Increasing diversity in geosciences- What we are doing wrong and what is working

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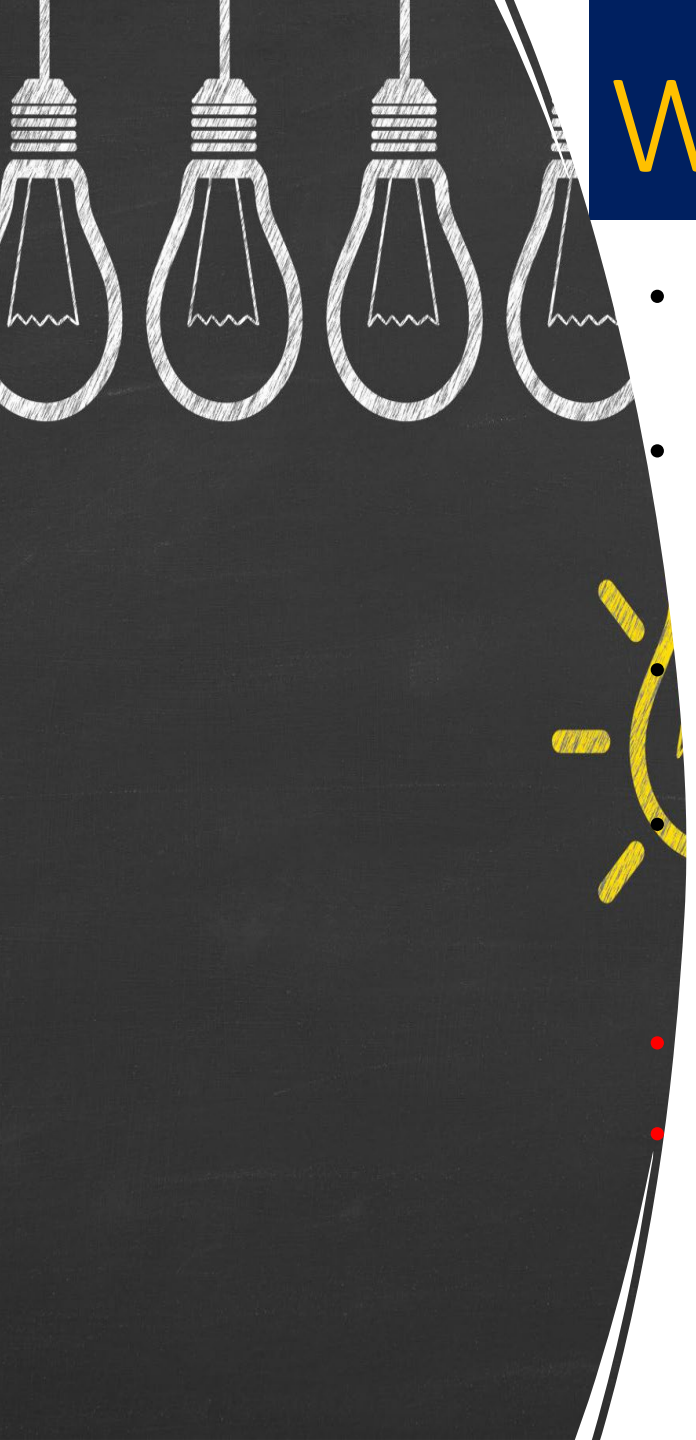
This presentation is my story for the last 30 years

- **General comments and opinion**
- **My experience at DoE labs (1995-1997)**
- **The NCAT Experience to increase diversity in geosciences (2001-2011)**
- **The outcome and the challenges**
- **Other examples of programs and activities that seemed to work (2001-present)**
- **Atmospheric Chemistry research 2012-Present**
- **Lessons learned**



What has been and is being done

- **There has been large investments by agencies like NSF and NOAA now DoE to help develop program in Geosciences at HBCUs and MSIs**
- **Funding agencies require statements on plans for Diversity, Equity and Inclusion to bring to the attention of PI's the need to be intentional about the issue.**
- **Federal labs, offer research opportunities for under-represented minorities mainly during summer.**
- **Universities have created new structures and personnel to help promote diversity and inclusion such as Deans of Diversity, Equity and Inclusion, or Officers of Diversity, Equity and Inclusion**
- **The Challenge Still remains!!!**
- **WHY?**

Discrimination is universal-Opinion!

- **In every society or country, there are the privileged few, or a dominant ethnic group, class or race that own most of the wealth and who determine who gets opportunities and who gets denied.**

- **Such issues are not addressed openly often leading to endless civil wars and genocides in extreme cases in some countries.**

- **In our country the issue is more complicated: we can talk about it address and confront the issue head on and try to change things through executive or legislative actions, and rules, and educating the public**

- **We should also realize that these efforts are triggering opposite reactions by some members of the dominant group; people who feel insecure and worried about losing control react in ways that are irrational and hard to explain.**

DoE labs-Los Alamos

- **1995-Summer- Los Alamos National Lab- Project: Photodetachment Studies on a Relativistic H- Beam," Host Dr. David Funk**

"Non-Resonant Excess Photon Detachment of H- Ions ," M. S. Gulley, Xin Miao Zhao, H. C. Bryant, Charlie E. M. Strauss, David J. Funk, A. Stintz, D. C. Rislove, G. A. Kyrala, W. B. Ingalls, W. A. Miller, and **S. Billign**, 1996 Joint Spring Meeting of the Texas Section of the APS, AAPT and Zone 13 of the SPS, March 15-16, 1996. Presented by Mark Gulley.

X. M. Zhao, M. Gulley, H. C. Bryant, C. E. M. Strauss, D. J. Funk, A. Stinz, D. Risolve, G. Kyrala, W. Ingalls and **Solomon Bililign**. (1996). "Excess Photon Detachment of Negative Hydrogen Ions" Contributed paper to the QELS Conference.

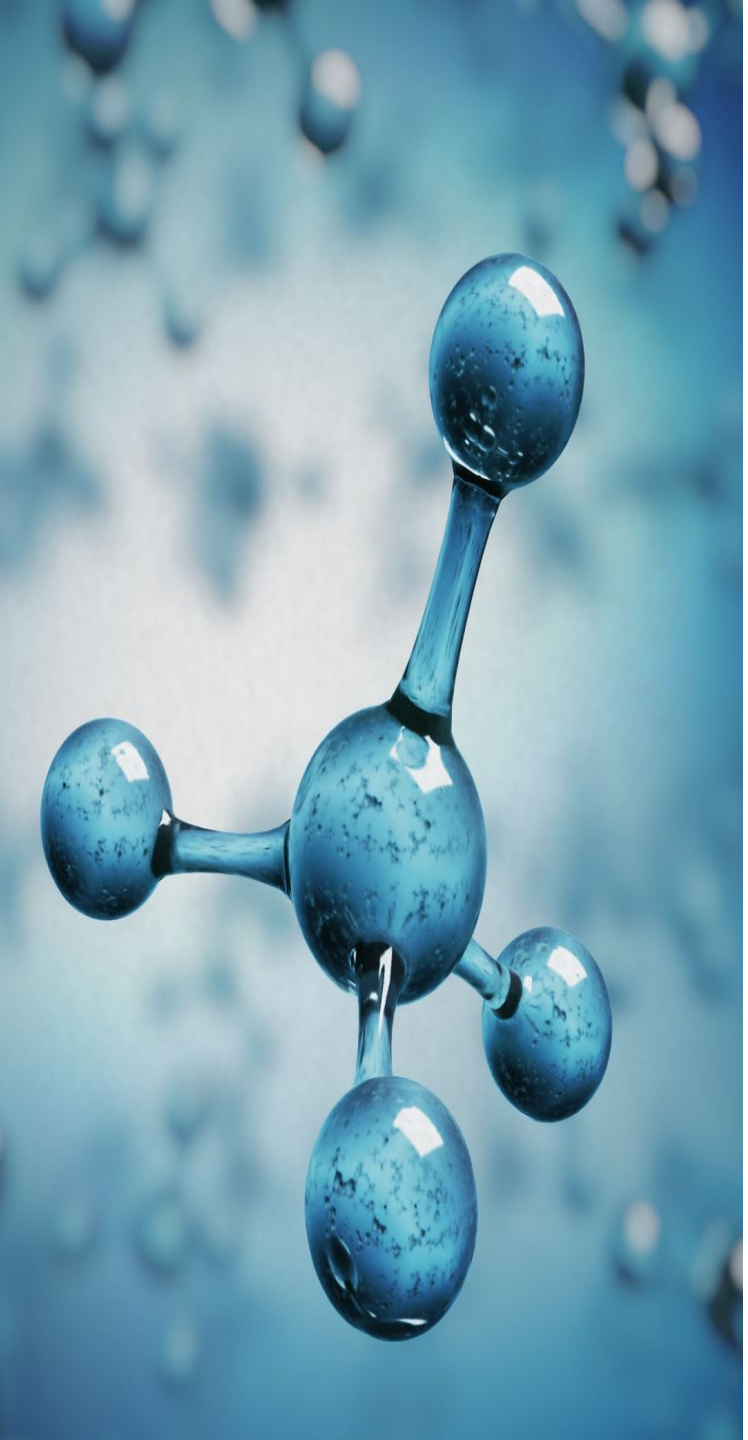
Was able to develop my NSF-CAREER proposal

DoE labs-Oak Ridge

- **1996, 1997- Summer: Oak Ridge National Lab. Photochemistry of Metal CVD precursors in cluster environment and nano chemistry within clusters: Host: Dr. John Miller**

Journal articles

- **B. E. McCarter, Solomon Bililign**, C. S. Feigerle, J. C. MillerJ. *Phys. Chem. 103, 6740, 1999*
- **Solomon Bililign**, C. S. Feigerle, and John. C. Miller., *Applied Surface Science. 127, 344.(1998)*
- C. S. Feigerle, **Solomon Bililign** and John C. Miller, *Journal of Nanoparticle Research. Volume 2(2) 147-155, (2000)*
- **Solomon Bililign,** L. Liu, C. S. Feigerle and John C. Miller. *J. Phys. Chem. 101, 4569 (1997)*
- **Solomon Bililign**, C. S. Feigerle, John C. Miller and M. Velegrakis. *J. Chem. Phys. 108, 6312 (1998)*
- **Ben McCarter- The First NCAT MS student in Physics did his research at Oak Ridge, now Application Engineer- Specialty Materials at CORNING!**



1998-2006 – Atomic Molecular/Chemical Physics

- **Received NSF-CAREER award in 1998 & NSF MRI (2003) and consecutive grants until 2006 build a Lab, and Grant from NSF-Quantum Chemistry Division (1997) – Credit DoE lab experiences.**

Focus of the Research:

- Spectroscopy of Transition State Dynamics and State-to-State Photochemistry
- Electronic Structure Calculations, Quantum calculations

Served as Department Chair 2001-2006

I came to be interested in the Geosciences to increase enrollment in the Physics Department at NCAT following the Spin UP report

The NCAT Experience to increase diversity in Geophysics

To solve the problem, we also need to understand why the investments so far did not lead to the expected results in increasing diversity in the Geosciences.

NCAT programs (I was a PI in)

- Two successive grants Opportunities for Enhancing Diversity in Geosciences (OEDG) close to 1.5 million in funding for geophysics
- NSF-PIRE program (Africa Array- geophysics field work in South Africa) with Penn State to help increase number of students in geophysics)
- Two NSF-IRES (geophysics field work in Ethiopia and Botswana

Goals were

To develop programs in geophysics a concertation within the Physics department

To creation several courses and collaborate with established program at NCSU and a to send students to NCSU to complete senior year.

To organize field trips to South Africa and Ethiopia on field trip experience.

To create awareness in the interdisciplinary nature of geosciences which are also of societal benefit.

The NCAT Experience to increase diversity in Atmospheric Sciences

I was the PI for NOAA Cooperative Science Center (12.5 million over five years)- a consortium five MSI's to develop programs to train students for the NOAA workforce in Atmospheric Sciences.

- Was instrumental in developing both undergraduate and graduate degrees programs in Atmospheric Sciences
- The large size of the grant also helped make the case to hire four tenure track faculty in atmospheric sciences
- Helped Create a strong collaborations and student exchange programs with NOAA-ESRL and NCAR that exposed several engineering and Science students to geosciences
- Personally, it helped me convert my lab designed for basic research in Atomic Molecular/Chemical Physics to use laser and other spectroscopic techniques for atmospheric applications and air quality research.

Outcome

There is no more a geophysics program at NCAT

The fate of the atmospheric sciences program is uncertain as deans and provosts are focused more on student enrollment instead of strategic needs of certain programs.

The effort to sustain the programs by proposing the establishment of Earth System and Engineering Institute at NCAT– failed due to turn overs in administrators.

Available on the Journal of Geosciences Education "**Programs to build capacity in geosciences at HBCUs and MSIs: Examples from North Carolina A&T State University**
https://doi.org/10.1080/10899995.2019.1636337

Programmatic challenges (at HBCU, MSI)

- **A lot of traditional programs/majors like physic, atmospheric sciences etc. are getting into trouble due to low-enrollment numbers of students. Geosciences programs are likely going to be low-enrollment programs.**
- ***For HBCU and MSI administrators having high enrollment courses and more traditional STEM areas that have a broader Alumni support is often safe than trying something new however important.***
- **HBCU alumni with graduate degrees in Geosciences often don't have a home department at HBCU's to go to. (e.g. NCAT graduates working at NASA, NOAA cannot come back as faculty members)**
- **Unlike Physics and Chemistry no viable all-encompassing geosciences professional organization is available.**

Challenges with research groups (university/federal lab) Personal Observations

- Some research environments are intimidating, unwelcoming often unrealistic exceptions.
- Some research groups are elitist and unwelcoming for those who are not well prepared.
- There are lots of unsubstantiated deep-rooted biases, assumptions, and decisions are made and actions taken note based on facts but on the assumptions.
- Underrepresented members invited to work in a research group try to learn about their host and what the group does, but the reverse is not true. Hosts never always take the time to learn about the educational background, life experiences, and challenges their guests face.
- The value added in hosting underrepresented members to the group is not well appreciated. It is often done to meet a requirement by funding agencies, not for the real benefit it brings for all involved
- Hosts are surprised by the successes, but failure and not performing well is almost a forgone conclusion.

Efforts Between 2011-2015

- Following the defunding of the NOAA Center, and after failing to create a structure to sustain the Center activities:

➢Make the case for Geosciences at HBCU/MSI at Every opportunity

(workshops, conferences organized by the Physics Community, letters to administrators)

➢Continue working on proposals to fund activities in my lab (Challenging without an established track record in Atmospheric Sciences)

➢Run collaborative projects that engage interdisciplinary groups in training students in atmospheric science activities left over from the Center

Making the case for geosciences programs at all institutions

- **Helps improve retention**

"**Retention of students in STEM areas can be facilitated by enhanced interdisciplinary education and research** since students are strongly attracted to research with societal relevance" (National Academy of Sciences, 2005, Keck Foundation).

- **Enrollment growth**

Applied interdisciplinary programs like atmospheric and environmental sciences can drive enrollment growth in critical but low enrollment STEM programs.

Making the case for geosciences programs at all institutions

- **Geosciences as engines of economic competitiveness and new innovations:**

Research on environmental sciences and geosciences help revolutionize other sciences.

- **New jobs- energy sector**

According to a 2013 report from U.S. Chamber of Commerce's 21st Century Energy Institute, fracking has created a job boom even in states that don't have shale deposits, with 1.7 million jobs already created and a total of 3.5 million projected by 2035.

- **Dependence of private engineering firm's insurance industry agriculture on results of accurate forecasts**

Increasing reliance on the results of the long-term weather, climate, and other natural hazards research enabled by government and university scientists to make strategic management decisions.

Making the case for geosciences programs at all institutions

- **Increase STEM enrollment and retention**

The social and economic relevance and interdisciplinary nature of the geosciences offers the potential for undertaking more innovative approaches to recruitment and retention of students in STEM and will make institutions an even stronger STEM Institutions.

Interdisciplinary programs embody the essence of best practices that enhance student learning and prepare students for the complexity of real-world issues.

- **Students want it**

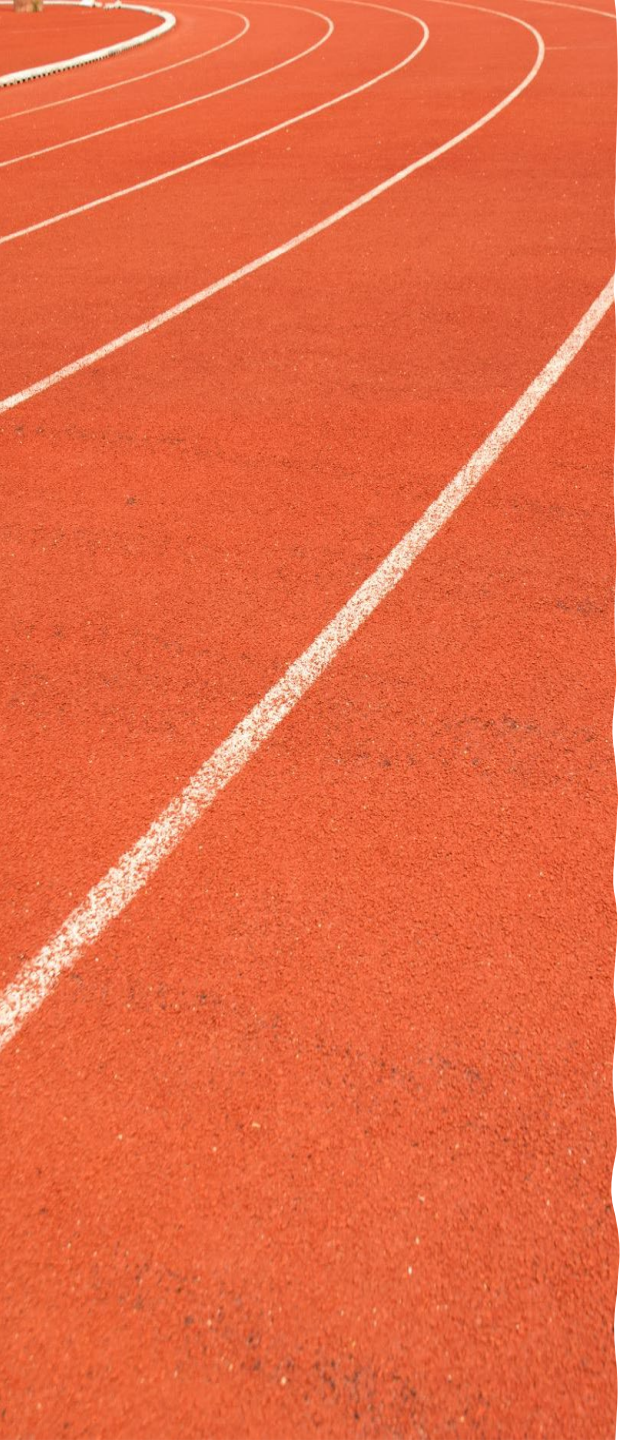
Many students increasingly **want their studies to be associated with a societal good, such as making people's lives better or preventing damage to the environment**. (APS: PHYS21-Preparing Physics Students for 21st-Century Careers, 2016) increasing enthusiasm about problems of global importance (Golding, 2009).

Making the case for geosciences programs at HBCU and MSI

- **African-American underrepresentation:**

The underrepresentation of students graduating in the geosciences is the lowest within all of the STEM fields. (Czujko 2008, NSF 2009)

- **Underrepresented groups and the poor are disproportionately impacted by environmental problems**
- The geosciences are relevant to the lives of HBCU students and provide an opportunity for impactful community engagement. (Center for American Progress 2013, Baird 2008, Huang 2014)
- Disadvantaged populations are exposed to increased burden of exposure to environmental stressors that may exacerbate health disparities and increased risk for diabetes cancer, infant mortality, and a myriad of other diseases (Tessum, C.W., et al, 2021, Lane, H.M., et al, 2022, Mennis, J.L. and L. Jordan, 2005)



Other Activities to promote Geosciences

- Organize a session "three sessions on Earth and Planetary Sciences-with sessions in geophysics, atmospheric sciences and planetary session" at the annual meeting of the National Society of Black Physicists' (2006-2018)

Session 1: Geophysics

Session 2: Atmospheric Sciences

Session 3: Planetary Sciences

- Organize a session "Role of Physics in the Geosciences" at the Southeastern Section of American Physical Society- 2008-Raleigh, NC 2010, Baton Rouge LA, 2013- Bowling Greene KY.

Example 1. NSF-REU

- **NSF-REU Site: Collaborative Earth System Science Research- Atmospheric modeling, sensing and societal impacts (2013-2015) at NCAT**

- **Team Members –Faculty from the following Departments: Physics; Chemistry; Atmospheric Sciences and Meteorology; Mathematics; Electrical Engineering; Nano-engineering; Business Administration; Marketing**
- **Program Elements:**

a) Year-round research for NCAT students

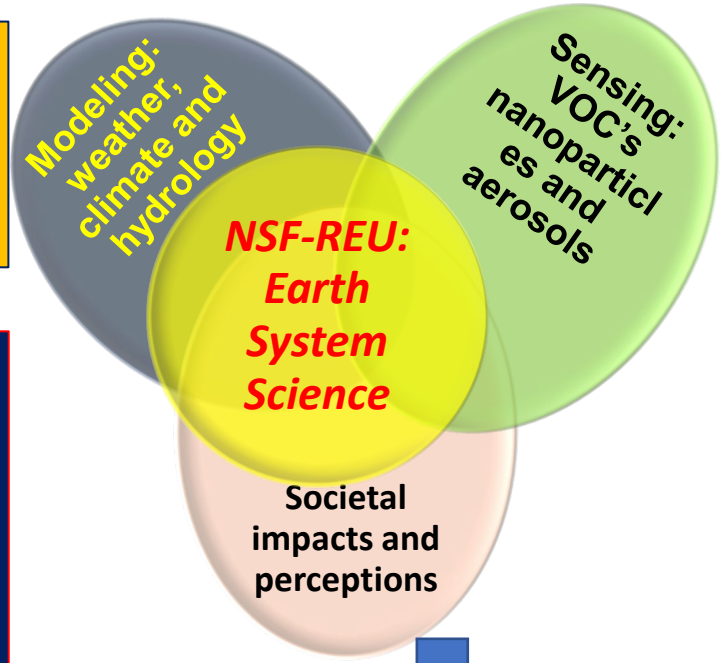
b) Summer 10-week program from students selected nationally

c) Short coordinated and intentional visits to National Labs

Targeted recruitment from local technical community colleges, s and on campus

Activities:
- Cohort building
- Structured mentoring
- Professional development
- Workshops
- Weekly meetings
- Field experience
- Federal lab experience
- Writing
- Presentation
- Literature review
- Interdisciplinary training
- Ethics training

Summer and academic year research



Outcomes:
- Independent research
- Careers in geosciences
- Earth system thinking
- Skills in interdisciplinary research
- Interest in graduate school

Research Themes

- Atmospheric & environmental sensing
- Weather and climate modeling
- Societal impacts

Activities

- Chemical sensor development
- MEMS sensors fabrication
- Trace gas detection
- Ocean sensors
- Small satellites
- Hurricane research
- Climatology
- Numerical methods
- Shallow water tank model
- Surveys of attitudes towards climate change

Skills to be acquired

- Small satellite system architecture
- Various spectroscopic techniques
- Materials/chemical syntheses
- Atmospheric chemistry
- MEMS fabrication technique
- Data acquisition and programming
- Numerical techniques
- Collecting and processing weather data
- Model simulations, and plotting model products
- Evaluation of sensor data
- Understanding social perception of climate change
- Interpreting scientific knowledge
- Presenting scientific knowledge to the public
- Independent research skills
- Communication and presentations
- Interdisciplinary thinking
- Research ethics

Total : 33 undergraduates participated

- **12-academic year from NCAT (Physics, chemistry, mathematics, psychology majors)**
- **19-Summer participants from across the mainland US**
- **Demography:15 Female, 18 Male; 17 African Americans; 3 Hispanics, 13 Caucasians**

Topics covered

ATMOSPHERIC/ENVIRONMENTAL SENSING

Project 1-a. Luminescent sensors derived from perturbations of metal-metal interactions
Project 1-b. MEMS sensors and systems to measure atmospheric variables
Project 1-c. Overtone induced dissociation of VOC's using cavity ring down spectroscopy
Project 1-d. Raman spectrometer in remote sensor module networks for water diagnosis
Project 1-f. Small satellite remote sensing system design

WEATHER AND CLIMATE MODELING

Project 2.a. Approximating a hurricane's path and position using simplified weather models
Project 2-b: Shallow water tank model
Project 2-c The Caribbean low-level jet: Climatology and variability
Project 2-d: Modeling of African easterly waves and hurricane formation

SOCEITAL IMPACTS

The researchers intend to investigate student attitudes on such diverse topics such as energy development and off-shore oil exploration; the economic, technological, and legal issues involved in the development and advancement of alternative energy options; issues related to mass transit; and attitudes toward climate change and global warming

REU Survey Results

- **At the start of the summer, I wanted to continue down the dentistry path, but exposure to new research fields invigorated my excitement for pursuing a PhD over professional school.**
- **“Benefits would be that I get to learn more facts from many disciplines, and because my major is math, so I can see how math is at work. When I first started this program, I was nervous how I was going to be able to learn other discipline materials, and after this program, I am now confident that I can tackle difficult topics such as fluid dynamics, meteorological dynamics, etc.”**
- “They take a diff approach to problems than I do, exploring more solutions.”
- “I believe it gives you a more rounded view of things because people see things from their discipline's point of view and to work with people who have different points of view will help you be more open minded and learn how to see things from a different perspective.”
- **“It allows everyone to bring a different perspective on how to solve the same problem. Each discipline is trained to think differently and when they come together it is a powerful tool.”**
- "It is great to network and meet the researchers at a federal lab. Reading a paper and asking the author questions on how they came to that conclusion and where they are going with future work is great. They ask for your input and are always willing to help. Plenty of opportunities are available and when you are in one of these labs you are able to take advantage of them all."

Example 2: NSF-GeoPaths: 2017-2019, continued

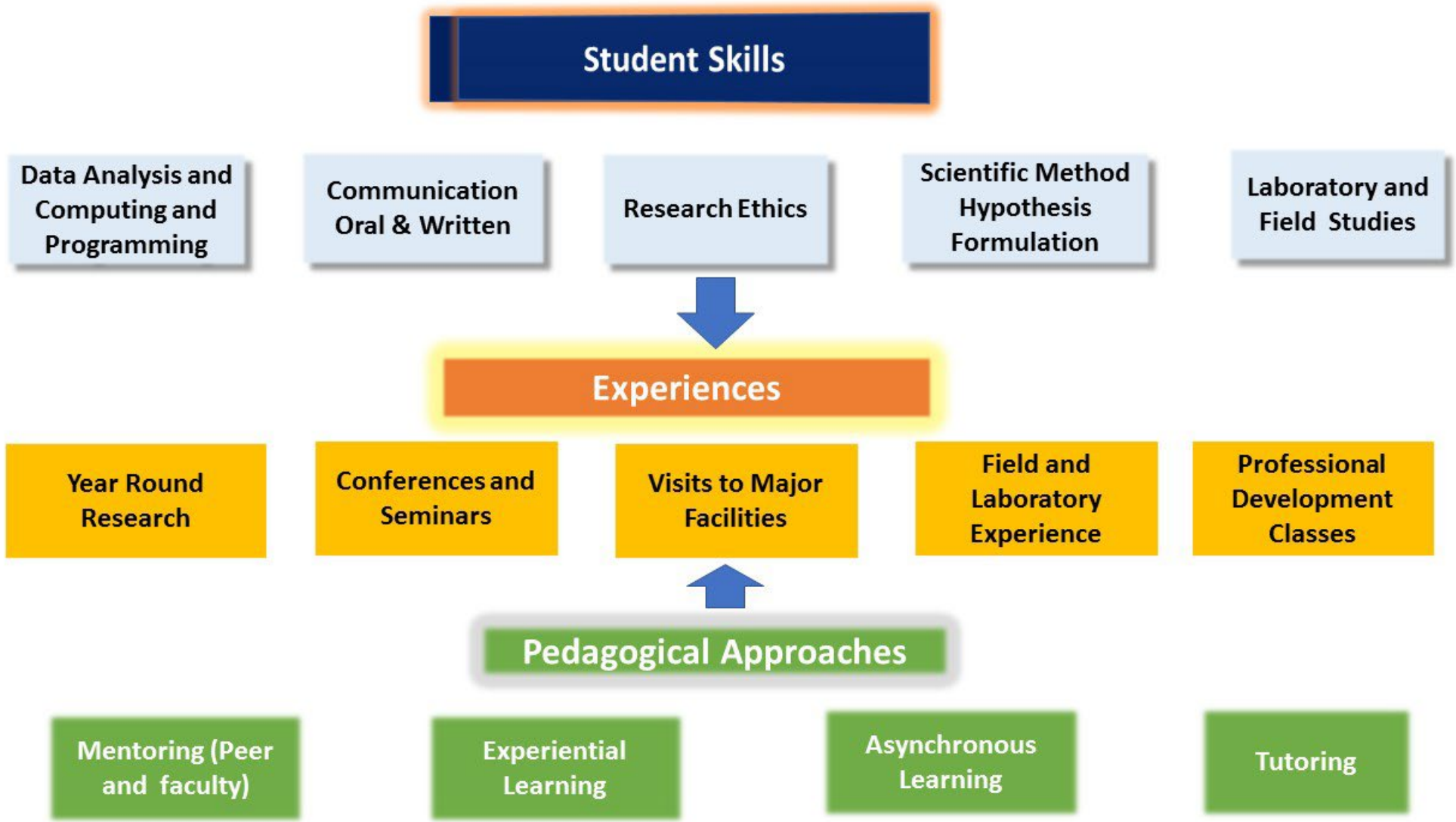
24 students participated in geosciences (mostly atmospheric sciences) through the NSF Funded Geopath program 2016-2021

Activities included

1. Visit to the National Weather Service in Raleigh-Annually
2. A one week visit to Colorado State University and NCAR 2017-2019
3. Professional development course and research year round

Discipline	Atmospheric sciences	Engineering	Other STEM
# of students by major	11 (atmospheric Sciences	8 (civil, EE, Computer science)	5 (Physics, Math)
Students who pursued MS in Atmospheric Sciences	6	1	2

The GeoPath approach



Survey Responses

- Students indicated that being a part of GeoPaths exposed them to new topics/ideas, provided them opportunities to learn new skills, and helped them understand research better.

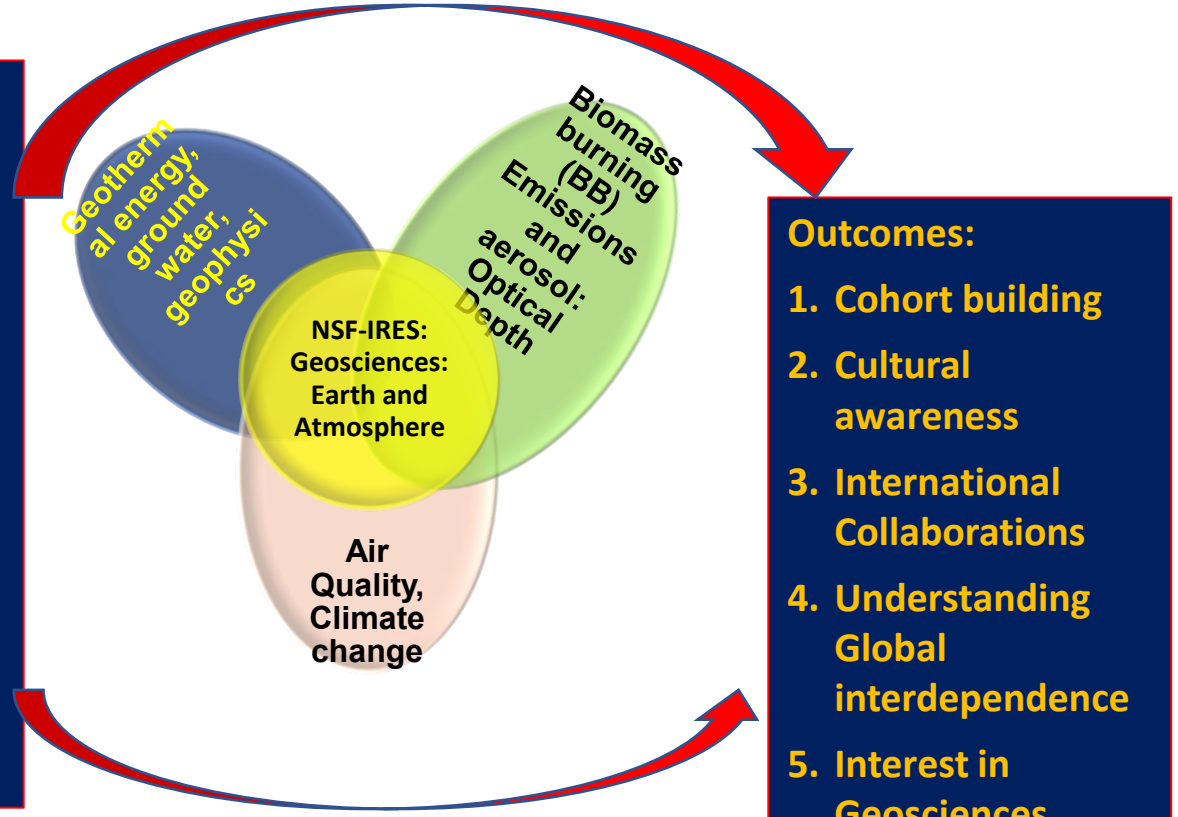
When asked what they liked best about the professional development visits provided to them, comments were very positive:

- It provided a look at a different field than my own. It exposed me to a lot of intriguing knowledge outside of the career I plan to pursue.
- The opportunities to witness professionals in action and learn about their research.
- I liked having the individual responsibility to complete research assignments on my own. It gave me a glimpse of what a real-world job would be like.

Example 3: NSF IRES: (Ethiopia: 2006-2009; Botswana 2018-2022)

Activities:

1. Laboratory studies
2. Field measurements
3. Data analysis and interpretation
4. Writing skills
5. Literature survey
6. Interdisciplinary research



Outcomes:

1. Cohort building
2. Cultural awareness
3. International Collaborations
4. Understanding Global interdependence
5. Interest in Geosciences

Program design

- Students recruited nationally
- Students spend 5 weeks in Botswana working with students and faculty in Botswana. Stipends paid both to US and Botswana Students
- Make presentations at AGU upon return

Botswana IRES Participants

NSF-IRES-Survey Results

- Students' ratings indicate that their time in Botswana allowed them to make gains in understanding
  - They further reported gaining skills in conducting database/Internet searches, keeping detailed lab notes, making oral presentations, and calibrating instruments.
  - On a personal level, students rated having made gains in terms of their confidence in their ability to contribute to science, comfort in working collaboratively with others, ability to work independently, and understanding of what everyday research work is like.
  - At least three indicated that they also, to a great extent, engaged in real-world science research, tested new ideas and/or procedures, and felt like a scientist and part of the science community.
  - Ethiopia (Peace of Heaven on Earth)

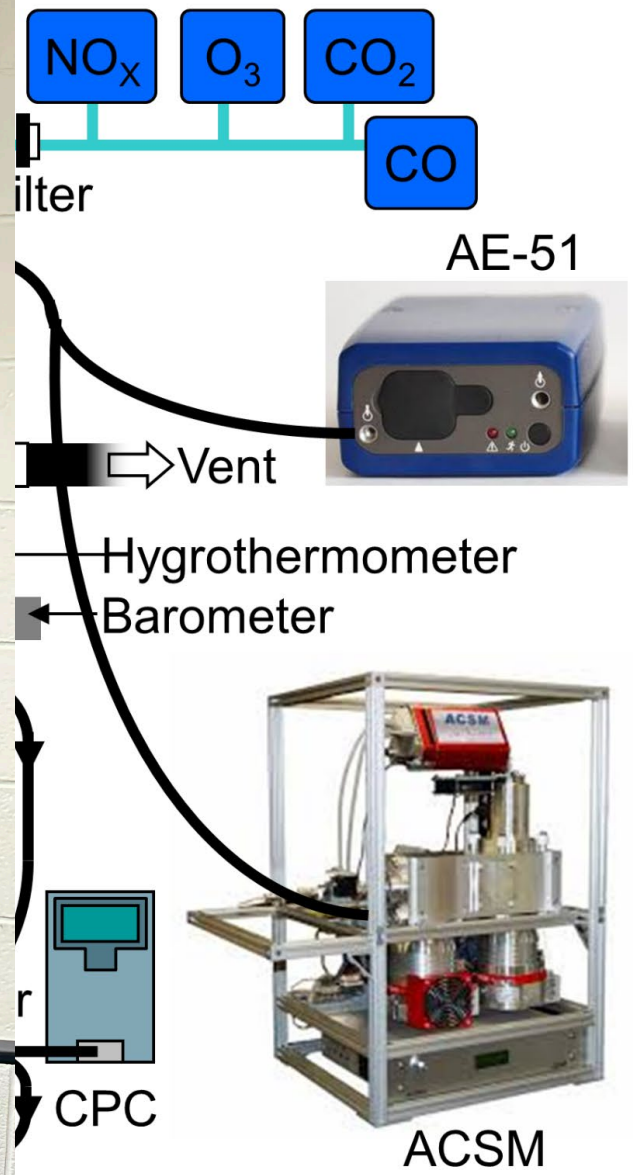
2015-present

- Series of funding from NSF-Atmospheric Chemistry Division and DoD was able to build a research program focused on African Biomass Burning aerosol

Spectroscopic techniques for atmospheric applications:

- The focus is laboratory measurement of optical and physio-chemical properties of biomass burning (BB) aerosol from African fuels.
- Laboratory studies are conducted to
- Explore impact of RH, aging, burn condition, morphology fuel type on optical and chemical properties.
- Measure emission factors of pollutants
- Determine the drivers of toxicity in BB emissions
- Model health impacts of biomass burning and trash burning in Africa
- Understand impact on climate and air quality
- Modeling: Refractive index and fractal dimensions of fractal aggregates
- Field Work: WINTER, FIREX, International-Africa

Our Current Group



PUBLICATIONS (2017-

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PNAS *32, 115, 8110-8115, **2019***.
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Atmosphere *11*(1), 62; **2020**.
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ACP-20, 10169–10191, **2020.**
JGR Volume126, Issue 5; ***2021***,
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PNAS Nexus, 2022
Clean Air Journal, Vol 22, 2022
Atmosphere 14(2), 221,2023
GeoHealth, Vol.7, Issue 2, 2023
AST Vol. 57, No. 7, 665–677, 2023,

Under Review and Under Preparation

Emission factors from wildfires in the Western US – An investigation of fuel type and diurnal dependencies during the FIREX-AQ 2019 campaign. **2022**, *Under Review - Journal of Geophysical Research-Atmosphere*.

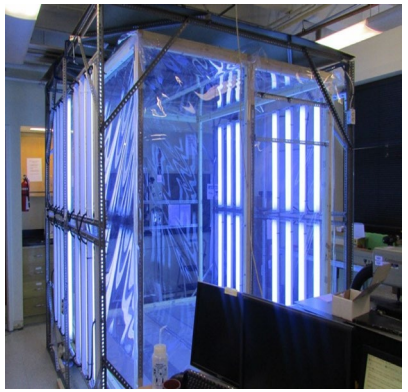
Human Bronchial Epithelial Lung Cell in vitro exposures to Ultrafine (Nano sized) Aerosols from the Combustion of White Pine" ***submitted Environmental Science and Technology***

Laboratory Studies of the Optical Properties of Organic Aerosol derived from Burning African Biomass Fuel under Different Aging Conditions and Relative Humidity- To be submitted to JGR

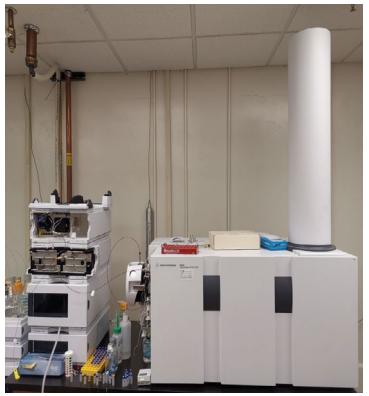
Quantifying the light-absorption properties and molecular composition of brown carbon aerosol from African biomass combustion: To be submitted to PNAS

Addressing the experimental knowledge gap on African fuel-derived BrC

North Carolina Agricultural and Technical State University



NC A&T indoor smog chamber
Smoldering combustion of African biomass fuels Dry or humidified chamber (rel. hum., RH, up to 70%)Primary and "control" (dark/photo-)aged emissions

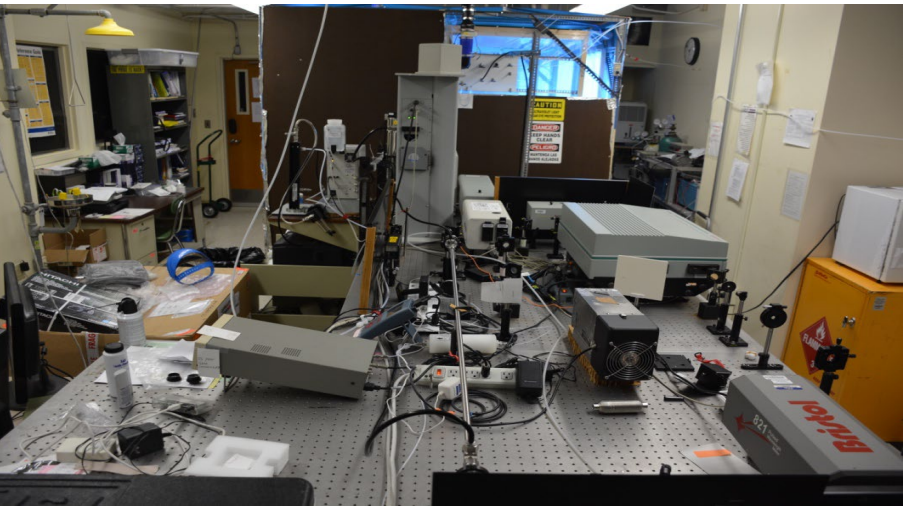


THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

UNC Biomarker Mass Spectrometry Facility
Ultra-performance liquid chromatography / diode array detection / high-resolution quadrupole time-of-flight tandem mass spectrometer Electrospray ionization, ESI(+)/(-), for BrC targeted analysis

Los Alamos NATIONAL LABORATORY

ACACIA NCAT LANL



Atmospheric aerosol sampling in Africa
Filter samples of airborne particulate matter ($PM_{2.5}$) from Botswana (BIUST & Gaborone) in the SH-winter fire season Atmospheric relevance evaluation of lab-generated BrC species

African Combustion Aerosol Collaborative Intercomparison Analysis (ACACIA)

A collaborative project between NCAT and LANL funded by DOE under grant # DE-SC0023051

Lesson #1-Creating a sense of belongingness

- Provide an inclusive environment that promotes a sense of belongingness that create a community where students feel welcome and are part.
- Students from underrepresented groups must overcome several barriers to become a professional in their field and identifying oneself as belonging to the specific professional community
- Requires paying attention and showing interest in their life journey and understanding where they come from their concerns, worries, fears.

Lesson #2-Help students in developing a professional identity

- The development of a professional identity or appropriate subject-specific identity is a fundamental part of student development and has a strong influence on retention and persistence of students in a discipline (Brophy , 2009; Flum, 2006)
- Research suggests that persistence in college in general is related to a student's ability to build academic and **social connections** within their institution (Tinto, 1987,1993, Pascarella, 1991)
- Students' development of a geosciences identity or being a geoscientist can also influence their persistence as the majors- related to a sense of belonging. (Pierrakos, 2009, Shanahan, 207)
- Recognizing racial and academic stereotypes and their roles in student success

Lesson #3- Custom design research program

- key to effective retention lies in a strong commitment **to quality** education and the building of a strong sense of inclusive educational and social community on campus.
- the design of courses about their relevance to real life and societal implications is critical to retention of students in STEM areas.
- culturally relevant pedagogy that recognizes students' experiences, cultures, and traditions.
- develop an innovative training program that will provide interdisciplinary training and pathways to geoscience careers for physical science and engineering students
- Design research that helps bring out the student's potential

Lesson #3 Cont'd

Developing Applied Interdisciplinary Programs within STEM departments- Each institution will have to develop a local model for how to incorporate interdisciplinary programs into the academic structures.

- Applied interdisciplinary programs embody the essence of best practices that enhance student learning outcomes and prepare students for the complexity of real-world issues. Students will be encouraged to perceive the connections between seemingly unrelated subjects, motivated for deep learning, and develop strong critical learning thinking skills (Ivanitskaya, 2002; Entwistle & Ramsden, 1983; Pascarella & Terezini, 1991; and De Costa, 1986,)

Lesson # 4- Be intentional and acknowledge the mutual benefit

- Increasing diversity requires an intentional effort in learning and understanding the “other” and our own unconscious biases and goes both ways.
- Realize that promoting diversity should help everyone by creating a new generation of scientists with expanded cross-cultural professional and social networks and cross-cultural understanding
- Be prepared to learn not only teach. Take time to listen to the student story.
- Recruiting and getting them to your lab is not enough- It is a lot of work but rewarding if you really care about diversity

Lesson #5- Sustained interactions

- One-time visits to Federal labs or major universities is not enough to build the disciplinary identity of the students.(Examples-NOAA lab visit experience, visits to other DoE labs)
- Follow up activity or research project for students once they get back to their home institutions is needed if students are to persist in the discipline.
- In collaborations among PI's, PI's at major institutions should invite faculty at MSI's not just to meet the funding agency criteria but for their merit.
- Often the request for collaboration is one sided

Lesson #6- Diversity should also mean maintaining high quality

- Increasing diversity should not come at a cost of compromising quality and rigor.
- We need to have the confidence and believe that everyone given equal opportunity can excel.
- Be consistent and have the same level of expectations from all your mentees.
- Key to effective retention lies in a strong commitment **to quality** education.

Lesson #7- Sustained funding for capacity building

- Most HBCU's, MSI's, Community Colleges and Teaching Universities need sustained funding to build capacity.
- One-time grant is not enough.
- The commitment (not just a letter) from MSI administrators to consider building geosciences program in their strategic goals for initial funding and continuation should evaluate the efforts to sustain the programs.

Lesson #8- Outreach to university administrators

- Grant funds alone will not help in growing and sustaining programs.
- University administrators who make policy and set the vision and direction of the universities should be educated on the values and strategic importance of the Geosciences.
- Most failures are not a result of faculty but the lack of internal support from Chairs, Deans and Provosts who often have no interest in the field

➢ **Workshops for HBCU leadership**

➢ **Engage HBCU alumni with graduate degrees in geosciences**

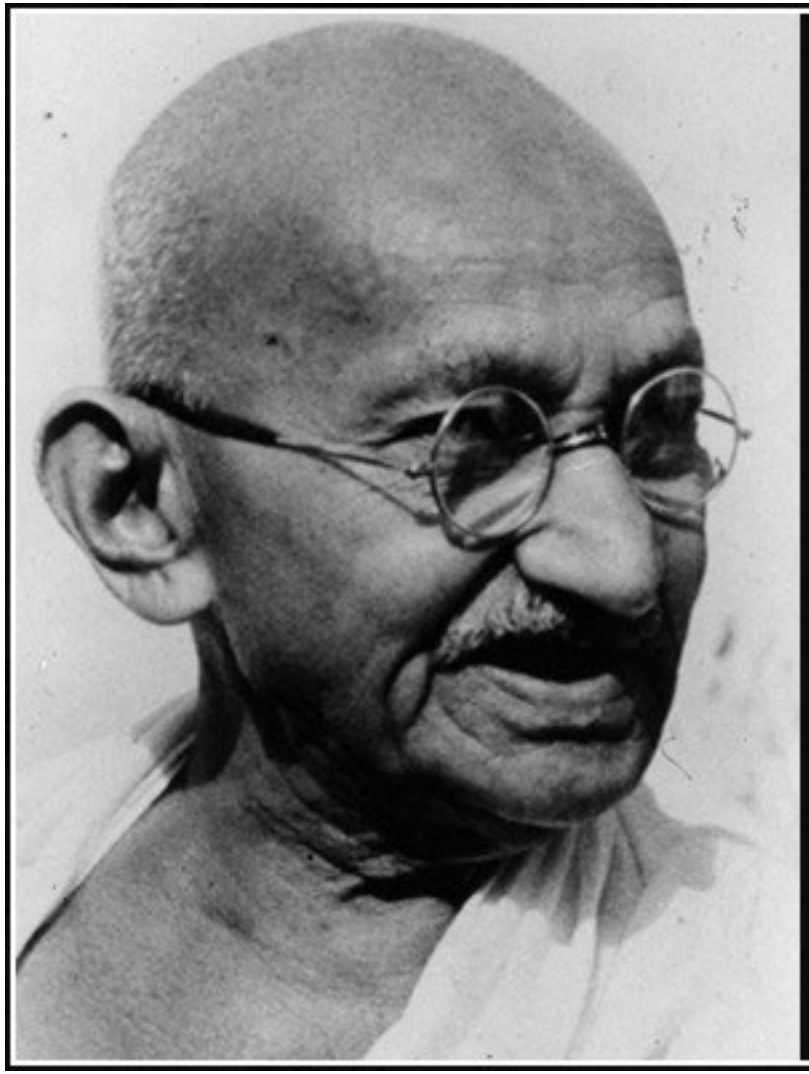
➢ **Ensure geosciences are discussed when long term strategic plans are drafted.**

Lesson #9 – Persistence and self-examination

- Ask yourselves

Do I really care about enhancing diversity in my group? What motivates me to do that? Do I care to learn about the "other"?

- Persist and never give up- Believe in the goodness of humanity and remember we all carry both the good and the evil within us.
- *"The line separating good and evil passes not through states, nor between classes, nor between political parties either—but right through every human heart—and through all human hearts."* *Alexander Solzhenitsyn*



You must not lose faith in humanity. Humanity is an ocean; if a few drops of the ocean are dirty, the ocean does not become dirty.

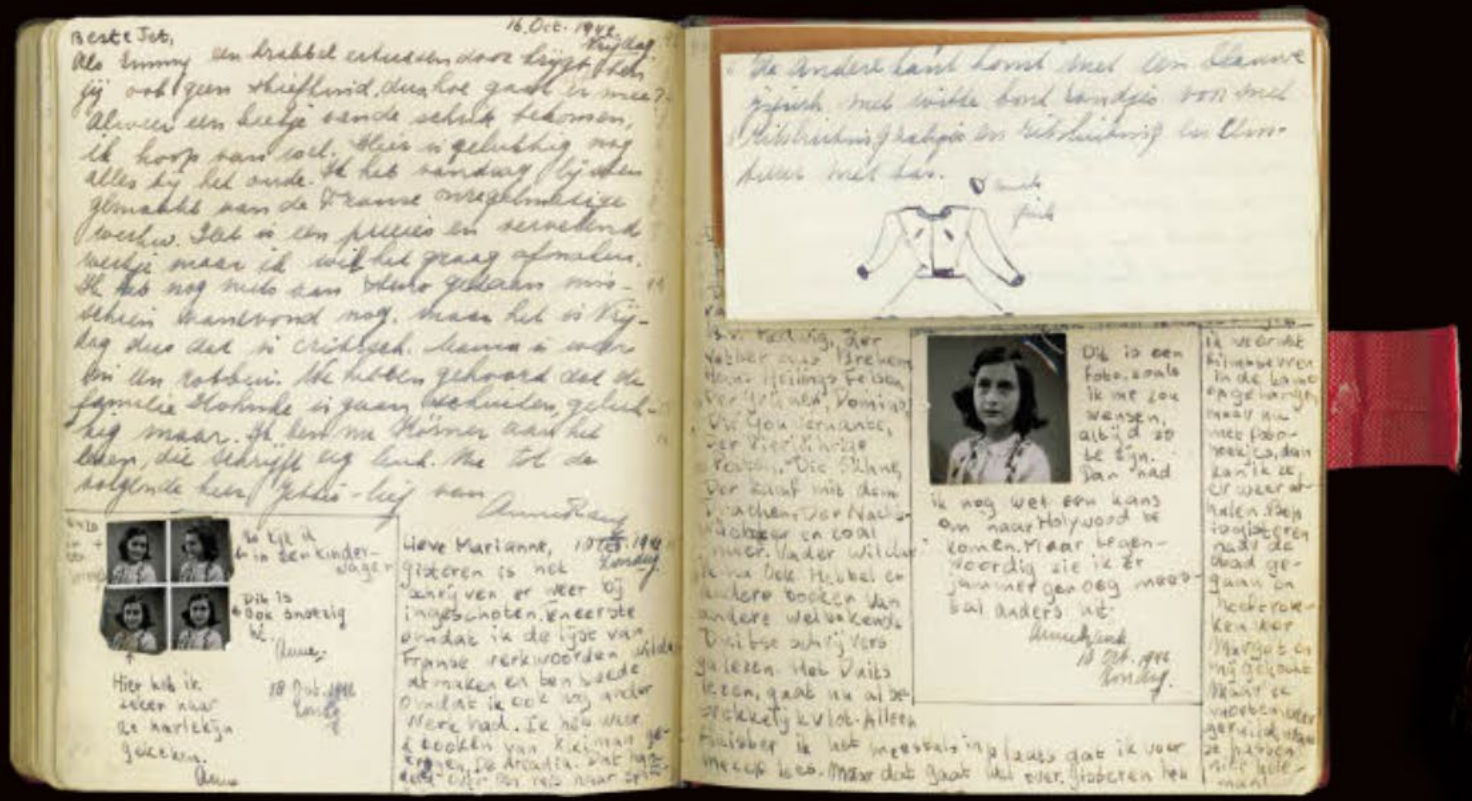
— Mahatma Gandhi —

AZ QUOTES

We signal that good can be achieved amongst human beings who are prepared to trust, prepared to believe in the goodness of people.

— Nelson Mandela —

AZ QUOTES



In spite of everything,
I still believe that people
are really good at heart.

-Anne Frank

Thank You! – Any Questions?