz (Ph.D. in Earth Sciences).
**Sherilyn Williams-Stroud, Ph.D., PG**

**Illinois State Geological Survey**

Dr. Williams-Stroud is a Research Scientist/Structural Geologist, at the Illinois State Geological Survey/University of Illinois Urbana-Champaign and also the President & CEO of California-based Confractus Inc. Her areas of expertise include structural and fracture analysis and modeling for oil and gas and geothermal energy production, with a specialization in microseismic data interpretation and induced seismicity. She has extensive experience in applied research and development in government and in industry and is the co-author of a patented methodology to integrate microseismic data into geologic interpretations for fracture modeling of microseismic results for use in reservoir simulation. In addition to teaching industry short courses, she has held adjunct positions at the University of Houston, California State University at Los Angeles and Northridge, and was a full-time faculty member at Whittier College. She was a member of the National Academies of Sciences, Engineering, and Medicine (NASEM) Committee on Seismology and Geodynamics from 2015 through 2018.

Dr. Williams-Stroud started her research career at the USGS and has previously held the position of Chief Geologist at MicroSeismic Inc, Sr. Geological Advisor at California Resources Corp/Occidental Oil & Gas, GeoTeam Leader at Midland Valley, and Sr. Research Scientist at Chevron. She received her MA and PhD from The Johns Hopkins University and her BA from Oberlin College, has authored and coauthored dozens of papers in her areas of expertise and has enjoyed giving talks as an AAPG Visiting Geoscientist since 2014.

**Eleanour Snow**

**U.S. Geological Survey**

Eleanour Snow's first job as a geologist was as an intern at USGS in the Earthquake group, working on the Parkfield project during her undergraduate program at Pomona College. From there, Eleanour earned her PhD at Brown University in the field of mineralogy and microstructural geology. She spent 28 years in academia, starting at University of Arizona, where she was the first women on the faculty in geology, then to University of South Florida. In 2005 her family moved to Austin Texas, and she began working at the University of Texas at Austin first with teacher professional development in geosciences, and then with an outreach program for rural and urban high school students in Texas. GeoFORCE Texas targeted mostly first-generation students, mostly minority, from challenged school districts, with the goal of helping bright high school students graduate from high school and go to college, especially in STEM fields. Through this work, she became reacquainted with USGS, and when a position opened up in Youth and Education, she came back to where she started, this time in Reston VA.
The Youth and Education in Science (YES) program has a diverse portfolio encompassing everything from STEM outreach to graduate student internships. In addition, Eleanour represents USGS and DOI on several federal committees in the field of STEM education.

**Panel Discussion: Federal Science Agencies**

Attendees will gain improved understanding of the role that geoscientists play in several federal agencies. Each of the three panelists will provide a brief review of their position and background, and while all are not geoscientists, they all manage science staff. They will address the recent patterns of their agencies for (diversity) hiring with some focus on opportunities for geoscience internships and hiring.

**Torry A. Johnson** is the Program Manager for the Minority University Research and Education Project (MUREP) within NASA’s Office of STEM Engagement. There he works to engage underrepresented, underserved communities in STEM by designing competitive research solicitations for Minority Serving Institutions (MSI) and promoting overall STEM awareness/opportunities at conferences, competitions, festivals, and workshops around the country. Torry is focused on developing strategic partnerships that ultimately lead to greater student engagement in STEM disciplines.

For over 15+ years Torry worked at NASA’s Goddard Space Flight Center in Greenbelt, MD. There he functioned as the Assistant Deputy Director in Earth Sciences and had operational oversight of the Hydrosphere, Biosphere and Geophysics organization within the Earth Science Division. His purview extended to multiple, research-based cooperative agreements and support service contracts, office space and technical facilities, education and public outreach and broadly focused Information Technology efforts.

Torry was appointed, trained, and served as an organizational Ombudsman to aide colleagues with conflict resolution, professional coaching and mediation. Prior to joining NASA, Torry worked in the private sector with such companies as Allstate, USA Today and the TriZetto Group. Business and financial analysis were his specialty areas.

Outside of the office, Torry volunteers on the board of a non-profit focused on developing low-income housing for seniors and supports community-based organizations with student mentoring and tutoring in addition to leadership and board coaching. Torry received his bachelor’s degree from Syracuse University and his master’s degree in public management, with an emphasis on leadership, from the University of Maryland, College Park.

Currently, Torry and his wife Jodie live in the Washington, DC. area. They are the proud parents of three adult children.
Dave Applegate is the Associate Director for Natural Hazards. In that role, he leads USGS hazards planning and response activities and oversees the Coastal & Marine Geology, Earthquake Hazards, Global Seismographic Network,Geomagnetism, Landslide Hazards, and Volcano Hazards Programs. He co-chairs the interagency Science for Disaster Reduction working group and co-leads the Department of the Interior’s Strategic Sciences Group. Applegate came to the USGS in 2004 as the first Senior Science Advisor for Earthquake and Geologic Hazards.

In addition to his USGS duties, Applegate is an adjunct full professor in the University of Utah's Department of Geology and Geophysics. He is a fellow of the American Association for the Advancement of Science and the Geological Society of America and is a past president of the Geological Society of Washington.

Prior to joining the USGS, Applegate spent eight years with the American Geological Institute federation of geoscience societies, where he directed science policy and served as the editor of Geotimes. Applegate has also served with the U.S. Senate Committee on Energy and Natural Resources as the American Geophysical Union's Congressional Science Fellow and as a professional staff member.

Dr. Applegate has a B.S. in geology from Yale University and a Ph.D., also in geology, from the Massachusetts Institute of Technology.

Noel D. Blackburn is the Manager of University Relations and DOE Internship Programs in the Office of Educational Programs (OEP) at Brookhaven National Laboratory (BNL). Blackburn is responsible for designing, implementing and managing a $3.0M university internship program and workforce development research programs at the Lab for undergraduates, graduates, and faculty from national and international educational communities. He also creates access opportunities for underrepresented and underserved groups into BNL and the DOE enterprise with such programs as the Interdisciplinary Consortium for Research and Educational Access in Science and Engineering (InCREASE).

Blackburn has received funding for workforce development programs funded by the DOE Office of Science - Office of Workforce Development for Teachers and Scientists, U.S. Department of Education - Minority Science and Engineering Improvement Program, the National Science Foundation – Louis Stokes Alliance for Minority Participation, the New York State College Science Technology Entry Program and a number of universities.

His passion is training the next generation of Science, Technology, Engineering and Mathematics professionals while trying to remove the closed “Glass Door” which hinders access for a well-qualified, less fortunate pool of intellectuals who are unable to stay ahead of the innovation curve. His philosophy is based on a simple quote – ‘rising tides raise all ships’.
Before his present position, Blackburn was an Educational Programs Administrator in OEP, a Project Engineer on the Peconic River Remediation Project and a Field Engineer on groundwater and soil remediation projects for the Brookhaven Lab Environmental Management Directorate. Noel has served in various engineering positions at Bechtel International, Inc. on the Atlantic Liquid Natural Gas Plant project in Trinidad and Tobago, West Indies. He also has served as an Adjunct Lecturer for the Physical, Environmental and Computer Science Department at Medgar Evers College, Brooklyn, NY.

Panel Discussion Respondents:

Chantay Dudley, PhD.

Chantay Dudley is a Senior Industrial/Organizational Psychologist at the National Science Foundation (NSF). She specializes in human capital management, learning and development, and statistical modeling and analyses. In her current position, she is responsible for designing and implementing high-quality programs to expand the knowledge, skills, and career progression for NSF staff. Prior to joining the NSF, she worked for the National Aeronautics and Space Administration (NASA), as a researcher for a non-profit research organization (Human Resources Research Organization [HumRRO]), and as a human capital consultant for Federal Management Partners (FMP). Her work in these organizations focused on applying and/or conducting human capital research in the areas of selection, performance management, mentoring, diversity and inclusion, training, psychometric analyses, strategic planning, and evaluations.

Chantay earned her Bachelor’s degree from Palm Beach Atlantic University in 2002 and both her Master’s and doctorate degrees in Experimental Psychology (concentrating in Industrial/Organizational Psychology) from the University of Memphis in 2006 and 2010, respectively. She has published in peer-reviewed journals, presented at conferences, and served on several panels.

Quentin Stubbs, PhD.

Quentin Stubbs recently became a Navigation Manager after serving 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 has also 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 University of Maryland - 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.
**No Time For Silence – A Call To Action**

**Dr. Lisa White**

The No Time for Silence Call to Action is led by a group of advocates and scholars committed to achieving greater inclusion and equity across the science and technology enterprise. This requires collaboration across disciplines, institutions, organizations, and constituencies. We stand with activists working against anti-Black and anti-People of Color police violence and racialized political, social, and economic exclusion. We likewise stand in solidarity with advocates of anti-racism and exclusion in STEM and, in particular, those calling for an end to systemic racism in the geoscience community. We seek alliances with and support from the multitudes of passionate faculty, students, and other stakeholders who have publicly condemned the racism that plagues our society and our profession. The recommendations and strategies for an anti-racist STEM community within these letters, as well as those in our letter, can be a resource for those seeking to make substantive change.

**Interview and Resume Skills: BP**

**Rebecca Wright - BP Americans Early Careers Specialist**

With six years working for major corporations, Rebecca Wright now works for BP as an Early Careers Specialist where she recruits Early Careers talent to join BP’s Innovation & Engineering entity. She also manages campus recruitment for all Early Careers roles in Trinidad & Tobago. From a campus perspective, she manages campus relations in the US with University of Oklahoma and Colorado School of Mines in addition to two main campuses in Trinidad & Tobago, University of West Indies – St. Augustine and University of Trinidad & Tobago.

**Challenges Confronting the Geoscience Graduate**

This event within the conference is specifically designed to afford the vocalization of student, faculty, and industry perspectives on some of the direct impediments to postgraduate career success and what can be done in the near term to mitigate some of the related issues. No one believes that there will be a one day cure all solution to today’s concerns or to what is on the horizon, however it is imperative that we have open discussion and that we clearly focus on building some concrete ideas for future pursuit that can influence the direction in which we travel as individuals and as an organization.
Adeyilola, Adedoyin, Natalia Zakharova, Kouqi Liu  
Central Michigan University

PETROGRAPHY OF THE DEVONIAN ANTRIM SHALE, MICHIGAN BASIN

Recent studies examining unconventional gas reservoirs have focused primarily on thermogenic gas shales where thermal maturity and burial depth play a major role in gas generation. Conversely, biogenic gas is generated at shallow depth with a low geothermal gradient and abundant microbiological activities. The Devonian Antrim Shale is an unconventional biogenic gas accumulation with a technical recoverable resource of 19.9 Trillion Cubic Feet. However, major knowledge gaps remain regarding our understanding of organic matter assemblages that drive the source rock richness and subsequent gas generation within the Antrim Shale members. This project will integrate both organic and inorganic petrology to identify the various organic facies within the study area.

Core samples from wells penetrating the Antrim shale members in both shallower and deeper parts of the basin have been selected from the Michigan Geological Repository for Research and Education (MGRRE). Preliminary core description and wireline logs have been used to identify the Upper Antrim, Lachine, Paxton and Norwood members of the Antrim Shale which are characterized by different mineralogical composition and organic matter content. For this study, about 40 thin sections were made across three wells, sampling all the members.

Results of the study show the fine scale variation in lithofacies within each member and confirms the vertical change in environment as a response to oxygen supply. Norwood member has the highest diversity and abundance of organic facies, Upper Antrim is intermediate, while the Paxton is organic lean. Dominant organic matter within the black shales are alginites, conodonts and brachiopods.

Akintomide, Akinbobola and Nancye Dawers  
Tulane University

THE ROLE OF SALT EVACUATION ON THE SPATIAL AND TEMPORAL THROW DISTRIBUTION IN THE TERREBONNE SALT WITHDRAWAL BASIN, GULF OF MEXICO

Fault throw distribution is influenced by a variety of mechanisms that range from interaction of faults with one another and with adjacent salt structure. Although the presence of salt influences the throw distribution, it remains unclear the impact of salt expulsion on the spatial and temporal throw pattern of genetically related faults. In the Terrebonne Salt Withdrawal Basin in the Gulf of Mexico, throw plots and maps were used to examine the throw pattern of two faults, the Lake Boudreaux fault, and the Isle de Jean Charles fault, a segment of the Golden Meadow Fault Zone. Both faults show similar temporal throw history, which suggests that they are kinematic coherent.
However, both faults show different spatial throw distribution. Throw on the northwest-southeast striking Lake Boudreaux fault is strongly influenced by intersecting east-west striking faults, whereas throw pattern of the segmented Isle de Jean Charles fault shows that the fault initiated as a kinematic and geometric coherent fault. Both faults are also different in the way they interact with adjacent salt stock. The throw of the Isle de Jean Charles fault increases towards the Bully Camp salt stock, whereas the Lake Barre stock absorbed the extension or strain within its vicinity, thereby inhibiting the propagation of the Lake Boudreaux fault towards it.

Avent II, Wynnie ¹ and Pascal Lee²
Virginia Polytechnic Institute and State University¹, SETI Institute, Mars Institute, and NASA Ames Research Center²

NEW CANDIDATE PITS AND CAVES AT HIGH LATITUDES ON THE MOON

Since 2009, >300 hundred pits have been identified on the Moon.¹,² Lunar pits are small (10 - 150 m across), steep-walled, negative relief features, surrounded by funnel-shaped outer slopes, and no raised rim.² They are interpreted as resulting from the fall of the roof of shallow subsurface voids.² Of the pits known, all but 16 are in impact melt.² Most pits identified to date were found between 50° latitude North and South.² However, a recent “manual” search identified candidate pits on the impact melt floor of Philolaus Crater, an impact structure of Copernican age (<1.1 Ga), located at 72.1°N, 32.4°W.³ High latitude candidate pits are of interest because their shadowed darkness would be cold enough to cold-trap volatiles.³ In this study, we expanded the search for high latitude pits on the Moon to other areas in Philolaus and to other impact melt floor sections in nearby craters. Using imaging data from the NASA Lunar Reconnaissance Orbiter (LRO) Narrow Angle Camera, a “manual” search for pits was conducted on the impact melt floors of four large, relatively fresh craters: Philolaus, Anaxagoras (73.48°N, 10.17°W), Carpenter (69.4°N, 50.9°W), and Scoresby (77.7°N, 14.1°E). Shadowed depressions were identified as candidate pits using these criteria³: i) depression straddles a linear discontinuous sinuous rille; ii) depression is approximately as wide as the rille; iii) absence of a raised rim; iv) presence of outer funnel-shaped slopes; v) shows local brightening contiguous to shadowed zone. We report identifying a total of ~ 35 new candidate pits, 20 of which are in Anaxagoras, and 15 in Philolaus. No shadowed depressions were identified in Carpenter or Scoresby yet. The new candidate pits in Anaxagoras represent the highest latitude candidate pits identified on the Moon to date. The impact melt lava tubes underlying these candidate skylights, if confirmed, would offer not only natural shelters against radiation, micrometeoritic bombardment, and wide temperature swings, but also locations cold enough to cold-trap volatiles such as H₂O ice, and would represent targets of great interest for science and human exploration.

Balogun, Fatai O.¹, Lucas Silva², and Matthew L. Polizzotto¹

Department of Earth Sciences, University of Oregon¹, Department of Geography and Environmental Studies, University of Oregon²

ASSESSING THE ROLE OF DISSOLVED ORGANIC CARBON COMPOSITION IN THE FATE OF CHROMIUM-6 IN MULTICOMPONENT SYSTEMS

Toxic chromium (Cr) contamination of soils and water from anthropogenic and geogenic sources is a pervasive environmental and health issue. The toxicity of Cr is highly dependent on its interactions in the environment. Manganese (Mn) oxides are very ubiquitous, and prolific in facilitating Cr(III) oxidation. Chromium availability and reactivity are also dependent on the suite of structurally diverse natural dissolved organic carbon (DOC) sources found within environmental systems. These confounding factors make it difficult to assess the specific risks of Cr contamination in natural systems.

The objective of this research is to evaluate the mechanisms of Cr redox dynamics as a function of Mn-oxide-induced oxidation and DOC concentration and functional group composition. To address this objective, mixed batch experiments using synthesized Cr hydroxide, manganese oxide (50 nm), and citric and phenolic acids as DOC sources are being conducted. Dissolved Cr(VI), Mn(II), total Cr and Mn are being quantified in order to develop a quantitative model for Cr(VI) production across DOC gradients of 0.5 – 10 mM.

Preliminary results at pH 5 show that Cr(VI) production is a function of citric acid concentration. At a starting concentrations 0.5 mM, citric acid caused rapid Cr(VI) production, which peaked at 5.2 µm within 48 hours. However, within the same period, 10 mM citric acid produced 7.5 times less Cr(VI), resulting in concentrations less than the 1.92 µm threshold for total Cr in drinking water set by the World Health Organization.

Ongoing work is seeking to quantify Cr(VI) production at pH 7 and 9 and measure changes in citrate concentrations in concert with Cr redox processes. X-ray absorption spectroscopy data are being analyzed to determine solid phase speciation of Cr and Mn. These results will show the efficacy of DOC in limiting Cr oxidation and help better understand fate of Cr in multi-component systems.

Geological Society of America GSA Connects Online 2020
26-30 October 2020
Dana Brown\textsuperscript{1}, Randy Flores\textsuperscript{2}, Bisrat Zerehaimanot\textsuperscript{2}, Sena Tay\textsuperscript{3}, Alex Villa\textsuperscript{4}, Hannah Tandy\textsuperscript{1}, Ingrid Maradiaga\textsuperscript{1}, Christian Blair\textsuperscript{5}, Robert N. Ulrich\textsuperscript{2}, Maxence Guillermic\textsuperscript{2}, Jean Lynch-Stieglitz\textsuperscript{6}, Fengming Chang\textsuperscript{7}, and Aradhna Tripati\textsuperscript{2}

Fort Valley State University\textsuperscript{1}, University of California – Los Angeles\textsuperscript{2}, Savannah State University\textsuperscript{3}, University of Wisconsin, Madison\textsuperscript{4}, University of Southern California\textsuperscript{5}, Georgia Institute of Technology\textsuperscript{6}, and Chinese Academy of Sciences\textsuperscript{7}

AN ASSESSMENT OF FIRST ORDER AND SECOND ORDER CONTROLS ON $\Delta_{47}$ IN PLANKTIC AND BENTHIC FORAMINIFERA FROM A META-ANALYSIS OF CORE-TOP DATA

Carbonate clumped isotopes are a relatively novel geochemical proxy that can be used to determine the temperature at which different minerals form. Numerous studies have published calibration data and reported the relationship between clumped isotope signatures and calcification temperatures in foraminifera, a widely used archive in paleoceanography and paleoclimatology, with sample sizes for each individual study ranging from a to b. One study has recently reported there may be a possible species-specific effect in \textit{Globigerinoides ruber}, a mixed-layer dwelling foraminifera. Recent advances in analytical methods have reduced sources of interlaboratory offsets in clumped isotope ($\Delta_{47}$) analyses and made it potentially possible to account for outside influences (e.g., “vital effects”) on this geochemical tracer in biominerals by combining datasets and conducting a meta-analysis. Therefore in this study, we 1) report new measurements from the Tripati Lab at UCLA on instrumentation designed for small sample analysis and 2) combine these data with published values reprocessed using the same standard operating procedures, yielding data for 182 samples of planktic foraminifera and 70 samples of benthic foraminifera from sediment core-tops. We perform a meta-analysis to determine species-specific effects and/or other secondary effects on the clumped isotope signature of foraminifera. We investigate whether there is evidence for a unique calibration for \textit{G. ruber}, and for other taxa. We also investigate additional variables including sample size, ecology, and site water depth.

Clairmont, Roberto\textsuperscript{1}, Folarin Kolawale\textsuperscript{1}, Abah Omale\textsuperscript{2}, Heather Bedle\textsuperscript{1}

University of Oklahoma\textsuperscript{1}, Louisiana State University\textsuperscript{2}

PRE-EXISTING STRUCTURAL CONTROLS ON CLINOFORM ARCHITECTURE AND THE ASSOCIATED PROGRADATIONAL SYSTEM ELEMENTS, NORTHERN Taranaki Basin, New Zealand

There remains a limited understanding of the scale of factors that control the architecture of deep-water progradational sequences. In the Northern Taranaki Basin (NTB), New Zealand, Pliocene post-extensional sedimentary sequences overlie Miocene back-arc volcaniclastic units. With the help of seismic reflection datasets, we investigate the spatio-temporal changes in clinoform architecture and the associated progradational system elements within the post-volcanic continental slope margin sequences. Our results show the following: (a) buried mound-shaped structures in the northern domain of the study area, overlain by younging progression of shelf-to-basin prograding clinoforms; (b) folding of the deeper clinoforms that systematically decrease in magnitude with shallowing depth from the top of the seamounts; (c) overall, the N-S-trending continental slope margin evolves from a highly curvilinear/angular trend in the deeper clinoforms (Units 1 and 2) into a rectilinear geometry within the shallower post-extensional intervals (Unit 3 and shallower); (d) Units 1 and 2 are
distinctly characterized by dominance of stacked offlap breaks and over-steepened (7–10°) clinoform foreset slopes in the northern domain, and dominance of gently dipping foreset slopes (<6°) in the south; (e) Unit 3 shows very low (<5°) and intermediate (5–7°) foreset slopes across the entire survey; (f) in the northern domain, differential loading by prograding sequences about the seamounts and horst–graben structures induced a differential compaction of the deeper units, influencing a temporal pinning of the prograding slope margin in pre-Unit 2 times and (g) wide, closely spaced channel incisions into over-steepened slopes dominate the deeper prograding sequence in the northern domain, whereas narrower, straighter channels dominate the south. We reveal that the buried pre-existing structures compose of rigid buttresses that modulated the syn-depositional topography and post-depositional architecture of the prograding sequences in the NTB. Our findings present a distinction in the controls on progradational sedimentation patterns between magmatic and non-magmatic continental margins.

Mason, K.G.,1, R.C. Ewing1, M. Nachon1, E.B. Rampe2, B. Horgan5, M.G.A. Lapôtre4, M.T. Thorpe2, C.C. Bedford3,2, P. Sinha5, E. Champion1
Texas A&M University1, NASA Johnson Space Center2, Lunar and Planetary Institute, USRA3
Stanford University4, Purdue University5

**FLUVIAL AND EOLIAN SEDIMENT SORTING AND Rounding IN A BASALTIC PRO-GLACIAL CATCHMENT: ÞÓRISJÖKULL GLACIER, ICELAND**

The SAND-E: Semi-Autonomous Navigation for Detrital Environments planetary analog project examines physical and chemical changes in basaltic sediments from a glacio-fluvial-eolian environment and tests operations of robotic and unmanned aerial systems technologies in the context of planetary exploration. As a component of the SAND-E project, this research examines fluvial sorting in a proglacial catchment and the contributions of fluvial sediment to the eolian system in the catchment.

A detailed surface geologic map was created to connect source rocks to sediments along a glacier-proximal-to-glacier-distal transect and characterize catchment geomorphology. Digital elevation models derived from TanDEMS-X were used to identify stream order in the catchment and extract a channel long profile. Bulk sand and pebble samples of fluvial and eolian sediments were collected every ~1 km along a ~8 km transect and their size and sphericity was measured using a Camsizer. In addition, the size of cobbles were measured using the Wolman cobble count method at every 1 km along the transect. Cobble count data show a decrease in the length of the intermediate axis from a mean of 1.95 to 1.32 cm between the proximal and distal locations, respectively. In addition, cobble aspect ratios increased downstream. The general decrease in size and increase in aspect ratio observed for cobbles is expected for sediment travelling downstream. Cumulative size distribution curves of the bulk finer sediments show no significant trend, however fluvial samples were more poorly sorted than eolian samples. The lack of significant size variation in the finer-size fraction signals that winds in the catchment were capable of transporting the sand fraction of fluvial sediments. The lack of rounding variation may be due to the relative proximity of the investigated sites to the source rocks.
PALYNOLOGICAL ANALYSIS OF LATE HOLOCENE SEDIMENTS IN LAKE IZABAL, EASTERN GUATEMALA

The use of palynological analysis to determine vegetation turnover continues to gain prominence mostly because of the direct and indirect benefits of vegetation abundance and diversity to nature and humans. Palynological data from a ~4.5 m-long continuous sedimentary core from Lake Izabal in eastern Guatemala is used to reconstruct, on different time scales, the vegetation history within the lake’s catchment and surrounding areas. The data spans 1,250 cal. yr BP based on the extrapolation of AMS $^{14}$C dates of organic fragments in the sediments. The characteristic pollen assemblage alternates between montane and lowland forest taxa (e.g., Myricaceae, Malvaceae, Euphorbiaceae and Rubiaceae), and open and disturbance or cultural taxa like Poaceae, Ambrosia and Asteraceae, and bisaccates represented by *Pinus* and *Podocarpus*. Spores and other non-pollen palynomorphs such as nonmarine algae and fungi occur with variable abundances and diversities. The results of this study offer the opportunity to compare the vegetation variability in the Lake Izabal basin with the records from other parts of the northern Neotropics, and to evaluate the dominant factors that drove vegetation changes in the geologic past. These insights about past vegetation can provide useful guide as climate changes to ensure a sustainable and resilient planet for future generations.

Ofori, Samuel $^1$, and William Menke $^2$
University of Nevada Las Vegas$^1$, Lamont-Doherty Earth Observatory $^2$

LITHOSPHERIC AND ASTHENOSPHERIC STRUCTURE BENEATH ALASKA USING TRAVEL TIME ANOMALIES FROM TELESEISMIC P AND S WAVES

We derive high-quality P and S wave differential travel time delay maps for Alaska using Transportable Array data, magnitude $\geq$6 teleseisms and waveform cross-correlation techniques applied to the vertical and radial components, respectively. P wave and S wave anomalies between stations observing a common event are as much as $+/−2$ s and $+/−6$ s, respectively. The footprint of the fast Cook Inlet (CI) anomaly is about 800 by 100 km, with its long axis extending inland, striking NNE. Following Berg et al. (2020), we identify it as the descending slab of the Alaska subduction zone. It is brightest and narrowest, with a strike of N28E. For earthquakes from the SW, implying rays are coming up-dip through the slab. The slow Cape Yakataga (CY) anomaly is about 100 by 250 km, with its long axis parallel to the coast. The slow the Central Brooks Range (CBR) anomaly is about 200 km by 330 km, with an EW long axis. While Berg et al. (2020) identifies an intensely slow anomaly beneath the Seward Peninsula, our delay maps are only moderately slow in that region. S anomalies generally follows the of the pattern P wave anomalies, except in the Yukon Delta region, where S is systematically late. We measure parallax of anomalies by comparing their geographical position on delay maps from teleseisms with opposing back-azimuths. The northern end of the fast CI anomaly shifts about 440 km for opposing northerly and southerly back-azimuths. The slow CY anomaly appears only for S and SW back-azimuths, presumably because parallax moves it $\geq$200 km, to an offshore position for opposing directions. The slow CBR anomaly shifts about 240 km between northwesterly and southeasterly back azimuths. These shifts of 200-440 km are consistent...
with the anomalies being most intense in the mid to lower asthenosphere. The ratio of the P wave S differential travel time anomalies, for all station pairs observing a common event, varies from 2.4 to 4.4, with a strong azimuthal variation about an average ratio of 3.067 +/-0.146 (95%). This ratio is typical of a thermal anomaly. The one-theta pattern peaks at an azimuth of N283E degrees and the two-theta pattern at N209E. These patterns are approximately parallel and perpendicular, respectively, to North American – Pacific plate motion and may be due to the dip of the subduction zone and strain-induced seismic anisotropy, respectively.

Ohenhenn, L.1, M. Mayle2, F. Kolawole3, A. Ismail4, E.A. Atekwana1
Department of Earth Sciences, University of Delaware1, Department of Geosciences, Colorado State University2, School of Geosciences, University of Oklahoma3, Boone Pickens School of Geology, Oklahoma State University4

INVESTIGATING GROUNDWATER POTENTIAL IN BASEMENT AQUIFERS USING RESISTIVITY THRESHOLD, CENTRAL MALAWI

Basement aquifers are conventionally hosted in fractures within the basement or the overlying weathered zone (saprolite/saprock) and often regarded as low-productivity aquifers. Geophysical surveys such as seismic and electrical resistivity are often used to delineate aquifers and identify optimum well locations. However, drilling through geophysical anomalies alone sometimes leads to low-yielding wells or even dry wells. Improving the success rate of drilling requires a better understanding of the basement weathering profile and the aquifer system. Here we use seismic reflection, magnetic, and electrical resistivity imaging (ERI) techniques constrained by well data to investigate local basement aquifers in central Malawi. Previously, wells drilled at the site had a success rate of 30% and struggled to provide a sustainable water source. ERI data was collected along nine profiles in dipole-dipole and Wenner-Schlumberger arrays. Seven seismic reflection profiles were collected with five lines being co-located with ERI. Source parameter imaging (SPI) of the magnetic data was used to estimate the top to magnetic basement in the area. Depth to basement estimates were derived by integrating ERI, seismic, magnetic derived SPI, and well data. The inverted ERI profiles reveal three electrical layers: thin (5-20 m) laterally continuous high-resistivity zone (layer-1), an intermediate (20-60 m), discontinuous and electrically heterogeneous layer (layer-2), and a deeper high-resistivity layer with discrete vertical/sub-vertical low-resistivity zones. Wells drilled along the profiles show that layer-1 is a lateritic topsoil, layer-2 is composed of deeply weathered portions of the underlying metamorphic basement (saprolite), and layer-3 is characterized by a combination of regolith (saprock) and fractured basement. Using the concept of resistivity threshold values constrained by both dry and producing wells, we find that there are two potential water bearing zones. The first zone occurs within layer 2 (lower/upper saprolite, 50–300 ohm-m) and aquifers (1–10 ohm- m) within this zone are discontinuous. The second zone represents deep weathered fractures within the basement rocks (layer 3). Although, the resistivity threshold values proposed for this study may be unique to the locality, we suggest that our approach is critical for optimizing the success rate and total volume of water exploration in areas of shallow basement aquifers.
Onema, Pauline 1, Abua Ikem 1, and Katrina Knott 2
Department of Agriculture and Environmental Sciences, Lincoln University1, Aquatic Systems and Environmental Health Unit, Missouri Department of Conservation2

MERCURY BIOACCUMULATION IN LARGEMOUTH BASS, MISSOURI RESERVOIRS

Mercury (Hg) dispersion in the soil and water system is a worldwide concern to the public because of the potential adverse effects on humans. (Hg) is ranked 3rd in the priority list of hazardous substances in the environment. The present study identifies biotic vs. abiotic drivers to mercury bioaccumulation in largemouth bass from Missouri reservoirs. To investigate this bioaccumulation, the study evaluates the water chemistry and contaminant transfer in the food web within Missouri reservoirs. These involves analyses of samples for pH and electrical conductivity (EC), total alkalinity, dissolved organic carbon, total nitrogen, 251 elements (Al, As, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Mg, Mn, Mo, Na, Ni, P, S, Pb, Se, Sb, Sn, Sr, V, U, and Zn), and ionic species (NO 3 −, PO 4 3 −, Br −, Cl −, SO 4 2 −, and NH 4 +). The methods for our data collection were by multiparameter probe, potentiometric titration, ion chromatography, combustion/ nondispersive infrared detection, chemiluminescence, and inductively coupled plasma – optical emission spectrometry. In addition, quality control samples and certified reference material (SRM 1640a: Trace elements in natural water) were analyzed to ensure the accuracy of our results. Given the global concern on excess nutrients and sedimentation in streams and the fate of chemicals in biota shows that this percentage is hazardous to the fisheries conservation and future health of humans. Thus, the current study is providing information that will guide fisheries management decisions at the Missouri department of conservation (MDC) and inform the Department of health and social services (DHSS) when determining fish consumption advisories.

Onwumelu J, Chioma, Bouchakour Imene, and Ozotta Ogochukwu
University of North Dakota, Grand Forks

EFFECT OF MATURATION ON GEOCHEMICAL AND MECHANICAL PROPERTIES OF ORGANIC RICH SHALE

Unconventional shale reservoirs have attracted a lot of attention due to decline of production from conventional reserves. Shale is complex and heterogenous sedimentary rock having a variable mineralogical composition. Detailed understanding of the geochemical and mechanical properties and how it is affected by maturation will provide some answers on the factors that affect the storage capacity of self-sourced organic rich shale. Here, we investigate the maturity of shale using source rock analyzer, the mineralogical composition using X-ray diffraction and mechanical properties using nanoindentation technique. Results show study samples ranged from immature to mature shale. Bulk mineral compositions were dominated by quartz, clay minerals and variable amount of pyrite. Nanoindentation tests on immature samples have a lowered Young’s modulus versus the matured samples. Consequently, at immature stage, the soft and load bearing organic matter contribute negatively to the shale stiffening while, with increasing maturity and decreasing organic matter content, shales becomes stiffer.
ESTIMATING MINERALOGICAL CHANGES OF SHALE RESERVOIR AFTER CO₂ SATURATION

Shale reservoir is a heterogeneous material with complex microstructures, lithofacies and mineralogical composition. To evaluate the mechanical properties of the rock material and the volume fraction, mineral composition is a critical factor because rock brittleness index increases with increase of the brittle mineral content in the rock with minerals like calcite, sulfur, and zinc-blend. Major minerals present in the shale reservoir includes clay, calcite, quartz, dolomite, and feldspar. Minerals present in the shale reservoir sample at the depth of investigation are calcite, quartz, dolomite, plagioclase, pyrite, and halite. Calcite dissolution is more common in carbonate-rich rock and it increases the brittleness of the rock and makes it susceptible to fracture, whereas precipitation of clay minerals as calcite dissolves make the rock more ductile and susceptible to deformation. The minerals present was estimated from the Field Emission Scanning Electron Microscope (FE-SEM) image. The sample was exposure to CO₂ for up to 60 days and the elastic properties of the mineral grains in the shale reservoir was measured using nanoindentation testing. Statistical Approach was used to interpret the changes in the mechanical properties of the mineral grains and the changes in the volume fraction of the minerals before and after CO₂ saturation, and decrease greater than 40% was observed. Frequency distribution showed the volume concentration of the minerals based on their elastic properties as it changes from pre-saturation to post-saturation. Discrete distribution map was used to visualize the spatial distribution of the individual mineral grains present in the rock. The discrete distribution map shows the elastic modulus and hardness of the shale reservoir for CO₂ pre-saturation and for post-saturation periods. A heterogeneous distribution of both mechanical properties in the shale reservoir was observed. The images roughly display the microstructure morphology of tested area and then indicate the approximate surface fraction of different constituent phases.

Solomon, Danelle ¹, De’Etra Young¹, Tom Byl²
Tennessee State University¹, U.S. Geological Survey – Lower Mississippi-Gulf Water Science Center²

OAT SEEDLINGS ARE STIMULATED BY GROUNDWATER NATURALLY RICH IN SULFIDE AND CALCIUM

Sterile water artificially enriched with sulfide has been shown to increase plant growth. This study’s objective was to determine if groundwater from Tennessee State University's farm wells drilled into limestone bedrock, naturally rich in sulfide, stimulated oat seedling growth. Oats (Avena sativa) raised using waters from a well containing high sulfide (65-115 mg/L) were compared to the same groundwater oxidized so sulfide (S²⁻) was transformed to sulfate (SO₄²⁻). The calcium concentration ranged from 15-18 mg/L. Both waters were supplemented with NH₃, PO₄, and K to assure macronutrients were not limiting. Seeds were germinated in tissue soaked in the experimental waters and raised in a growth chamber at 25°C. After 4 weeks, the oat plants raised in sulfide-water had 9% greater height, 3-times more lateral roots and 16% greater biomass than plants raised in oxidized-
water. Plant peroxidase activity was 20-25% greater in plants exposed to sulfide, giving them stronger, more compact cell. Oat plants raised in sulfide-water had more efficient photosynthesis capacity as compared to plants raised in oxidized-water. There was 10% more chlorophyll and 3-times greater uptake of CO₂ in the sulfide-raised oats as compared to those raised in oxidized waters.

Stanford, Tyrese ¹, Jonathan Alford¹, Shakarah Nelson¹, Rickard Toomey², De’Etra Young¹, Thomas Byl¹,3
Tennessee State University¹, Mammoth Cave National Park², U.S. Geological Survey³

MICROCYSTIN TOXIN AND PHOTOSYNTHETIC PIGMENTS IN ALGAE GROWING IN MAMMOTH CAVE NATIONAL PARK, KENTUCKY

Algae have adapted to live in a variety of terrestrial environments, even in the cave passages at Mammoth Cave National Park. Cyanobacteria (blue-green algae) and chlorophyta (green algae) grow close to many tour lights along the cave passages. The algae are considered a nuisance because they are not natural cave flora, can detract from a natural cave experience, and possibly produce toxins. The objective of this research was to quantify microcystin toxin levels in different algae types and cave locations, and, differentiate between cyanobacteria and chlorophyta communities by measuring pigments associated with each alga. Microcystin toxins were measured using ELISA tests. Cyanobacteria and chlorophyta were characterized using a fluorescence-based sensor for phycocyanin and chlorophyllₐ, respectively. Toxins were found in 11 out of 12 cave sites. The ratio of phycocyanin to chlorophyllₐ provided a quick method to determine if the algal community is dominated by cyanobacteria or chlorophyta. Exposure to ultra-violet radiation appeared to reduce the chlorophyll and phycocyanin fluorescence in some algae communities.
Wilk, Kierra $^{1,2}$ and Janice L. Bishop$^2$
Rensselaer Polytechnic Institute$^1$, SETI Institute$^2$

CHARACTERIZING THE SALTY COMPONENTS OF IUS CHASMA, MARS

Ius Chasma, located at the western end of Valles Marineris, contains layered outcrops of hydrated materials. Previous analysis of Ius Chasma observed unique surface materials that could be attributed to acidic alteration [1]. Outcrops at Geryon Montes include unusual spectral “doublet” features in CRISM images, which have two bands between 2.2 – 2.3 μm, and vary across the region. Here we analyzed newly developed calibration versions of CRISM images to probe the mineralogy further, including components contributing to the spectral doublet features as well as phyllosilicates found here. We utilized MTRDR images that include joined S and L image data and reduced spectral noise to provide improved spectra across the region 0.4 to 3.9 μm [2], as well as images processed with a new algorithm employing simultaneous atmospheric correction and denoising that results in superior spectra of the surface from 1-2.6 μm [3]. Spectra collected from both methods were compared, verifying the integrity of both processing methods. Further, we employed a new feature extracting algorithm [4] based on Generative Adversarial Networks to identify locations containing specific spectral signatures that we matched with lab spectra of expected minerals. We are mapping subtle differences in the “doublet” materials and associated minerals in relation to neighboring outcrops through analysis of the spectral features. This study aimed to characterize the spectral doublet features identified in the Geryon Montes outcrop in relation to mixtures of hydrated silica and phyllosilicates with sulfate minerals, that could be forming through aqueous alteration of volcanic ash in the wall rock [5]. Characterizing the stratigraphy of these salty components in relation to phyllosilicates and hydrated silica will allow for improved understanding of the changing geochemical environments in which they formed.

References:

American Geophysical Union

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

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

We want to bring your attention to three specific programs:
AGU Bridge Program - Advancing the Earth and space sciences through increased representation of Hispanics, African Americans, American Indians, Pacific Islanders, Alaska Natives, and Native Hawaiians in geoscience graduate programs. Opens in December for student applications.
Mentoring365 - Mentoring365 is a virtual mentoring program developed among Earth and space science organizations to facilitate an exchange of professional knowledge, expertise, skills, insights, and experiences through dialogue and collaborative learning. Open year round for seeking mentors.
Student and Early Career Conference – (at the AGU Fall Meeting). The 2020 AGU Student and Early Career Scientist Conference will provide attendees with valuable learning and discussions geared around professional development and skills-building and a chance to meet and interact with their peers from across the Earth and space sciences. Opens in late September for registration.

Contact Drs. Pranoti Asher (pasher@agu.org) or Margaret Fraiser (mfraiser@agu.org) with your questions about AGU programs.
Mission statement-To provide foundational support for all aspects of the land-grant mission of Auburn University through (1) impactful courses and curricula, (2) forefront research that advances the mathematical, physical, and life sciences, and (3) outreach and service programs that improve the lives of citizens of Alabama, the nation, and the world. The Department of Geosciences is committed to promoting a diverse, inclusive, and equitable university community where we can learn and thrive without fear of discrimination based on age, race, gender, sexual orientation, gender identity, ethnic background, nationality, economic status, and/or disability. We believe acceptance and inclusion of diverse students and faculty is integral to the success and well-being of our students and to achieving overall academic excellence within our discipline.

We Would Love to Have You Apply to:

- **Auburn University’s NSF Research Traineeship Program on Climate Resiliency**-Our NSF Research Traineeship (NRT) program aims to train the next generation of scientists and leaders who can help build resilient communities that are prepared for, can effectively respond to, and quickly recover from damaging hazard events in the southeastern United States. This NRT project values inclusion and diversity, outreach and effective communication, actionable science, and engagement of communities and stakeholders for sustainable climate resilience solutions. We have funded and unfunded NSF trainee positions available. Applications are accepted now through Jan 4, 2021.

- **The Graduate Diversity Campus Experience (DiCE)** is an annual event hosted by the Black Graduate Student and Professional Student Association (BGPSA) in collaboration with the Office of Inclusion and Diversity. This program has been helping individuals interested in pursuing graduate studies for more than 5 years and continues to grow every year. DiCE seeks to identify highly qualified and competitive students from underrepresented groups to encourage them to pursue graduate degrees in their academic field.
  - Program attendees will have the opportunity to interact with current graduate students and faculty members from their program of interest while exploring Auburn’s campus and community. Participants will attend workshops that will provide them with the skills and resources needed to help strengthen their graduate school application packet, while participating in such professional development as mock interviews and a review of their personal statement.
  - Applications will open February 2021 for Fall 2021

Checkout These AU Links:

Auburn’s Geosciences Department:

Auburn University’s Graduate Program:
[http://graduate.auburn.edu/prospective-students/](http://graduate.auburn.edu/prospective-students/)
Auburn University’s NSF Research Traineeship Program on Climate Resiliency Website: 
http://www.auburn.edu/cosam/climate_resilience/index.htm

Black Graduate and Professional Student Association: 
http://bgpsa.auburn.edu/

Diversity Campus Experience 2021 
http://bgpsa.auburn.edu/diversity-campus-experience-dice/

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**BP**

Mission Statement

- At BP, we’re reimagining energy for people and our planet. With operations working across almost every part of the energy system, we’re leading the way in reducing carbon emissions and developing more sustainable methods for solving the energy challenge. We’re a diverse team of engineers, scientists, traders and business professionals determined to find answers to problems that must be solved. But we know we can’t do it alone. We are looking for people who share our passion for reinvention to bring a fresh perspective, collaborative spirit, and challenge our thinking in our ambition to achieve net zero.

Small summary of the programs to promote:

- **Internship programs:**
  - Our internship program provides hands-on, career-specific experience working full-time, usually during summer break. You will work on real projects that deliver tangible benefits and measurable results. At the same time, you will have the opportunity to learn about and help to solve some of the most important issues we face. You will experience genuine collaboration, and work alongside highly qualified and experienced colleagues, while you work on live projects and operations, using the latest equipment and technology.
  - 12 weeks long; May-August
  - Available to individuals graduating from Dec 2021-May 2023 (see role below)

- **Specific role to promote – link to all roles under relevant hyperlinks**
  - Geophysicist/Imaging Developer Internship

Relevant hyperlinks

- Application Website: www.bp.com/uscampus
- Talent Community: https://bp.avature.net/earlycareerstalentcommunity
• “Virtual You” series – virtual engagements with bp this fall: https://bpbrandportal.papirfly.com/readimage.aspx?asset.pdf?down=1&pubid=0Fwf1YD2ulZ20eGIK0M5Jw

California Institute of Technology

The California Institute of Technology (https://www.caltech.edu) is a private, research-focused university located in Pasadena, CA. Our mission is to expand human knowledge and benefit society through research integrated with education. We investigate the most challenging, fundamental problems in science and technology in a singularly collegial, interdisciplinary atmosphere, while educating outstanding students to become creative members of society. The Division of Geological and Planetary Sciences (https://www.gps.caltech.edu) houses Ph.D.-granting graduate options in geophysics, geology, geochemistry, geobiology, planetary science, and environmental science and engineering (https://www.gps.caltech.edu/academics/graduate-program). Our small research groups, tradition of joint mentoring of students, and interdisciplinary centers enable students to pursue unique and original research projects at the cutting edge of human knowledge. We are seeking outstanding candidates for our graduate program among undergraduate students in geosciences, geological engineering, and beyond. We are committed to building a vibrant and diverse academic community and to cultivating an environment that enables all of our members to thrive and realize their full potential, irrespective of individual backgrounds and circumstances (https://www.gps.caltech.edu/resources/dei-gps).

Geological Society of America

GSA Mission Statement
To advance geoscience research and discovery, service to society, stewardship of Earth, and the geosciences profession.

Program Summary
GSA helps a diverse community of geoscientists find the tools, confidence, and connections they need to navigate the complexity involved in advancing science and driving their careers to fulfilling new heights. Enriching student programs offer research grant funding, mentorship, travel awards, scholarships, field experiences, and career information.

Hyperlinks
GSA Research Grants Program
www.geosociety.org/gradgrants

On To the Future
Expanding Representation in the Geosciences Scholarship
https://www.geosociety.org/GSA/About/awards/GSA/Awards/erg.aspx

GeoCorps
www.geosociety.org/geocorps

NPS Geoscientists-in-the-Parks (GIP) [soon rebranding to “Scientists in Parks”]
www.geosociety.org/gip

Field Camp Scholarships
https://rock.geosociety.org/eo/moreInformation.asp?program=scholar

GeoCareers Webinars

Exhibitor Participants
Tahlia Bear, Diversity and Career Officer, tbear@geosociety.org
Matthew Dawson, Education Programs Manager, mdawson@geosociety.org

Lawrence Berkeley National Laboratory’s (Berkeley Lab) Earth & Environmental Sciences

Lawrence Berkeley National Laboratory’s (Berkeley Lab) Earth & Environmental Sciences Area is a premier Earth sciences research organization where scientists are tackling some of the most pressing environmental and energy challenges of the 21st century in order to enable sustainable stewardship and judicious use of the Earth’s resources. With the breadth of expertise of integrated teams offered by the Climate and Ecosystem Sciences and the Energy Geosciences Divisions, EESA’s vision is to lead the nation in solving complex environment and energy challenges.

URLs: https://eesa.lbl.gov/virtual-exhibit-booth/
Programs: At EESA’s virtual exhibit booth, visitors can find information about current job and internship opportunities, take virtual tours of some of our facilities and labs, and read about current areas of research spanning a wide range of Earth science. For more information, visit our organization website eesa.lbl.gov.
National Association of Geoscience Teachers

The National Association of Geoscience Teachers (NAGT) is a member-supported organization that seeks to build and maintain a diverse, inclusive, and thriving community of educators and education researchers to improve teaching and learning about the Earth. NAGT works toward building geoscience expertise and an Earth-literate society through high-quality education. NAGT programs and opportunities include:

- **Sponsored Sessions, Events and Programs** that support the mission of the organization
- **Professional Development** opportunities such as workshops, webinars, conferences, and online resources that support geoscience educators
- **Publications** such as the *Lab Manual in Physical Geology*, the *Journal of Geoscience Education*, and *In the Trenches* magazine
- **Scholarships and Awards** that support both educators and students and communicate respect for their outstanding efforts
- **Advocacy Committee** which serves to maximize the impact of NAGT work on behalf of members and all geoscience educators

The easiest and best way to get involved with NAGT is to first become a member! Learn more about the many benefits of NAGT membership by visiting the [Member Benefits page](#). NAGT Members may find leadership opportunities through serving on committees and councils, or by joining a Division to become part of a nationwide interest group. Visit [this webpage](#) to learn about even more ways to become involved with NAGT. Feel free to [contact NAGT](#) if you’d like more information about the Association.

National Science Foundation

The National Science Foundation (NSF) is an independent federal agency that supports basic research to create knowledge that transforms the future. NSF provides support for all fields of fundamental science and engineering, excluding medical sciences, to keep the United States at the leading edge of discovery in areas from astronomy to geology to zoology. In addition to funding research, NSF also supports the future of science by providing direct and indirect funding for students at the undergraduate and graduate levels to prepare a diverse and globally engaged STEM workforce.

Within NSF, the Directorate for Geosciences (GEO) supports research spanning the Atmospheric, Earth, Ocean, and Polar sciences. GEO supports basic research that improves our understanding of the many processes that affect the global environment. These processes include the role of the atmosphere and oceans in climate, the planetary water cycle, and ocean acidification.

NSF staff are looking forward to talking with attendees during NABG's Exhibitor Showcase and Virtual Happy Hour. Please stop by our virtual exhibit booth to talk with Program Officers. You can email any questions to [ear-communication@nsf.gov](mailto:ear-communication@nsf.gov).
United States Geological Survey

The USGS is the science agency of the Department of the Interior. The USGS mission is to monitor, analyze, and predict current and evolving dynamics of complex human and natural Earth-system interactions and to deliver actionable information at scales and timeframes relevant to decision makers. As the Nation's largest water, earth, and biological science and civilian mapping agency, USGS collects, monitors, analyzes, and provides science about natural resource conditions, issues, and problems. Our diverse expertise enables us to carry out large-scale, multidisciplinary investigations and provide impartial scientific information to resource managers, planners, and other customers.

University of Alabama - Department of Geosciences

We provide a welcoming environment in which to explore your planet, to conduct science that can improve lives, and to start an exciting career. Our students seek Bachelors, Masters, and Ph.D. degrees, allowing them to explore a wide range of topics, including water, energy, environmental science, natural hazards, marine science, tectonics, paleo-sciences, and planetary geology. Our graduates succeed in careers in environmental consulting, energy and mineral exploration, government, and research. We offer cutting-edge laboratory facilities, lead field research on all continents and oceans, and share our campus with allied institutions, such as the U.S. National Water Center and the Geological Survey of Alabama. Plus, we have close partnerships with many companies across the nation. We constantly seek new students and post-doctoral scholars to join us, and we offer competitive fellowships, assistantships, and scholarships to support our students financially.

Please visit our website (https://geo.ua.edu/) to learn more about the department, our faculty members, and our current students – and don’t miss the video at https://geo.ua.edu/overview/!

To learn more about our labs, field areas, and projects, please visit https://geo.ua.edu/research/.

For undergraduate students:
Why study geological sciences at The University of Alabama? Let some of our students give you their opinions and insights! Please see https://geo.ua.edu/undergraduate/why-study-geology/ for more details. Information about undergraduate scholarships can also be found at https://geo.ua.edu/undergraduate/scholarships/.

For graduate students:
Information regarding graduate student financial support can be found at https://geo.ua.edu/graduate/financial-support/. Interested student may apply to the graduate program at https://graduate.ua.edu/prospective-students/apply-now/.
Contacts:
Prospective undergraduate students are encouraged to contact our undergraduate program director, Dr. Samantha Hansen (shansen@ua.edu). Similarly, prospective graduate students can direct their questions to our graduate program director, Dr. Geoff Tick (gtick@ua.edu). Information about post-doctoral fellowships can be obtained from Dr. Fred Andrus (fandrus@ua.edu).

University of Arkansas – Fayetteville
(Environmental Dynamics and Geosciences)

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

Geosciences and Environmental Dynamics have been participants at NABG for over 17 years and hosted the conference in 2009 and 2019. NSF awards to Dr. Stephen K. Boss since 2009 supported over 350 unique students from over 100 institutions over 661 times.

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

The Environmental Dynamics Program is an interdisciplinary program offering a MS or PhD. We host 76 faculty from all across campus who mentor our students. Our focus on human-environment interactions looks into deep time recreating paleoclimates and how this affected human development and into the present researching natural and social impacts of global climate change, impacts of rapid economic development on environmental quality, landscape evolution and degradation, natural hazards, watershed sciences, soil erosion and nutrient depletion to name some areas of study. For additional information on our program go to our website at https://environmental-dynamics.uark.edu/prospective-students/index.php

Please feel free to contact Dr. Steve Boss sboss@uark.edu or Jo Ann Kvamme jkvamme@uark.edu with specific questions or how to apply!
University of California – Irvine – Department of Earth Sciences

Studying Global Climate and Environmental Change: Causes, Impacts, and Solutions

Mission statement: To contribute through research and teaching to a fundamental scientific understanding of the Earth as a coupled system, to train the next generation of Earth scientists, and to inform and educate policy makers and the public-at-large. We envision a society that understands the impact of human activities on the global environment and the interactions within the Earth system that preserve the habitability of the planet.

Session Overview: Earth System Science (ESS) is a highly interdisciplinary field that focuses on how the atmosphere, land, oceans, cryosphere, and life interact as a system. Faculty and students in the Department of Earth System Science at UC Irvine, the first ESS department in the nation, study a wide range of topics from how climate change will impact sea level, ecosystems, and extreme weather events to how human systems, such as agriculture and energy, are likely to impact and be impacted by global environmental change.

Furthermore, ESS is committed to environmental and climate justice, to increasing diversity, equity, and inclusion of minorities in STEM, and we stand in solidarity with Black Lives Matter. In this session, we’ll provide an overview of student opportunities in the ESS Department at UCI, highlight some of the programs that make UCI a national leader for inclusive excellence, and leave plenty of time for Q & A.

Degrees we offer:
B.S. in Earth System Science B.S.: https://www.ess.uci.edu/undergrad/bs/requirements
B.A. in Environmental Science and Policy: https://www.ess.uci.edu/ensp
PhD in Earth System Science (Fully funded!): https://www.ess.uci.edu/grad

Other links:
UCI Homepage: https://uci.edu/
Earth System Science home page: https://www.ess.uci.edu/
Inclusive Excellence at UCI: https://inclusion.uci.edu/
Thank you for attending and supporting the virtual 39th Annual Technical Conference of the National Association of Black Geoscientists