

2018

# ANNUAL REPORT





# TABLE OF CONTENTS

1. Director's Message
2. About our Mission and Vision based on using the JSG Strategy Plan
3. Student Profile
4. Partnerships
5. Student Highlights
5. Amigos
6. POSSE nominations
7. GeoFORCE Summer Academies
8. Summer Data
9. Valedictorians and Salutatorians
11. Student Profile
12. GeoFORCE College
14. College Data
15. GeoFORCE GearUp
16. Student Profile
17. GeoFORCE Outreach
18. 2018 Financial Snapshot
19. Endowments and Sponsors
20. 2017-2018 Outreach Staff
21. 2017-2018 Summer Staff
22. Instructors, EC/ECITS, Counselors

# DIRECTORS LETTER



## Friends and future friends,

GeoFORCE Texas continues to be a success. In the 2013 Annual Report, GeoFORCE measures of success were listed as: impact on a large number of students from diverse backgrounds, retention of students in the program through high school, high school graduation and college matriculation rates, and number of students studying STEM fields, especially geology and engineering. GeoFORCE has been successful in all four areas. The program has impacted 1,207 students since the first summer of 2005. No matter what life path these students take, they are Earth science literate citizens who have the knowledge to make science-based decisions about Earth resources, the environment and natural hazards at local, state, national, and global levels.

Starting in summer 2017, GeoFORCE is working to increase the already successful persistence rate by making the transition to college easier for students. By providing a week-long college experience on the University of Texas campus for seniors, with field experiences in the nearby Llano uplift area, students gain the confidence to be on a college campus and working on group projects in computer labs, and presenting as a group. The 2017 field experience was built on the central Texas academy that Dr. Leon Long led for students from the Fort Valley State University Mathematics, Science and Engineering Academy (MSEA) from 2004 to 2011. To encourage more students to choose geoscience majors, rising 12th grade academy seniors visited a variety of Jackson School of Geosciences faculty, research scientists, and graduate students in their labs to see the multiple opportunities for careers in the geosciences. Finally, to increase the competitiveness of STEM majors applying for graduate school and industry jobs, GeoFORCE will provide students entering the first year of college, a week-long residential calculus and chemistry summer camp to provide a foundation for math and science success.

Just as there were lessons learned from the first 9th grade academy in 2005 that led to improvements for the second 9th grade academy in 2006, GeoFORCE will make improvements to the 2018 central Texas 12th grade academy based on the experiences and feedback from the 2017 central Texas 12th grade academy. Improvements to the 2006 9th grade academy included reducing the trip from 13 to 8 days, administering age-appropriate quizzes developed by education specialists, providing an easy to understand field guide to focus activities, defining the roles and assigning duties to every adult participating, and adding educational coaches to assist the instructor. We look forward to working with all of the GeoFORCE stakeholders to learn from the past and build on the successes to meet the mission of diversifying the STEM workforce.

Best Regards,

Samuel L. Moore, Ph.D.  
Director of Outreach and Diversity  
Jackson School of Geosciences  
The University of Texas at Austin



GeoFORCE has retained over 90% of students in the program through four years of high school. Of these students, 100% graduate from high school compared to graduation rates of 89.1% for Texas and 83% for the US. Of the GeoFORCE students who graduate from high school 86% matriculate to college compared to 52% for Texas. The students who matriculate to college persist to the sophomore year at a 90% rate versus 84% for Texas, with 52% of these students majoring in STEM. Thinking forward, what's next?

# *"THE BIGGEST IMPACTS ARE MADE HERE"*

## METHODOLOGY AND MEASURES

The Jackson School of Geosciences at The University of Texas at Austin is one of the largest and most prestigious academic geoscience institutions in the world. It was established as a college-level school in 2005, as the result of the bequest of Jack and Katie Jackson, with the overarching goal of becoming the preeminent academic geoscience program, with international prominence in geology and geophysics, energy, mineral and water resources and in the broad areas of earth science, including Earth's environment.

The school consists of the Department of Geological Sciences (DGS), Institute for Geophysics (UTIG), and Bureau of Economic Geology (BEG), which also serves as the Texas Geological Survey. It is made up of 53 faculty, 90 research scientists, 110 research staff and postdoctoral scientists, 600 graduate and undergraduate students, and 140 support staff, working together to create a distinctive academic institution unlike any other in combined scope, impact, and direct societal relevance







## PARTNERSHIPS

“ Together, we are better at serving the needs of our target population and furthering our objectives. ”

GeoFORCE maintains strong partnerships with universities, school districts, industry, and government organizations that share our values and goals. Together we are better at serving the needs of our target population and furthering our objectives.

### Southwest Texas Junior College (SWTJC)

Our partnership with Southwest Texas Junior College is the cornerstone of the southwest Texas region's success. SWTJC supports every aspect of GeoFORCE implementation, from building relationships with local school districts to providing logistical support for GeoFORCE events in the area.

### Houston Independent School District (HISD)

HISD supports our partnership in the Houston region by giving us access to middle schools for recruiting and to high schools for our outreach programs. We have used HISD facilities for meetings and as drop-off and pick-up locations. Most importantly, individual principals and teachers have gone out of their way to make GeoFORCE possible for their kids.

### University of Alaska Fairbanks (UAF)

GeoFORCE Alaska currently is working with their second student cohort, completing their third summer in 2018. We continue to collaborate with and support this growing GeoFORCE program as it develops into the second GeoFORCE program in the nation.

### Fort Valley State University (FVSU)

We remain closely connected to FVSU, where the model for GeoFORCE was framed. We continue to work together to bring opportunities to students of color. Isaac Crumbly and Jackie Hodges run the Fort Valley programs.

### Amigos de las Americas

GeoFORCE has collaborated with Amigos de las Americas to provide two GeoFORCE students the opportunity to gain essential education and life experience, leadership training, and an entirely new network of friends by living and working in amazing communities throughout Central and South America.

<b>First Name</b>	<b>Last Name</b>	<b>Company</b>
Chelete	Burnett	Anadarko
Tom	Griffith	Anadarko (Retired)
Scott	Schmidt	Baker Hughes
Chris	Lerch	BHP
Christine	Skirius	BHP
Jessica	Swafford	BHP
Kira	Diaz-Tushman	BP
Larry	Thomas	BP
Karen	Rawls	Chevron
Melissa	Loyd-Furnas	Conoco Phillips
Allen	Gilmer	Drilling Info
Mark	Nibblink	Drilling Info
Nick	Way	Exxon
Reggies	Beasley	Exxon (Retired)
Mike	Loudin	Exxon (Retired)
Abayomi	Olufowoshe	Halliburton
Karla	Auzenne	HISD
Hortense	Campbell	HISD
Yolanda	Evans	HISD (Retired)
Danny	Eoakes	Marathon Oil
Erin	Roehrig	Marathon Oil
Christina	Venditti	Newfield
Michale	Alvarez	Shell
Mark	Martin	Shell
Denise	Butler	Shell (Retired)
Paula	Harris	Schlumberger
Susan	Rosenbaum	Schlumberger
Emily	Clodfelter	TWC

<b>Park:</b>	<b>Individual:</b>	
McKinney Falls State Park	Victoria Dorough	9th
Goose Island State Park		9th
University of Texas Marine Science Institute	Amanda Taylor	9th
Katy Research Vessel	Capt. Stan Dignum	9th
Texas State Aquarium	Glenda Martinez	9th
Galveston Island State Park	Lisa Reznicek	9th
Zion National Park		10th
Valley of Fire State Park		10th
Glen Canyon Dam	Nikki Jaborski	10th
Wilderness River Adventure	Robin Marquis	10th
Grand Canyon National Park	Roy Benefield	10th
Sunset Crater/Wupatki National Indian Ruins	Steven Rossi	10th
Mt. St. Helen's National Monument	Kristine Cochrane-Bell	11th
Vista House at Crowne Point		11th
Mt. Hood - Timberline Lodge	Kim Nylund	11th
Newberry National Volcanic Monumnet	Karen Gentry	11th
Crater Lake National Park	Katie Day	11th
Oregon Dune State Park		11th
Pacific Northwest Region Forest Service		11th
Oregon Coast Aquarium	Carrie Evans	11th
Barton Springs Pool	Carlos Nunez	12th





## STUDENT HIGHLIGHTS

# Student Stories



## Theresa Gaitian

*Product Release Specialist*

Peterbilt custom makes all of their trucks for each customer, so my job involves going through each frame layout in a 3D modeling program and placing certain components on the rails, such as air systems, fuel tanks, battery boxes, and cross members, according to the customer's needs. However each component has specific requirements related to things such as heat clearance zones, weight distribution, and cable lengths that all need to be taken into account. So some trucks require me to go back and talk with the customer about making small adjustments in order meet those requirements. By the end I have a drawing that shows where all the components will be, but mostly shows where each hole in the frame of the truck needs to be drilled.

After that drawing is done, I also go through the bill of materials for each truck. Based on where I placed certain components, I have to make sure the bills match what the frame layout data says.

.....

For the most part, the trucks I have drawn have been pretty straight forward, not too many complications. But I have had a few where you really have to figure out how to make everything work. Though it is a lot of going back and forth with the customer and reading through our book of guidelines for components, it's just fun to figure those out. Sometimes because the customer requires certain components to be in certain places, you not only have to figure out one solution but two or three and then maybe the customer will pick one.

It may just be one component that is causing you problems, so you try to focus on that one area, but then you figure out the the answer was with something on the other side of the truck.

I always think of GeoFORCE as the place where I realized what I wanted to be.. an engineer. I remember being a student and having a sponsor, who happened to be an engineer, come talk to us and just hearing about all things that they do and the opportunities.. something just clicked in me and I just knew engineering was what I wanted to do. GeoFORCE helped shine a light on a path had never even crossed my mind and I'm sure eventually I would have figured it out, but definitely not as early as I did.

**"I always think of GeoFORCE as the place where I realized what I wanted to be.. an engineer".**



## Reynaldo Cabrera

*Geologist at Luxe Minerals & Luxe Energy*

I am currently a Geologist for both Luxe Minerals & Luxe Energy and I have been with the company for over a year and a half now. Being that Luxe is a smaller private company, I have been exposed to numerous aspects of the oil and gas industry. I have analyzed seismic data, geosteered wells, interpreted well logs, and generated numerous geological maps, while simultaneously gaining exposure to the land, finance, and engineering side of the business. Gaining expertise in these skills has allowed me to perform my primary job, which is providing thorough geologic assessments of all mineral deals sent to Luxe in the Permian Basin. The one thing I have enjoyed/been surprised about in this job is the competitive nature of the industry. When good deals come in, you have to be fast and efficient with your analysis in order to get the big payouts. GeoForce truly opened my eyes to the industry by educating me on the fundamental processes of geology while also allowing sponsors from big public oil and gas companies to come along on our trips.

Hearing them discuss their work experiences and how the knowledge we acquired from GeoForce instructors is utilized in their everyday work truly sparked my interest in geology.

analyzed seismic data, geosteered wells, interpreted well logs, and generated numerous geological maps, while simultaneously gaining exposure to the land, finance, and engineering side of the business providing thorough geologic assessments of all mineral deals sent to Luxe in the Permian Basin

Reynaldo "Rey" Carbrera has been working for Luxe Minerals & Luxe Energy in Austin, TX for more than 1.5 years, and he has enjoyed the competitive nature of the business.

"When good deals come in, you have to be fast and efficient with your analysis in order to get the big payouts," Cabrera said. His primary responsibility is to provide thorough geologic assessments of all Permian Basin mineral deals sent to Luxe. As such, Cabrera engages in a variety of tasks, including analyzing seismic data and generating geologic maps, interpreting well logs and geosteering wellbores and even familiarizing himself with the land, finance, and engineering side of the business. Cabrera was first inspired to pursue a career in the petroleum industry by GeoFORCE sponsors on his summer trips. "Hearing them discuss their work experiences and how the knowledge we acquired from GeoFORCE instructors is utilized in their everyday work truly sparked my interest in geology," he remembers. Years later, Cabrera finds himself following in their footsteps, eager to become a role model for younger GeoFORCE students.

**"GeoFORCE truly opened my eyes into the industry by educating me on the fundamental processes of geology".**

## Student Stories



### David Splawn

*Geoscience Technician*

I am working for ExxonMobil as a geoscience technician. I am supporting the West Africa New Opportunity team. My job involves using GIS to create accurate maps that efficiently display our data and information and geological knowledge to help support and manage data in petrel. My favorite thing is seeing all the different hypothesis in early research of leads where data is limited. GeoFORCE provided me with the fundamental geological and spacial knowledge that allowed me to easily build on from college.

**"GeoFORCE  
provided me with  
the fundamental  
geological and  
spacial knowledge".**

# Katherine Garcia

*Geoscience Technician*

Nearly 1,700 miles from where she takes geology courses at Franklin and Marshall College in Lancaster, PA, Katherine Garcia found herself applying the geoscientific knowledge learned in the classroom as an intern with DJR Energy in Denver, CO. “The internship reaffirmed my interest in the field of geosciences. It also provided me with a better understanding of the oil and gas industry,” said Garcia (GeoFORCE Class of 2017). She gained experience with a range of geologic techniques at multiple scales – from analyzing core samples to deciphering well log data. At an even larger scale, Garcia used ArcGIS to make topographic maps of the San Juan basin. To round out the internship, Garcia went to the field and performed a variety of tasks at wells in New Mexico, including restarting pump jacks, installing joints on wells and checking oil levels in tanks. Garcia credits GeoFORCE with leading her to the internship, saying that “GeoFORCE set the foundation towards my career in geosciences. Without GeoFORCE I would have never been introduced to geology or encouraged to apply to college.”

**"GeoFORCE set the foundation towards my career in geosciences, Without GeoFORCE I would have never been introduced to geology".**

**GeoFORCE Class of 2017**

## Student Highlights



GeoFORCE collaborates with other organizations to provide opportunities to our students. We have the privilege of nominating students for and directing them towards competitive scholarships. For example, a number of our students are Posse Houston Scholars. Through a rigorous interview and application process, students are selected to be part of a cohort – or posse – and receive a four-year full tuition scholarship to attend a partner university. Posse Scholars are valued for their leadership skills, positivity, and ambition. Oftentimes GeoFORCE students are nominated by their high schools or other programs to become Scholars. Three students nominated by GeoFORCE have gone on to become Posse Scholars: Francisco Castro (GeoFORCE Class of 2014, Carleton College), Jamal Fielder (GeoFORCE Class of 2015, UT Austin) and Jennifer Ray (GeoFORCE Class of

2016, Texas A&M University). Currently, three more GeoFORCE students are in the semi-finalist round of their Posse interviews.



## GeoFORCE student receives four-year scholarship

Katie Story Sabinal High School senior Marlowe Story displays the oversized scholarship check presented to her by University of Texas at Austin deputy director of admissions Miguel Wasielewski.

Sabinal High School senior Marlowe Story received one of her best presents just days after Christmas when University of Texas at Austin deputy director of admissions Miguel Wasielewski arrived on the family's doorstep bearing news of a four-year scholarship.

The letter Wasielewski presented from UT admissions director Susan Kearns announces that Story has been admitted to the Jackson School of Geosciences for the fall 2018 semester. Kearns also writes that Story will benefit from a full scholarship, worth approximately \$12,000 per year.

Wasielewski arrived bearing gifts. In addition to the oversized check declaring the scholarship amount, Story also received a University of Texas backpack and balloons.

## Amigos and GeoFORCE



**P**articipating in Amigos provided me with countless opportunity to prove myself as a leader. This was an unparalleled experience that awarded me with cross-cultural communications skills, collaborative skills, adaptability skills, critical thinking skills, etc. I was pushed out of my comfort zone and I learned how to embrace challenges and overcome obstacles. In collaboration with a partner and various community leaders, I led a youth development project on water conservation. I lived in an area that is a hydrological reserve, an important source of water for the country of Panama. This enabled us to build a water tank for the local clubhouse in our community. I organized and lead various meetings with my partner and community members.



At these meetings, we were able to decide on a project, draft an action plan, organize fundraising events, and schedule workdays. I also lived with a host family and collaborated with the Panamanian Ministry of Health on my community service project. Also, with my partner, I planned and facilitated extracurricular activities for kids centered on environmental sustainability and public health.

Most importantly, I learned how to support others. Maintaining a supportive partner relationship was very important to me. My partner got really sick and had to return back to Texas before the end of the program, and I was able to be there and support her through it all. The challenges we faced together enabled us to build a stronger relationship, and we have formed such a great friendship.

Next semester, I will be studying and interning abroad in Granada, Spain. As an intern at a non-governmental organization (NGO), I will assist with administrative tasks, translate texts, and help with fundraising activities. Interning at an NGO will help me gain the hands-on, practical experience I need to start my environmental non-profit in the future. The knowledge and skills I gained from my environmental sustainability project in Panama furthered my activism for the environment. I want to be a part of grass root efforts that bring awareness to some of our environmental problems especially the contamination and depletion of ground and surface water. My knowledge of Spanish will definitely help me in my future goal because I want my non-profit to have its presence in the landscape of international development especially in South and Central America. In addition to being able to receive academic credits from my internship, I will further gain cross-cultural communication skills and networking opportunities with professionals and like-minded peers.

## PARTNERSHIP WITH GEAR UP



The GEAR UP partnership with GeoFORCE began the summer of 2014 and sought innovative programs to help encourage students to pursue their education. Since GEAR UP is a discretionary grant program designed to increase the number of low-income students who are prepared to enter and succeed in postsecondary education, GeoFORCE and GEAR UP became a perfect fit. As part of the GEAR UP program, students were offered the GeoFORCE experience with summer trips to Florida, Arizona, Oregon, and the Appalachian region. GeoFORCE GEAR UP was comprised of students from four Texas cities: Lubbock, Manor, San Antonio, and Somerset.

During the summer of 2017, 39 students completed their final academy with GeoFORCE. The 2018-2019 school year marks the next step in life for our GeoFORCE GEAR UP students as they embark on their first year of college. They are currently attending universities across the state, along with a few who have ventured beyond Texas to colleges such as the University of Arizona and Harvard University. Eight GEAR UP students attended the Math and Science Institute, and four students are majoring in geosciences.



Recipient of the 2016 GEAR UP Youth of the Year award, Lucero “Lucy” Castañeda participated in all four GeoFORCE GEAR UP Summer Field Experiences. The road to academic success hasn't been an easy road for Lucy, who said she has faced big disadvantages, and in some situations even had to teach herself to keep up with the national competition. Graduating top of her class from Somerset High School, Lucy is the first Somerset graduate to attend Harvard University.



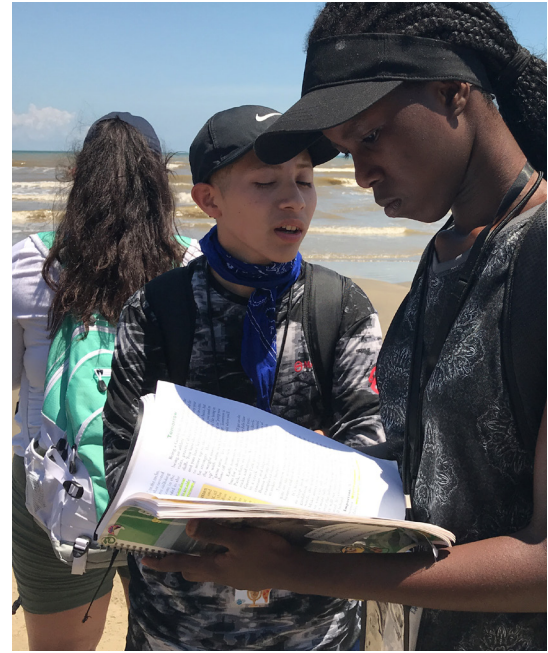
**GEOFOR**  
T E X A  
JACKSON SCHOOL OF GEOSCIENCE

A group of approximately 20 students are posing for a photo in front of a massive, layered rock formation. They are holding a large orange banner that reads "THE UNIVERSITY OF TEXAS AT AUSTIN JACKSON SCHOOL OF GEOSCIENCES". The students are dressed in casual summer clothing, and many are making peace signs. The background shows the rugged, reddish-brown rock face under a clear blue sky. A large, semi-transparent orange circle is overlaid on the right side of the image.

## ACADEMIES DATA

# 9th Grade Academy

Students are introduced to basic geological terms and processes while provided with opportunities to experience life on a major university campus.





## GFH 9 2018

June 2 – 8, 2018

Coordinator: Edgar Garza

Instructor: Tiffany Caudle

EC: Danielle Chambers

Trail Driver: Madelynn Mize

Media Coordinator:  
Selene Alba

Sponsor: Joel Le Calvez –  
Schlumberger

Student Participants: 40

Staff Participants: 10

Sponsors: 1

## GFSW 9 2018

June 16 – 22, 2018

Coordinator: Chris Graham

Instructor: Tiffany Caudle

EC: Alejandra Martinez

Trail Driver: Kathleen Wilson

College Coordinator: Dana Thomas

Sponsor: Mark Martin – Shell

Christine Skirius – BHP

Yomi Olufowoshe  
– Halliburton

Student Participants: 44

## 10th Grade Academy

During the second summer of GeoFORCE, we inspire students to “think like a geoscientist,” and apply geological concepts in real time. Students learn about sedimentary structures, processes, and environments.

### GFH 10 2018

June 2 – 8, 2018

Coordinator: John Hash

Instructor: Jaime Barnes

Educational Coach: Kyla Hardaway

Trail Driver: Evan Ramos

College Coordinator: Dana Thomas

Sponsor: Jess Swafford – BHP

Lauren Fortsen – ExxonMobil

Erin Roehrig – Marathon Oil

Student Participants: 40

Staff Participants: 11

Sponsors: 3

### GFSW 10 2018

June 9 – 15, 2018

Coordinator: Larry Savoy

Instructor: Peter Flaig

Educational Coach: Hector Garza

Trail Driver: Teresa Gaitan

Media Coordinator: Selene Alba

Sponsor: Michael Gutierrez

- ExxonMobil

Student Participants: 44

Staff Participants: 10

Sponsors: 1





# 11th Grade Academy

During the third summer, we introduce students to volcanic structures, processes, and environments. We compare and contrast West Coast and Texas Gulf Coast coastal processes, all while reinforcing the geological

## GFH 11 2018

July 7 – 13, 2018

Coordinator: John Hash

Instructor: Jeff Paine

EC: Kyla Hardaway

Trail Driver:  
Edgar Aguilar

Sponsors: Deb Pfeiffer – JSG Advisory  
Council; Danielle Carpenter – Chevron

Student Participants: 37

Staff Participants: 10

Sponsors: 2

## GFSW 11 2018

July 21 – 27, 2018

Coordinator: Chris Graham

Instructor: Jeff Paine

EC: Matthew Moreno

Trail Driver: JT Treviño

Media Coordinator: Selene Alba

GeoFORCE Staff: Dan Campos

GeoFORCE Staff: Marissa Vara

College Coordinator: Dana Thomas

Sponsor: Belle German – JSG Staff

Student Participants: 40

Staff Participants: 12

Sponsors: 1





# 12th Grade Academy

During the third summer, we introduce students to volcanic structures, processes, and environments. We compare and contrast West Coast and Texas Gulf Coast coastal processes, all while reinforcing the geological



## GFM 12 2018

June 15 – 23, 2018

Coordinator: John Hash

Trail Driver: Marissa Vara

Instructor: Wonsuck Kim

EC: Phil Caggiano

EC: Michelle Ribelin

ECIT: Caitlin Tran

ECIT: Robin Lee

ECIT: Daniela Garza

Sponsor: Julie Jackson – Shell

Chris Lerch – BHP

Tom Griffith – Anadarko (Retired)

Student Participants: 31

Staff Participants:

Sponsors: 3

## GFH 12 2018

June 8 – 16, 2018

Coordinator: Daniel Campos

College Coordinator: Dana Thomas

Instructor: Linda McCall

EC: Enrique Reyes

EC: Eric Goldfarb

Trail Driver: Rebecca Alexander

Sponsor: Bud Scherr – Valence Operating Company

Bill Magee – Shell

Student Participants: 32

Staff Participants: 12

Sponsors: 2



## ***GFSW 12 2018***

June 29 – July 7, 2018

Coordinator: Daniel Campos

College Coordinator: Dana Thomas

Trail Driver: Chris Graham

GeoFORCE Staff: Marissa Vara

Instructor: Sarah George

EC: Lauren Oefinger

EC: Eric Goldfarb

ECIT: Marianne Coholich

ECIT: Robin Lee

ECIT: Mia Moi

Sponsor: Kristen Guerra - Schlumberger

Student Participants: 34

Staff Participants: 16

Sponsors: 1







## HIGH SCHOOL DATA

# Saludatorian and Valedictorian

GeoFORCE has been very successful in recruiting the top performing students from the schools we target. Of the 144 GeoFORCE students who graduated high school this past year, 25 of them graduated at the very top of their class. These students exemplify the hard work and perseverance we have come to expect from all GeoFORCE students. These students, along with their fellow GeoFORCE alum are sure to become the future leaders and trailblazers on campus. We wish you all the best in your college endeavors.



Nathan Alonzo  
La Pryor High School  
Valedictorian



Ayme Bruce  
Brackett High School  
Valedictorian

# 17.4%

Graduated 1st or 2nd in their  
high school class

• • • • • • • • • •



Brian Cardenas  
Carrizo Springs High School  
Valedictorian



Lucy Castaneda  
Somerset High School  
Valedictorian



Jolee Cave  
Leahey High School  
Valedictorian



Christa Chapa  
Crystal City High  
School  
Valedictorian



Sasha Corral  
CC Winn High School  
Salutatorian



Eleanor Cote  
D'Hanis High School  
Valedictorian



Jessica Dong  
Knippa High School  
Valedictorian



Jennifer Garcia  
Young Women's College Prep  
Salutatorian



Alan Gonzalez  
CC Winn High School  
Valedictorian



Heather Hernandez  
Cotulla High School  
Valedictorian



Janae Jensen  
Brackett High School  
Salutatorian



Emma Lessing  
Hondo High School  
Valedictorian



Leah Lewis  
Young Women's College Prep  
Valedictorian



Nadia Navarro  
Sabinal High School  
Salutatorian



Jennifer Pena  
Eagle Pass High School  
Salutatorian



Jaden Riley  
Kashmere High School  
Salutatorian



Brandon Garcia  
Memorial High School  
Valedictorian



Baylee Rubio  
Sabinal High School  
Valedictorian



Hector Ruiz  
Rocksprings High School  
Salutatorian



Ryan Salazar  
John F. Kennedy High School  
Salutatorian



Ernesto Salazar Yanez  
E. L. Furr High School  
Salutatorian



Alexzandra Urrabazo  
Crystal City High School  
Salutatorian



Matthew Williams  
Uvalde High School  
Salutatorian

## Geoforce Academies Data

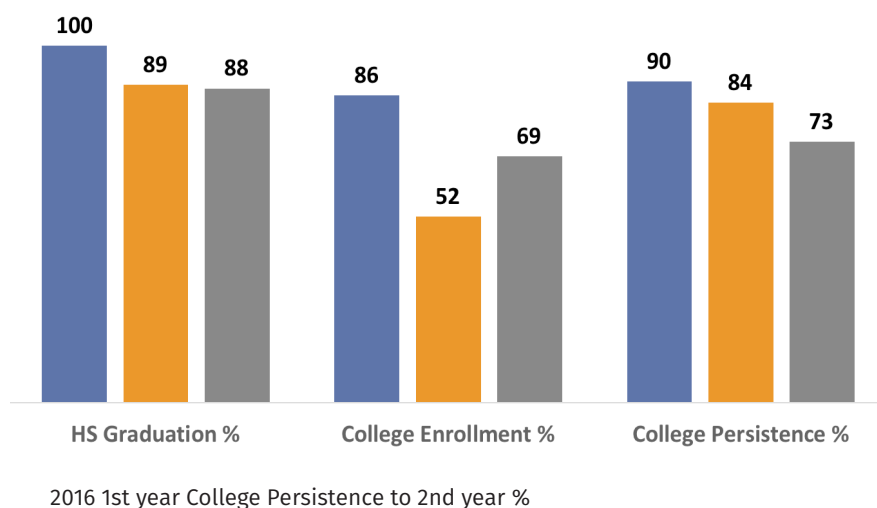
**84%**

of 2017 high school  
participants are  
minorities.

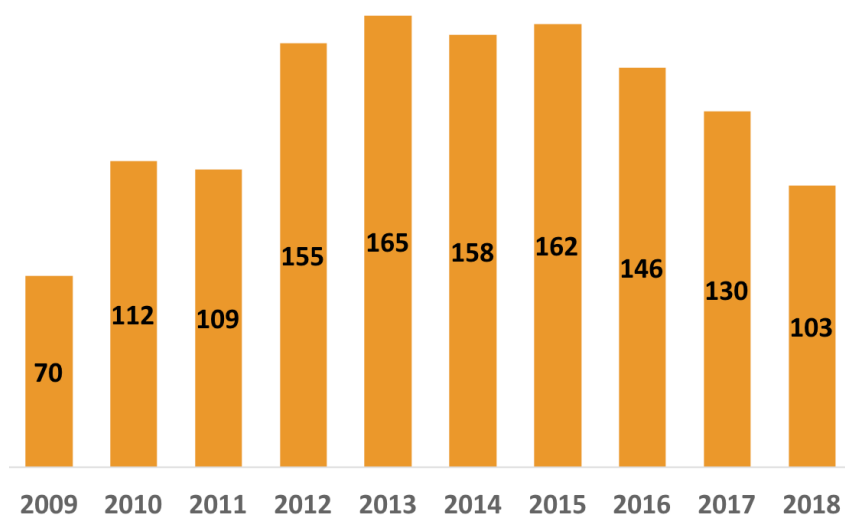
HISPANIC  
PARTICIPANTS:  
**57%**

PRIMARILY FROM  
SOUTHWEST REGION

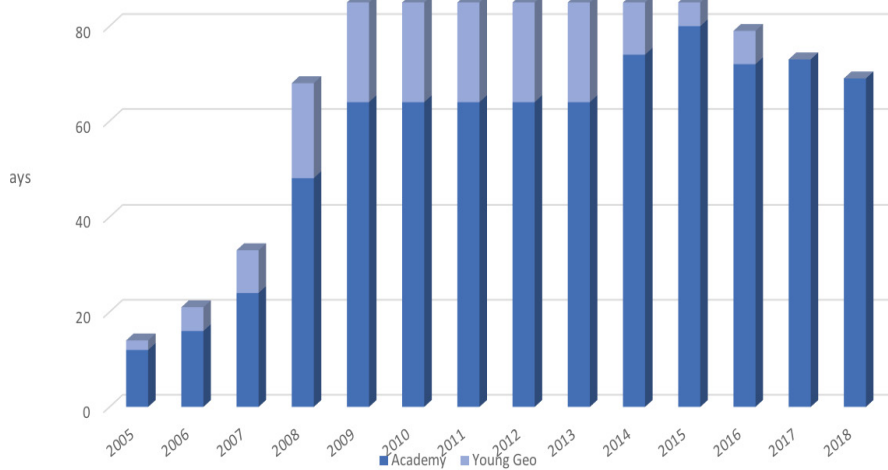
**GeoFORCE Academies Post Secondary Outcome Rates vs. State and National**



**Number of GeoFORCE H.S. Graduates per Cohort**



Total Program Days

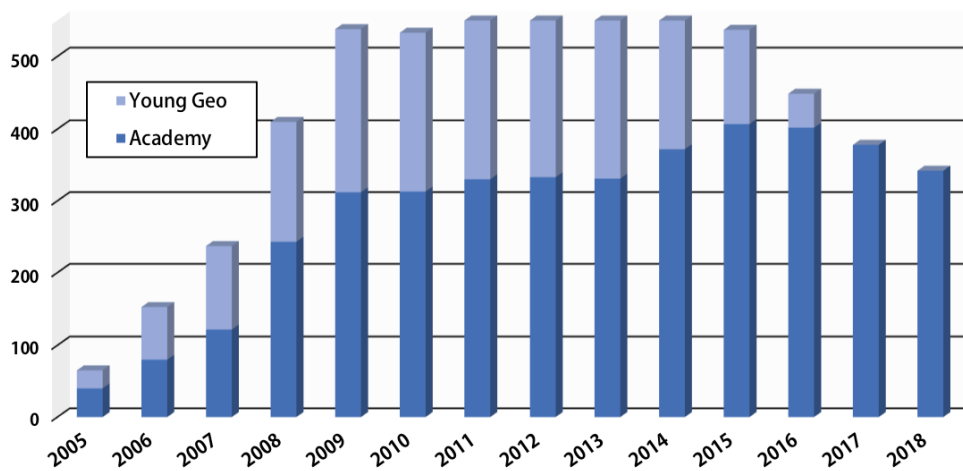


AFRICAN  
AMERICAN  
PARTICIPANTS:

17%

PRIMARILY FROM  
HOUSTON REGION

Total GeoFORCE Students



FEMALE  
PARTICIPANTS:

60%

SUMMER 2018



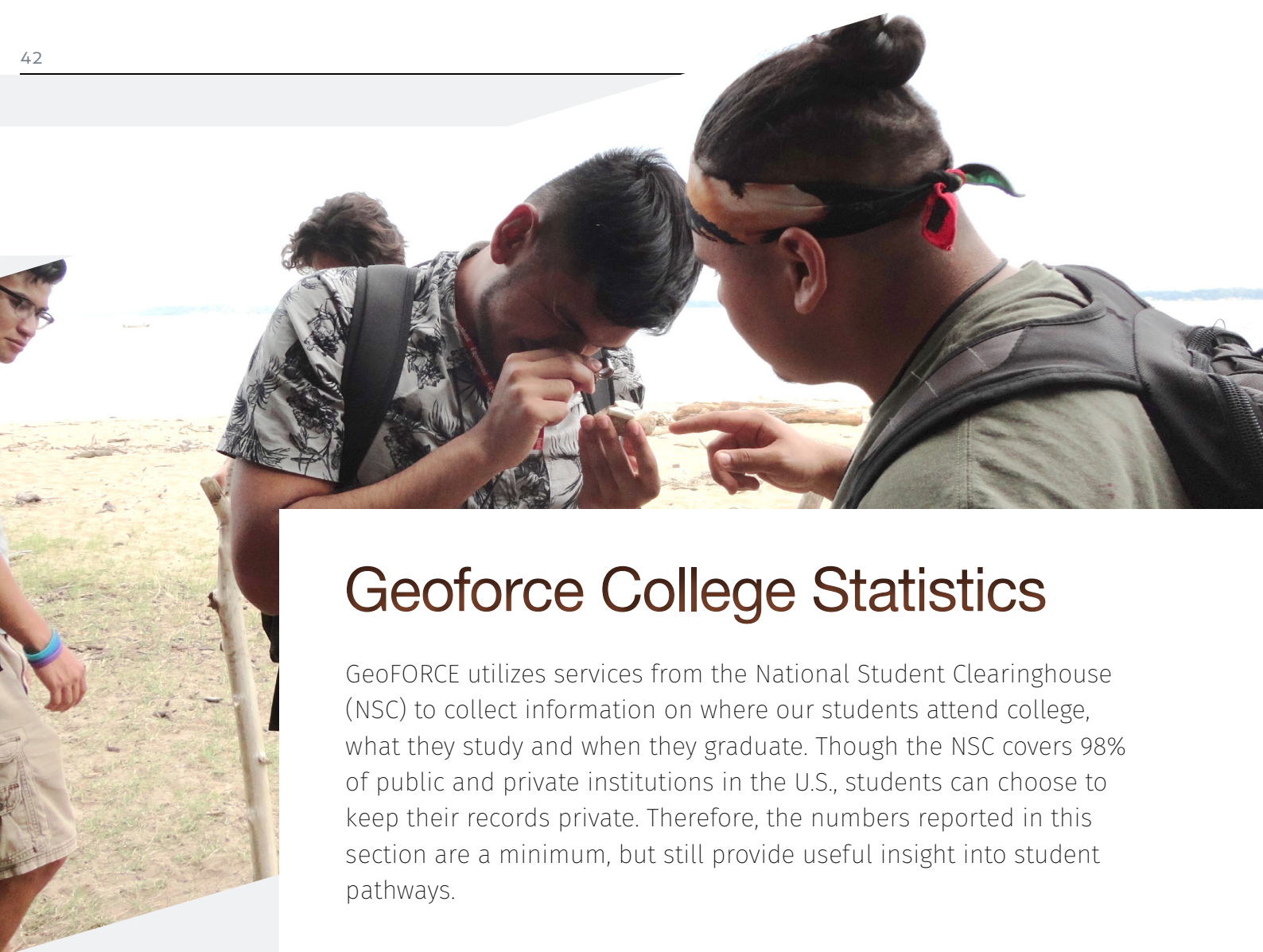
**342** THE NUMBER OF HIGH  
SCHOOL STUDENTS WHO PARTICIPATED  
IN GEOFORCE SUMMER FIELD  
EXPERIENCES IN 2018

**103** THE NUMBER OF HIGH SCHOOL  
STUDENTS WHO GRADUATED FROM HIGH  
SCHOOL IN 2018





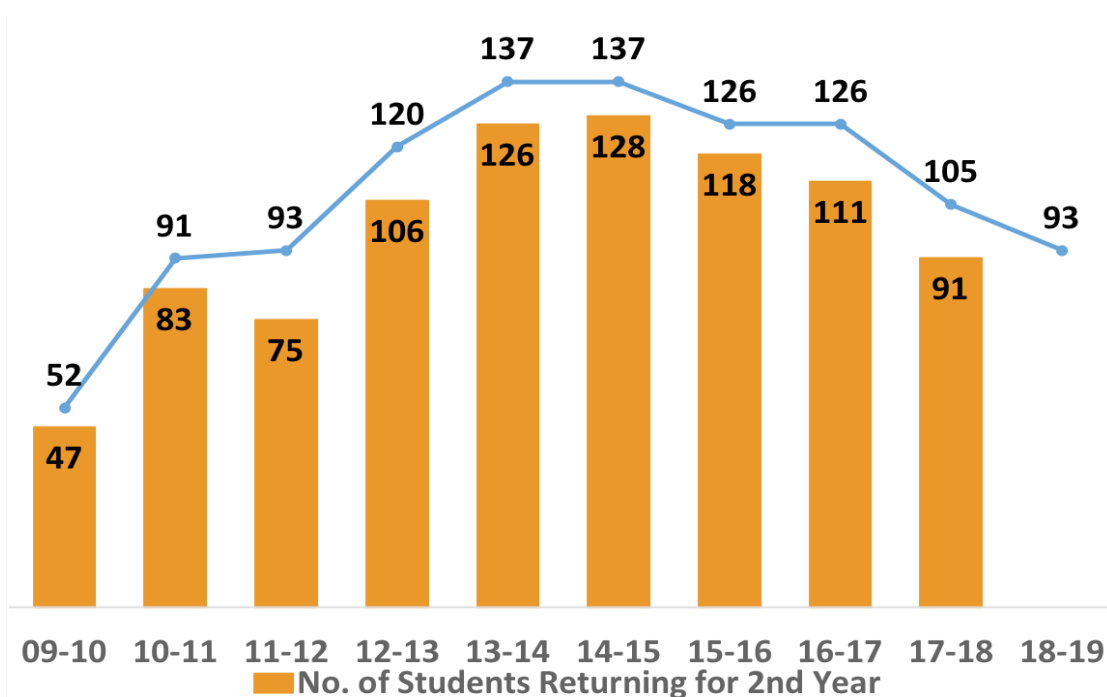
**COLLEGE DATA**



## Geoforce College Statistics

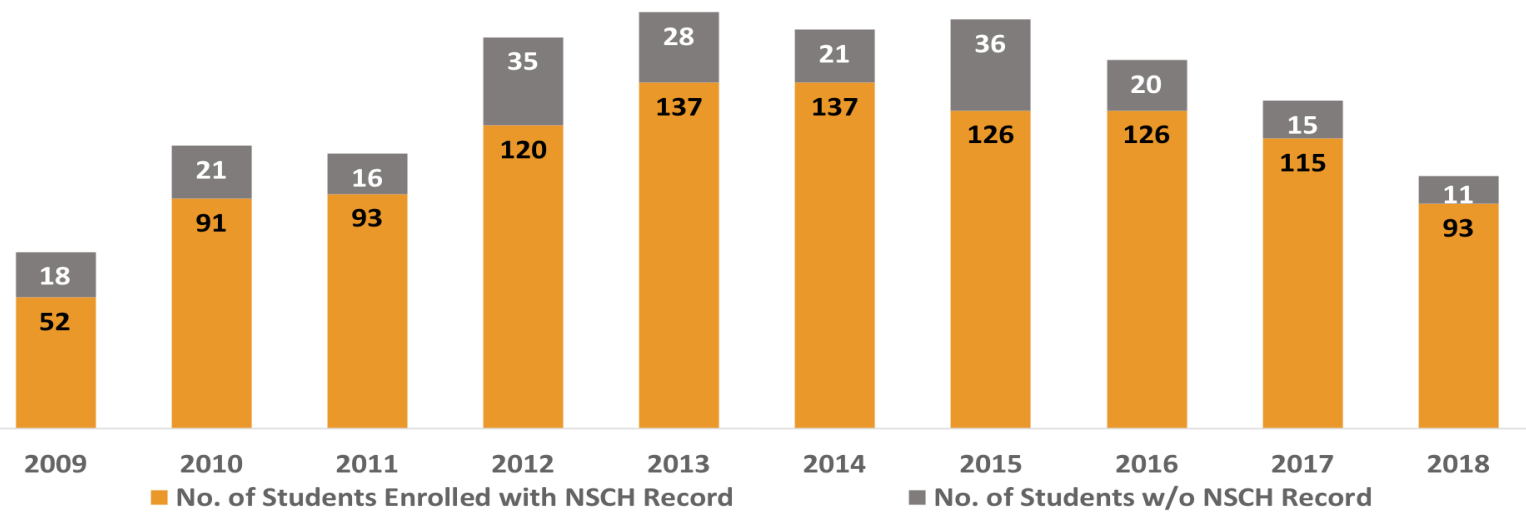
GeoFORCE utilizes services from the National Student Clearinghouse (NSC) to collect information on where our students attend college, what they study and when they graduate. Though the NSC covers 98% of public and private institutions in the U.S., students can choose to keep their records private. Therefore, the numbers reported in this section are a minimum, but still provide useful insight into student pathways.

**Graph 1. College Matriculation and Persistence**



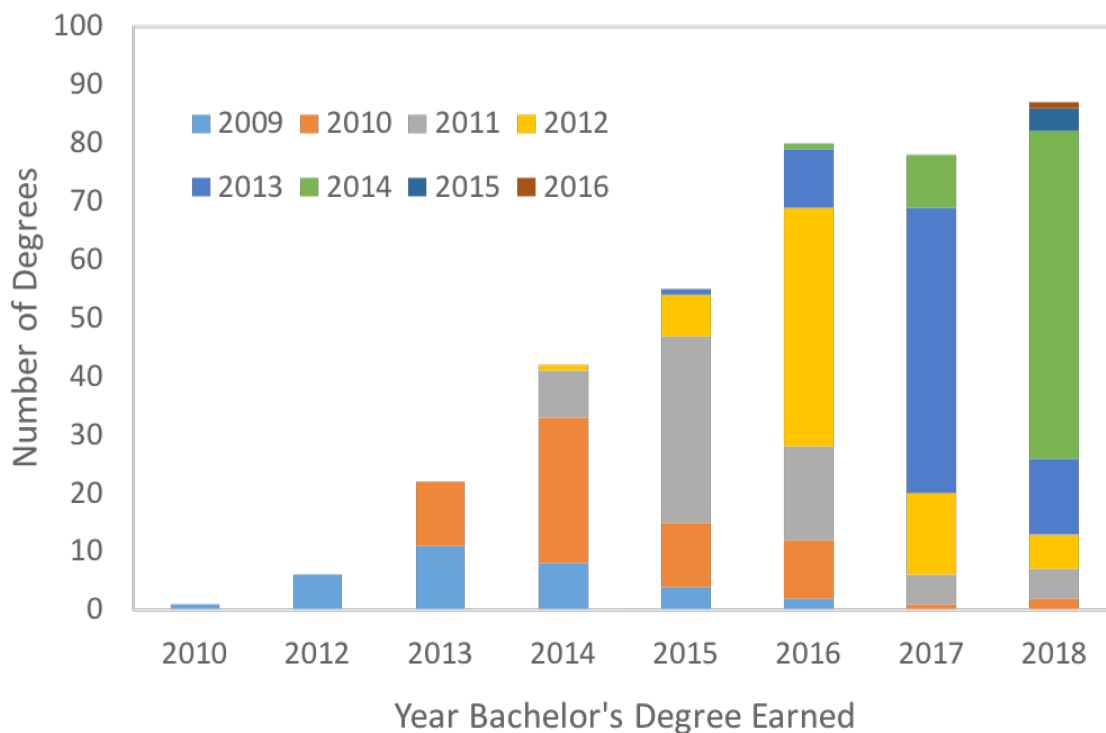
On average, 90% of GeoFORCE students persist into their second year of college. The national average for persistence to the second year in college is 75%. (National Center for Education Statistics, Integrated Postsecondary Education Data System, 2017)

Graph 2. College Enrollment- First Year



At least 83% of GeoFORCE students enroll in college immediately upon graduating from high school. Nationally, 69.5% of recent high school graduates enrolled in college from 2014-2016 (NCES, IPEDS, 2017)

Graph 3. Bachelors Degrees Earned by High School Graduating Class





Thinking about the timeline of a GeoFORCE student  
*A “fastest possible” outcome*



# 34%

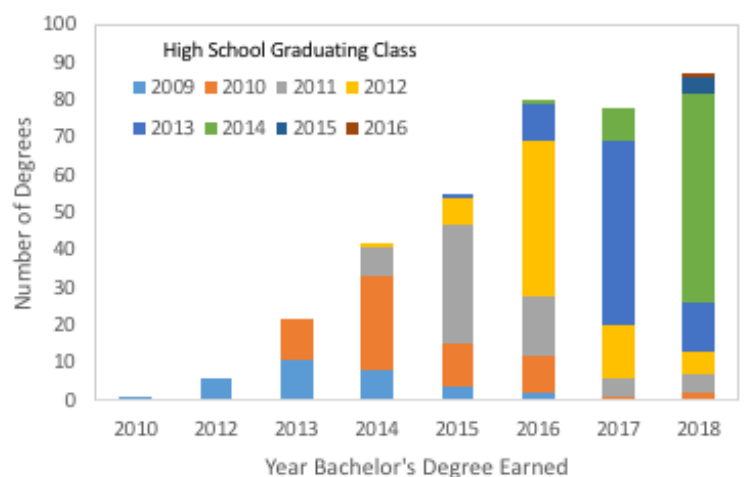
Bachelors degree earned  
from high school graduating  
classes 2011-2016.

**from socially economically  
disadvantaged homes).**



Year Bachelor's Degree Earned	High School Graduation Year								Total
	2009	2010	2011	2012	2013	2014	2015	2016	
2010	1								1
2012	6								6
2013	11	11							22
2014	8	25	8	1					42
2015	4	11	32	7	1				55
2016	2	10	16	41	10	1			80
2017		1	5	14	49	9			78
2018		2	5	6	13	56	4	1	87
Total	32	60	66	69	73	66	4	1	371

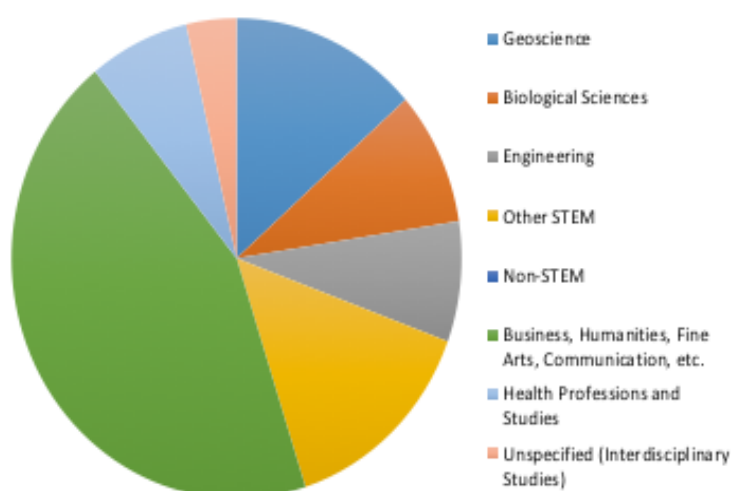
Bachelor's Degrees Earned by High School Graduating Class



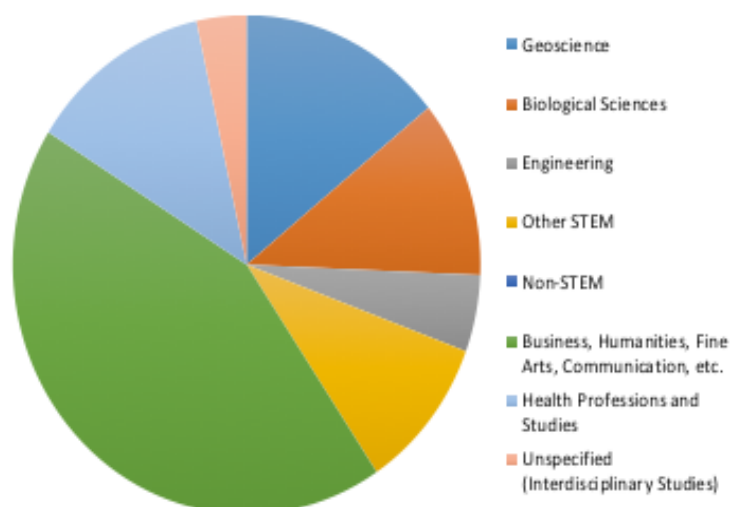
Total Bachelor's Degrees earned = 371

# Bachelors Degrees Earned

## Bachelor's Degrees Earned: Houston



## Bachelor's Degrees Earned: Southwest



### Absolute numbers: Bachelor's Degrees Earned

	Houston	Southwest	Total
<b>STEM fields</b>			
Geoscience	15	37	52
Biological Sciences	10	30	40
Engineering	9	13	22
Other STEM	16	26	42
<b>Non-STEM</b>			
Business, Humanities, Fine Arts, Communication, etc.	49	113	162
Health Professions and Studies	8	33	41
Unspecified (Interdisciplinary Studies)	4	9	13
<b>Grand Total</b>	<b>111</b>	<b>261</b>	<b>372</b>

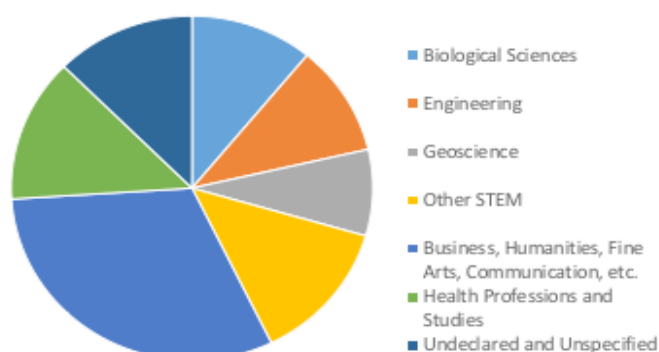
### Percentages: Bachelor's Degrees Earned

	Houston	Southwest	Total
<b>STEM fields</b>			
Geoscience	4%	10%	14%
Biological Sciences	3%	8%	11%
Engineering	2%	3%	6%
Other STEM	4%	7%	11%
<b>Non-STEM</b>			
Business, Humanities, Fine Arts, Communication, etc.	13%	30%	44%
Health Professions and Studies	2%	9%	11%
Unspecified (Interdisciplinary Studies)	1%	2%	3%
<b>Grand Total</b>	<b>30%</b>	<b>70%</b>	<b>100%</b>

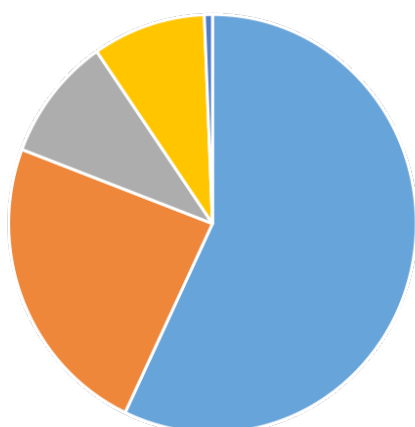
## Enrollment by fields of study (Bachelor's-seeking and graduate degree-seeking)

Field of study	No. of students	% of total students
<b>STEM fields</b>		<b>43%</b>
Biological Sciences	57	11%
Engineering	54	10%
Geoscience	42	8%
Other STEM	69	13%
<b>Non-STEM</b>		<b>45%</b>
Business, Humanities, Fine Arts, Communication, etc.	162	31%
Health Professions and Studies	70	13%
<b>Undeclared and Unspecified</b>	65	<b>13%</b>
<b>Total</b>	<b>519</b>	

Fields of Study, Fall 2018



## Ethnicity of GeoFORCE STEM degree earners



■ Hispanic
 ■ White/Caucasian
 ■ Asian
 ■ African American
 ■ American Indian

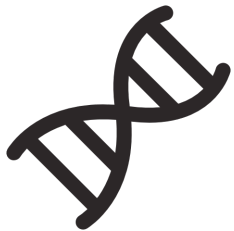
Ethnicity of Degree Earner	Number of STEM degrees earned	Percent of GeoFORCE STEM degree earners	Ethnicity of GeoFORCE students (%) Class of 2009-2016	Percentage of STEM degrees conferred to U.S. citizens in 2015-2016+
Hispanic	89	57%	60%	11%
White/Caucasian	37	24%	18%	65%
Asian	15	10%	15%	7%
African American	14	9%	6%	14%
American Indian	1	0.6%	0.2%	0.40%

+National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS)



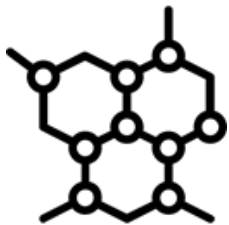
# 52

GeoFORCE alumni earned a **Geoscience** degree, from Southwest and Houston regions.



# 40

GeoFORCE alumni earned a **Biological Science** degree, from Southwest and Houston region.



# 156

GeoFORCE alumni earned a **STEM related** field degree, from Southwest and Houston region.







GeoFORCE alumni,  
Fabian Pena at  
graduation.

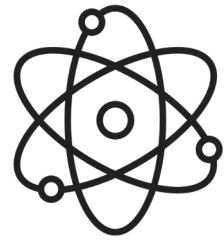
# 604

Geoforce graduates students currently in college (at least half time).



# 1311

of GeoFORCE students completed the program.



# 60%

of GeoFORCE declared a STEM Major in 2018

**HEALTH SCIENCE**

**85**

**BIOLOGICAL SCIENCE**

**57**

**ENGINEERING**

**54**

**OTHER BIO SCIENCES**

**43**

**GEOSCIENCE & ENVIRONMENTAL SCI**

**42**

**COMPUTER SCIENCE**

**10**

**OTHER STEM FIELDS**

**7**

**TOTAL 306**

*\*\*Above is the number of degrees in STEM pursued by GeoFORCE in 2018.*



# 21

Certificates Technical diplomas earned by GeoFORCE students.



# 4

Doctoral degrees earned by GeoFORCE students.

# 98

Associate degrees earned by GeoFORCE students.



# 31

Master's degrees earned by GeoFORCE students, including 5 in Geoscience



# 372

Bachelor's degrees earned by GeoFORCE students.

# 526

Total degrees earned by Geoforce graduates.





GeoFORCE alumni,  
(on right) Lea NellDungo and  
(on left) Zach Bordovsky at graduation.

"GeoFORCE on steroids," said Theresa Perez. That is how UT Austin students Perez (Petroleum Engineering, GeoFORCE Class of 2015), Thomas Quintero (Geological Sciences, GeoFORCE Class of 2016) and Gabriel Villaseñor (Geological Sciences, GeoFORCE Class of 2016) described their field experience in Slovakia with Jackson School of Geosciences Associate Professor Elizabeth Catlos. Professor Catlos is the Principal Investigator of a National Science Foundation International Research Experiences for Students (IRES) program that brings geoscience students to Slovakia for four weeks of geological field-based research. The students receive a weekly stipend, and all expenses are covered. Catlos conducts research in the Carpathian Mountain range of Slovakia to understand geological processes associated with the closure of ancient ocean basins, and she specifically recruits GeoFORCE students. As Catlos explains, "They have knowledge of geology and are used to challenging travel!" The research experience began long before the summer. To develop their research plans and learn about the geology, culture and even the language of the area, the students participated in a 2018 spring semester course with Professor Catlos. In Slovakia, the group visited historic and current mines, relating gold, silver and base metal deposits to the regional geologic history. At quite different elevations, the students endured challenging hikes through the scenic High Tatra Mountains, sometimes using cables and ladders. "We explored deep down from 600 m below the ground to thousands of meters above on the peaks," described Perez.

Each student will continue working on their individual research projects throughout the 2018 fall semester. The tumultuous geologic history of the region offers a diverse range of research projects. Supervised by JSG Professor Richard Kyle, Quintero is studying hydrothermally altered clastic rocks of the Rozalia gold mine in central Slovakia to tease out any linkages between precious metals and textural features in the rocks. Villaseñor will be reconstructing the thermal history of a section of paleo-ocean floor using serpentinite samples from an asbestos mine in Dobšina, processing samples for U/Pb dating. Perez is already at work prepping samples for thin sections. She hopes to obtain information about the collision and burial of the Carpathians by age-dating monazite grains within garnet-bearing rocks from the Western and High Tatras.

All three students acknowledged that GeoFORCE helped connect them to the project. "GeoFORCE is really this sort of gateway to how college level education works, especially research," said Quintero, and Villaseñor explained that GeoFORCE connected him with the professors involved. As Quintero puts it, GeoFORCE helped spark his innate curiosity. "When we go out to places like the Grand Canyon or Florida for the first time, our minds are flooded with questions asking why and how these landscapes came to be." No matter the setting, GeoFORCE students continue to be curious about the world around them.

# UT Austin Students Experience Fieldwork and Research in Slovakia



From left: Thomas Etzel, a PhD student with Professor Catlos, with GeoFORCE students Gabriel Villaseñor, Thomas Quintero and Theresa Perez



GeoFORCE alumni,  
Robyn Moses at  
graduation.


# Universities and Colleges attended by GeoFORCE Graduates

ABILENE CHRISTIAN UNIVERSITY	1	HOWARD PAYNE UNIVERSITY	1	TEXAS A&M UNIVERSITY - SAN ANTONIO	3
ADAMS STATE UNIVERSITY	1	HUSTON-TILLOTSON UNIVERSITY	1	TEXAS A&M UNIVERSITY - KINGSVILLE	7
ALBION COLLEGE	1	INDIANA UNIVERSITY BLOOMINGTON	1	TEXAS LUTHERAN UNIVERSITY	2
AMERICAN UNIVERSITY	1	LAMAR UNIVERSITY - BEAUMONT	5	TEXAS STATE TECHNICAL COLLEGE - FORT BEND	1
AMHERST COLLEGE	1	LANGSTON UNIVERSITY	1	TEXAS STATE UNIVERSITY - SAN MARCOS	28
ANGELO STATE UNIVERSITY	5	LIBERTY UNIVERSITY	1	TEXAS TECH UNIVERSITY, LUBBOCK	6
ASHLAND UNIVERSITY	1	LONE STAR COLLEGE SYSTEM DISTRICT	9	TEXAS WOMAN'S UNIVERSITY	3
BALL STATE UNIVERSITY	1	LOUISIANA STATE UNIVERSITY - AG	3	TRINITY UNIVERSITY	3
BAYLOR UNIVERSITY	4	NEW MEXICO STATE UNIVERSITY-MAIN	1	UNIVERSITY OF ALABAMA	1
BLINN COLLEGE	1	NORTHWEST VISTA COLLEGE	4	UNIVERSITY OF ARIZONA	1
BLINN COLLEGE- BRYAN CAMPUS	6	OCCIDENTAL COLLEGE	1	UNIVERSITY OF CALIFORNIA-LOS ANGELES	2
BLINN COLLEGE- TEXAS A&M HSC CAMPUS	3	OUR LADY OF THE LAKE UNIVERSITY OF SAN ANTONIO	1	UNIVERSITY OF COLORADO BOULDER	1
BOSTON UNIVERSITY	1	PENNSYLVANIA STATE UNIVERSITY	2	UNIVERSITY OF HOUSTON	49
BOWDOIN COLLEGE	2	PITZER COLLEGE	1	UNIVERSITY OF HOUSTON-CLEAR LAKE	1
BRIGHAM YOUNG UNIVERSITY	2	PRAIRIE VIEW A&M UNIVERSITY	8	UNIVERSITY OF HOUSTON-DOWNTOWN	13
BRIGHAM YOUNG UNIVERSITY - IDAHO FALL/ WINTER	1	PURDUE UNIVERSITY - WEST LAFAYETTE	1	UNIVERSITY OF MARY HARDIN-BAYLOR	1
CARLETON COLLEGE	1	RICE UNIVERSITY	6	UNIVERSITY OF MICHIGAN	1
CASE WESTERN RESERVE UNIVERSITY	1	ROSE-HULMAN INSTITUTE OF TECHNOLOGY	1	UNIVERSITY OF MINNESOTA-DULUTH GRADUATE	1
CENTRAL TEXAS COLLEGE-TRADITIONAL	1	RUTGERS -THE STATE UNIVERSITY OF NJ -NEW BRUNSWICK	1	UNIVERSITY OF NORTH TEXAS	4
CLEMSON UNIVERSITY	1	SAINT JOHN'S UNIVERSITY	1	UNIVERSITY OF OKLAHOMA	1
COLBY COLLEGE	2	SAM HOUSTON STATE UNIVERSITY	12	UNIVERSITY OF PUGET SOUND	1
COLLEGE OF THE MAINLAND	1	SAN JACINTO COLLEGE	3	UNIVERSITY OF ST THOMAS	1
COLORADO SCHOOL OF MINES	1	SMITH COLLEGE	1	UNIVERSITY OF TEXAS - SAN ANTONIO	57
COLORADO STATE UNIVERSITY	1	SOKA UNIVERSITY OF AMERICA	1	UNIVERSITY OF TEXAS ARLINGTON	1
CORNELL UNIVERSITY	1	SOUTH PLAINS COLLEGE	1	UNIVERSITY OF TEXAS AT AUSTIN	92
DALLAS BAPTIST UNIVERSITY	1	SOUTHERN METHODIST UNIVERSITY	2	UNIVERSITY OF TEXAS AT DALLAS	1
DARTMOUTH COLLEGE	1	SOUTHERN NEW HAMPSHIRE- 10WEEK	1	UNIVERSITY OF TEXAS AT TYLER	3
DEL MAR COLLEGE	1	SOUTHWESTERN UNIVERSITY	2	UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER SAN ANT	2
DICKINSON COLLEGE	1	ST. MARY'S UNIVERSITY	8	UNIVERSITY OF THE INCARNATE WORD	4
FRANKLIN W. OLIN COLLEGE OF ENGINEERING	1	STANFORD UNIVERSITY	1	UNIVERSITY OF VIRGINIA	1
FRIENDS UNIVERSITY	1	STEPHEN F. AUSTIN STATE UNIVERSITY	4	UNIVERSITY OF WISCONSIN - MADISON	1
FRONT RANGE COMMUNITY COLLEGE	1	SUL ROSS STATE UNIVERSITY	4	VANDERBILT UNIVERSITY	1
GEORGETOWN UNIV - GRAD SCHOOL	1	TARLETON STATE UNIVERSITY	1	WASHINGTON AND LEE UNIVERSITY	2
HARDIN-SIMMONS UNIVERSITY	1	TENNESSEE WESLEYAN UNIVERSITY	1	WASHINGTON UNIVERSITY	1
HAVERFORD COLLEGE	1	TEXAS A&M INTERNATIONAL UNIVERSITY	4	WEST TEXAS A&M UNIVERSITY - GRADUATE	1
HOUSTON BAPTIST UNIVERSITY	2	TEXAS A&M UNIVERSITY	75	XAVIER UNIVERSITY OF LOUISIANA	1
HOUSTON COMMUNITY COLLEGE	34	TEXAS A&M UNIVERSITY - CORPUS CHRISTI	6		
HOWARD COLLEGE	1	TEXAS A&M UNIVERSITY - GALVESTON	2		
				Grand Total	564



*Photo: from left to right: JT Trevino, Daniela Garza, Suzet Salinas, Gabriella Marines-Chio, Cheyenne Hibbitts and Marlowe Zamora at The Grand Canyon, summer 2018.*

# GEOFORCE COUNSELORS



Undergraduate GeoFORCE counselors are vital to the success of the program. Each counselor has been through four years of summer field experiences. They are assigned a group of students for whom they are responsible, ensuring the students stay focused and safe throughout the week. To students, their counselors are more than just chaperones--they are role models to whom they comfortably relate and seek advice about college. When counselors share their journeys to college, they provide unique insight to students who often grew up in the same towns or region from which they come.

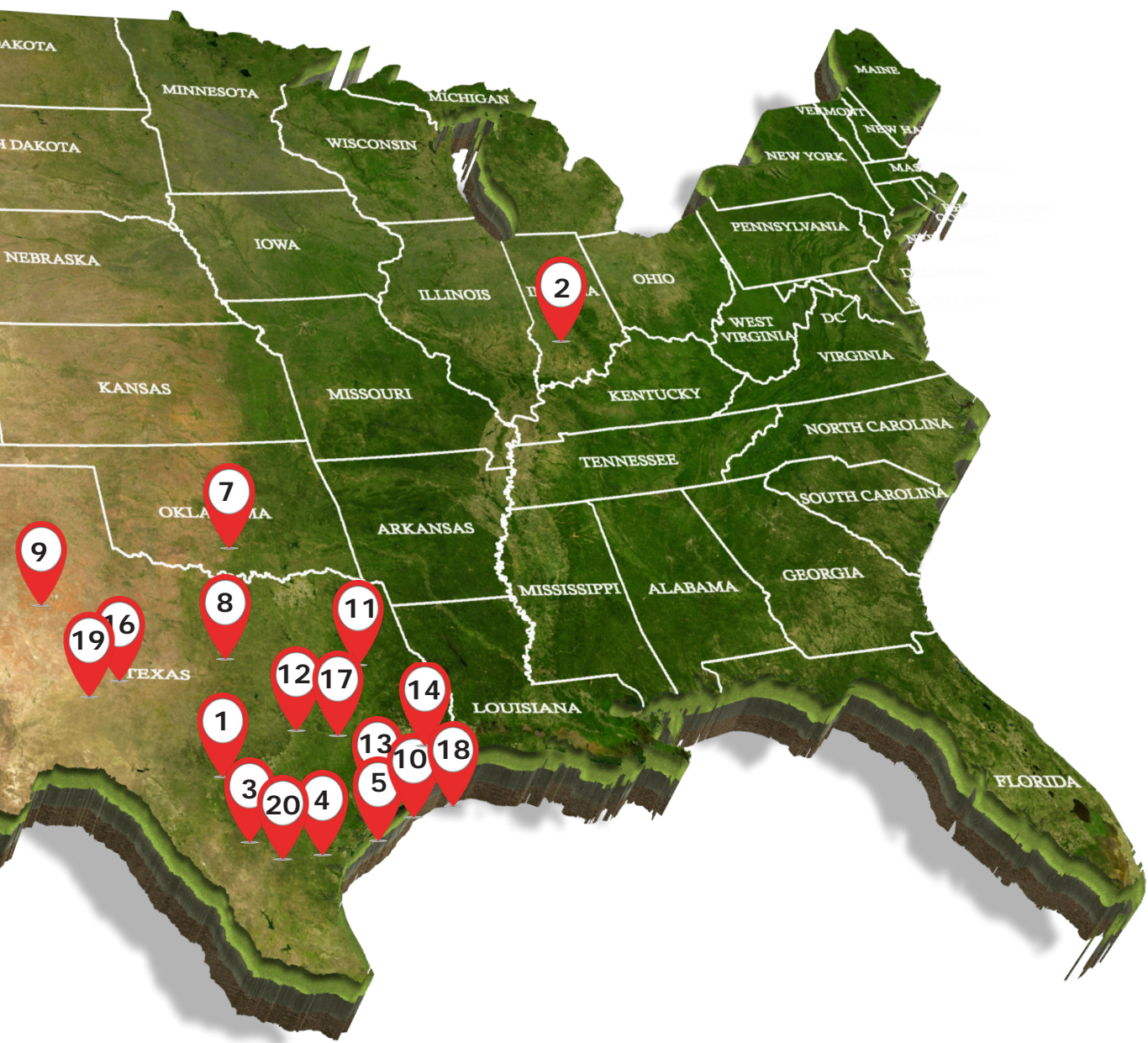
Students consistently voice their desire to someday become a counselor because they want to “pay forward” the mentorship and friendship they experienced during the program. This life cycle model of students returning as counselors after they complete the GeoFORCE academy strengthens their resolve to succeed and promotes self-empowerment.

# Univeristies Attended

by COUNSELORS



- |  |   |
|--|---|
| 1 University of Texas at Austin (8)          | 11 Stephen F. Austin State University (1) |
| 2 University of Notre Dame (8)               | 12 Sam Houston State University (1)       |
| 3 The University of Texas at San Antonio (3) | 13 Rice University (1)                    |
| 4 St. Mary's University (2)                  | 14 Prairie View A&M University (1)        |
| 5 University of Houston (2)                  | 15 Pitzer College (1)                     |
| 6 University of Colorado Boulder (1)         | 16 McMurry University (1)                 |
| 7 The University of Oklahoma (1)             | 17 Lone Star College Montgomery (1)       |
| 8 Texas Woman's University (1)               | 18 Houston Community College (1)          |
| 9 Texas Tech University (1)                  | 19 Angelo State University (1)            |
| 10 Texas Southern University (1)             | 20 University of the Incarnate Word (1)   |



# 12th Grade Capstone Experience

We redesigned the 12th grade GeoFORCE summer program as a challenge-based learning capstone experience. Central Texas was selected as the setting because of access to JSG research labs, technology and communication experiences available on UT's campus and the proximity to interesting field settings that span more than a billion years of Earth history. Curriculum and instruction followed the STAR Legacy Cycle, developed at the Learning Technology Center at Vanderbilt University. The instructor-led direct teaching (lecture) of previous GeoFORCE trips was replaced by learning facilitated by a multi-person instructional team that reflected the racial, ethnic, gender, and cultural diversity that the geosciences strive to achieve.

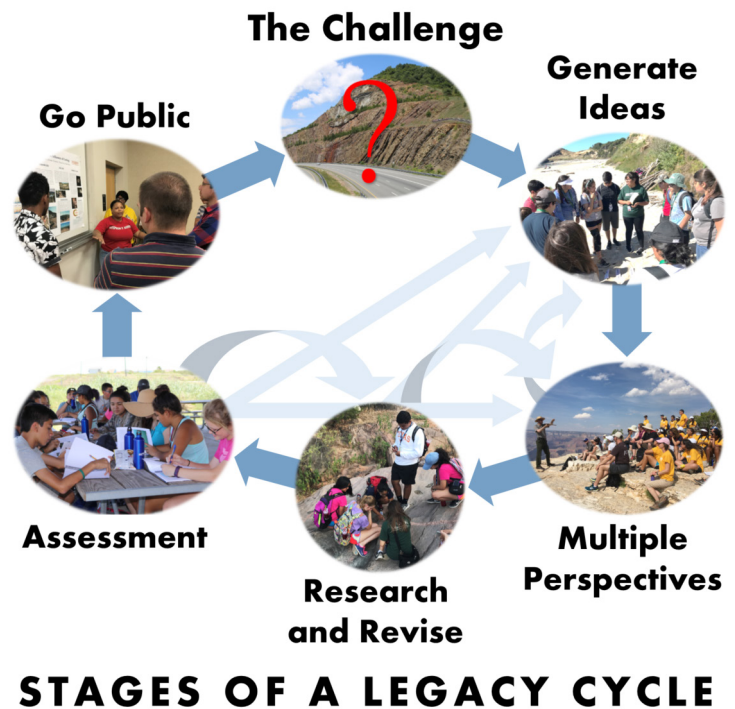
Students worked in teams to solve one of two challenges. Challenge A tasked students with conducting site surveys of the field sites visited as “scenic connectors” for a hypothetical high-speed railway. For Challenge B, students created designs for a series of Snapchat (Snap Inc.) filters – photo overlays to represent the geology and geologic history of sites visited – to entice more millennials to visit Texas State Parks. Although students needed time to adapt to the new style of learning, they soon adjusted to learn new content and skills. All student teams successfully addressed the challenge. As evident in the examples of student work (see figures 1 and 2), the challenge “deliverables”—12-minute technical talk, poster, and 5-minute lightning talk—were of high quality and reflected varying levels of comprehension and ability to use scientific knowledge towards solving the challenges. Examples of deep learning were observed during the delivery of the technical talks and as students explained their posters to guests and parents at the closing ceremony.



The Central Texas capstone experience provided the context for students to begin to truly experience the practices that constitute geologic reasoning (i.e., temporal thinking, scale, understanding complex Earth systems, and spatial visualization). Indeed, students are beginning to “see the world like geologists,” moving from novice learner to geoscience apprentice. Beyond a deeper understanding of geoscience, role-playing gave students the opportunity to use their personal strengths and knowledge of other disciplines, including art, engineering, statistics, and theater to help solve the challenge and further develop important soft skills (e.g., communication, collaboration) that will serve them well no matter what career choice they make. Students expressed gratitude for their GeoFORCE experiences and feel a strong sense of belonging to the group.

### *Summary of the 2018 Summer Twelfth Grade Capstone Experience*

*Written by Dr. Kathy Ellins*





**Alizandra Berrelez**  
**Andrew Castro**  
**Ashley Ethredge**

**GEOFORCE**  
 BROU  
**TGOT IND**

## Purpose:

Our goal is to make SnapChat Geo-Filters for Texas's parks. By using these three themes: Life Through Time, The Power of Water, and Dynamic Earth Processes, we aim to increase the attendance of 18-30 year-olds to these parks.

### Mount Bonnell

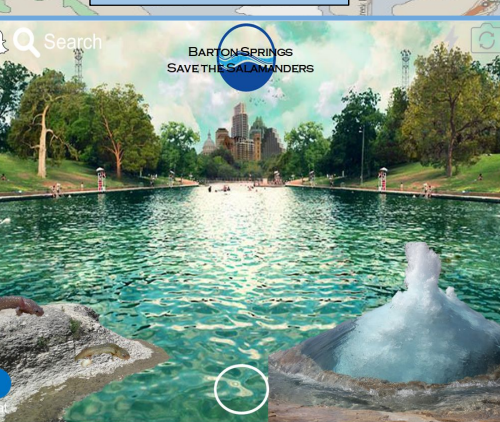


#### Swipe Up

- 30.3208° N, 97.7733° W
- Mount Bonnell is made of the Glen Rose formation which was deposited during the Cretaceous period 113 Ma
- Mostly composed of limestone
- The climate during deposition was relatively hotter than it is today
- We observed fossils in the rock leading us to infer that the area used to be under the sea

#### Power of Water

### Barton Springs

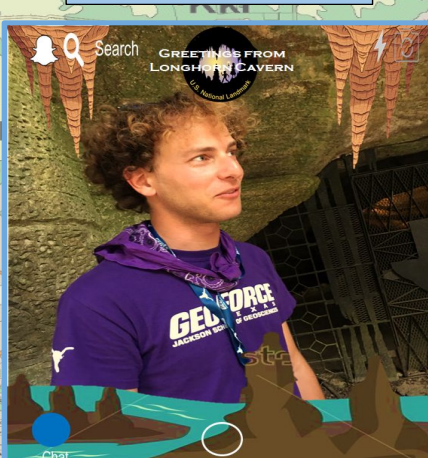


#### Swipe Up

- 30.2670° N, 97.7729° W
- The limestone here is about 100 Ma during the Cretaceous period
- Edwards Aquifer is within the Edwards Limestone
- The climate was colder when the rock here was formed
- The spring was formed from the aquifer underneath spewing out water, known as the discharge zone

#### Power Of Water

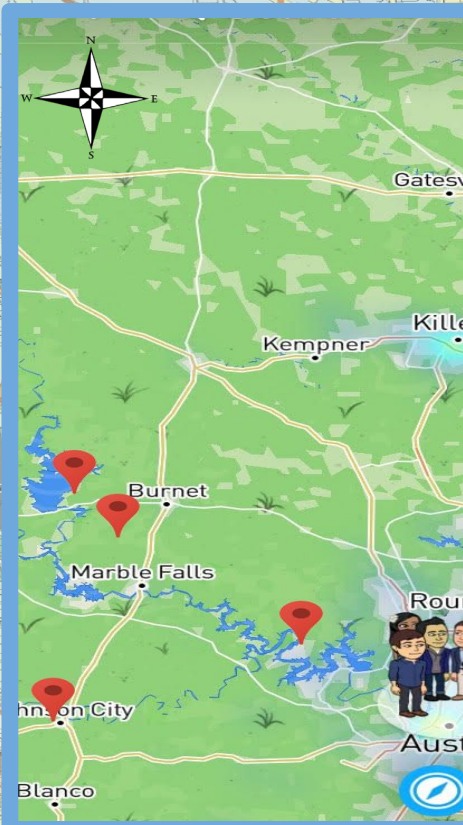
### Longhorn Cavern



#### Swipe Up

- 30.6839° N, 98.3523° W
- Began forming 1.5 Ma and took 700,000 years to form
- Formed in the Ellenburger Limestone (~450 Ma)
- From observing the inverse potholes, we can infer that a river cut through the rock to create the cavern. These are caused by the intense pressure of the water being trapped in a small space
- The water that gets in to the cave helps erode the sides and makes the cave bigger

#### Power Of Water



## SnapChat Map

### Park Review

#### **Barton springs** Rated 3.8

Sarah George, 26 - "I would want to go back and I want to see the salamander."

Kristen Guerra, 28 - "I wouldn't want to go back everywhere, oh but it was beautiful."

#### **Enchanted Rock** Rated 5

Marissa Vara, 26 - "I would go back because of Dana Thomas, 30 - "Yes it's a special Texas experience."

Kristen Guerra, 28 - "Absolutely, it's the perfect spot."

#### **Pedernales Falls** Rated 4.5

Sarah George, 26 - "There was a big unconformity." Mia Moi, 19 - "How there were so many geological uplifts."

#### **Waco Mammoth National Monument**

Raphael de los Santos Truba, 22 - "The fossil was with her kid, and I found shark teeth in the rock." Linda Hesles Quintero, 21 - "The size of the fossil was amazing."

#### **Inks Lake** Rated 4.8

Marissa Vara, 26 - "My favorite part of Inks Lake is the fishing." Daniel Campos, 25 - "I love the actual lake and the fishing."

#### **Longhorn Cavern** Rated 4.5

Sarah George, 26 - "I would go again, because of the cave." Mario Gonzalez, 22 - "I would go again because of the cave activity."

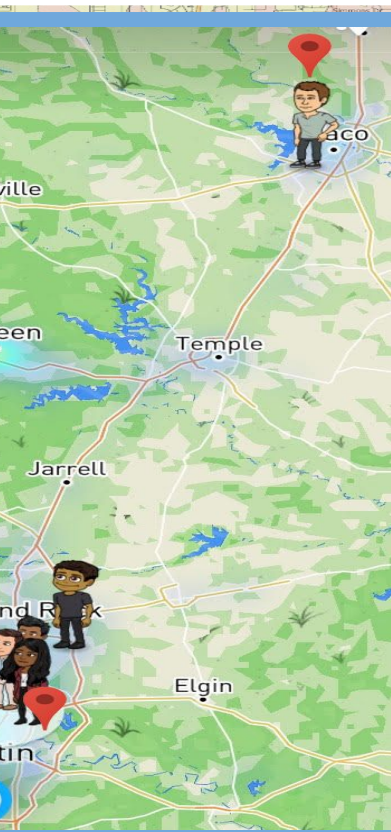
## References:

### Earth Finder App

Smith, Shepard. Texas Parks and Wildlife, [tpwd.texas.gov/](http://tpwd.texas.gov/).

# ALTERS GHT TO YOU BY DUSTRY

Jacob Rodriguez  
Mayra Martinez  
Will Gardenhire



## Key Locations

### Views

because it is a cultural hub of Austin  
back because there were ants

of the views.  
experience and the views."  
ect spot for yoga."

rmity there. I would use it."  
gical processes like the unconformity,

### Rated 4.3

ils and the fact that Wanda may have  
e fossil hunt."  
Columbian mammoths were large."

ke is the migmatites"  
d its recreational activities especially

se it was a cool cave.  
use I want o do the cave exploring

### Swipe Up

- 30.7367°N 98.3814°W
- The metamorphic rocks created here are 1.4 to 1.2 Ga
- The main rocks are the Valley Springs Gneiss and granite dominated by potassium feldspar
- Water running through here erodes the gneiss

### Dynamic Earth Processes and Events

### Inks Lake



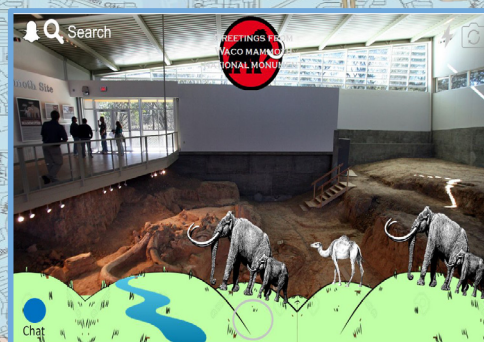
### Pedernales Falls



### Enchanted Rock



### Waco Mammoth National Monument



### Swipe Up

- 30.3081°N 98.2577°W
- Marble Falls Limestone was deposited 320 Ma
- Limestone is located here along with the Sycamore Conglomerate. The rocks there are all eroded to be very smooth and has a lot of potholes
- The climate when the limestone formed was warmer than it is today
- The limestone and fossils shows that the area used to be under the sea
- Area still prone to flash floods

### Dynamic Earth Processes and Events

### Swipe Up

- 30.5066°N 98.8189°W
- Formed underground about 1.1 Ga
- Granite consists of feldspar, quartz, biotite
- From the large crystals in the granite we can infer that it was an intrusive igneous rock
- Today Enchanted Rock is exfoliating and it is evident through the big boulders on the sides

### Dynamic Earth Processes and Events

### Swipe Up

- 31.6067°N 97.1760°W
- The mammoth fossils at the Waco Mammoth Monument were from 67,000 years ago
- The fossils were located in alluvial strata
- The rock was darker than the rest of the rock because of the rainfall and flooding that occurred
- There is no erosion currently because it is inside a shelter

### Life Through Time

## Acknowledgements



TEXAS Geosciences  
The University of Texas at Austin  
Jackson School of Geosciences



## Introduction

Our project's purpose is to provide information to engineering companies about the geology of the areas based on the research that we conducted in different locations. We conducted several procedures at each site to test how reliable each location would be to place the rail line across the major cities in Texas. The rail line is responsible for connecting geological historical landscapes to provide the public with an opportunity to learn while relishing the picturesque environment.

## Barton Springs

### Background

- Discharge zone to the Edwards Aquifer, supplies abundant amounts of water to cities of Texas
- Composed of limestone and is a habitat to many animals (Barton Springs Salamander)
- Environmental concern (contamination of the water supply to cities in Texas)

### State of Transformation/Red Flags & Solutions

- Hiring Environmental engineers once a month to monitor threats (test the water samples)
- Barton Springs can be used to build the rail line

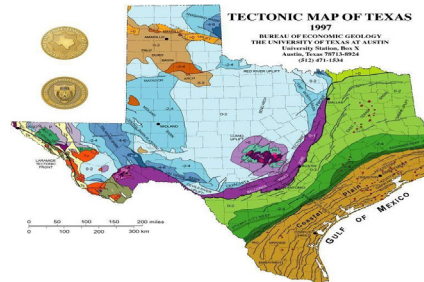
## Waco Mammoth

### Background

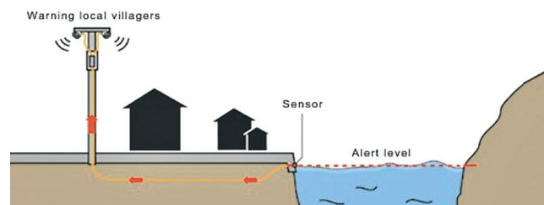
- A national monument museum open to the public
- Several Columbian Mammoth fossils discovered (years: 1978 - 1990)
  - From the Pleistocene epoch

### State of Transformation/Red Flags & Solutions

- Stable site for construction with conditions
- Poor, dry, non porous soil cause recurring floods in the area
  - Evidence seen in layers of bedding
    - Implementing early flash flood warning systems
    - Protective scenic rest stop (protecting the public and fossils)



Mount Bonnell Salamander, endangered species found only in Mt. Bonnell



Flooding is a concern at every site. We plan to monitor water level for an early warning system.

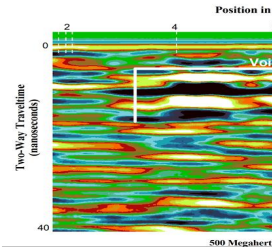


Inside of Longhorn Cavern

## Pedernales

### Background

- Composed of Marble Falls (about 3
  - Paleozoic era: Pennsylvanian ep
  - Crinoid stems: small fossilized orga
- State of Transformation/Red Flags & Solutions
  - Acceptable location
    - Very sturdy and durable rock (Marble Limestone)
  - Potential risk of flash flooding
    - Bridge or tunnel submerged in water
      - Creation of a flood prone area colliding with the water
      - Use of LiDAR to detect movement
  - Angular unconformity
    - 320 million year old Paleozoic rock
    - 65 million year old Cretaceous rock

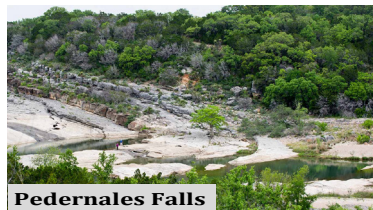


Seismic image for sinkhole

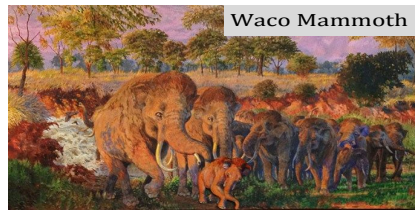
## Longhorn

### Background

- Longhorn cavern started in 1932
- Composed of limestone
- Carved by a river
- State of Transformation/Red Flags & Solutions
  - The vibration and pressure cause the cave to collapse
  - Not suitable for establishment



Pedernales Falls



Waco Mammoth



Mt. Bonnell

GeoFORCE Express

GeoFORCE Express

Garza, Edgar, Katherine K. Ellins, Matthew Hoffer, Alison Mote, Vanshan Wright, Michael Arratia, Lauren Oefinger, Cynthia Maye, Enrique Reyes, Kiara Gomez, and Marla Hibbits (2017), A comparison of two pedagogical approaches, traditional lecture vs. Project-based, and how their approach affects student engagement, Paper 78-13, Geological Society of America Abstracts with Programs. Vol. 49, No. 6, ISSN 0016-7592, doi: 10.1130/abs/2017AM-306471

Berry, Michelle, Vanshan Desmond Wright, Katherine Kelly Ellins, Mercy Grace Jackson Browder, Rocio Castillo, Alissa Jeanne Kotowski, Julie C. Libarkin, Johnny Lu, Nishma Maredia, and Nicole Butler (2017), Transitioning from Faculty-Led Lecture to Student-Centered Field Learning Facilitated by Near-Peer Mentors: Preliminary Findings from the GeoFORCE/STEMFORCE Program, Abstract ED23B-0298, presented at 2017 Fall Meeting, AGU, New Orleans, LA, 11-15 Dec.

Coholich, Marianne, Harkjun Lee, Mia Moi, Katherine K. Ellins, Daniel Campos, Sarah W.M. George, John Hash, Eric Goldfarb, Won-suck Kim and Lauren Oefinger (2018), Our experience as undergraduate instructors for the GeoFORCE 12th grade Central Texas Academy, Paper No. 6-12, Geological Society of America Abstracts with Programs. Vol. 50, No. 6, doi: 10.1130/abs/2018AM-320702.

# Geotech Consultants

Alissa Mena, Jonathan Greene,  
Bernard Fernandez, Lilliana Garcia



**TEXAS** Geosciences  
The University of Texas at Austin  
Jackson School of Geosciences

## Falls

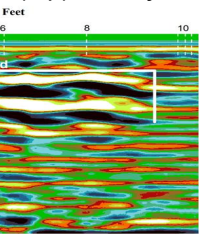
(20 million years old)  
granite  
mechanisms trapped in rock  
& Solutions

Marble Falls

Water  
avoid the rail line

movement of rocks

rocks (bottom) and 100  
feet (top) overlay



hole exploration

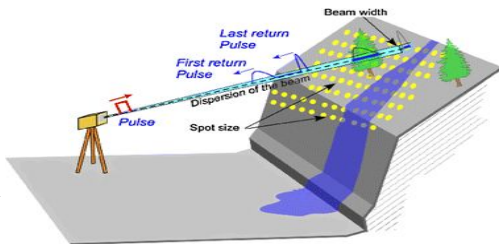
## Cavern

State park, established in

limestone and dolomite rock

pressure may cause the

establishing a rail line



Lidar will be used to monitor how slopes change over time and make sure they are stable. This will be used at Enchanted Rock and Pedernales Falls.

## Mt. Bonnell

### Background

- Rock formations are composed of solid, strong limestone which is susceptible to malleability
- A point along Lake Austin portion of the Colorado River in Austin, Texas
- Balcones Fault has been inactive for millions of years

### State of Transformation/Red Flags & Solutions

- Susceptible to future faulting
- Glen Rose formation has potential for sinkholes
  - Dangerous and expensive accidents
    - Placing barriers along the pathway to prevent future hazards

## Inks Lake

### Background

- Valley Spring Gneiss was named after Valley Springs Creek
- Contains a mixture of metamorphic rock, and igneous rock (migmatite, dikes) which are strong, sturdy, and resistant
- Boudinage is found in rocks, showing compressional forces that acted on the rock and created folds in several events

### Red Flags & Solutions

- Joints and faults are likely to occur, so we would need to monitor movement with LiDAR

## Enchanted Rock

### Background

- Once part of a huge underground magma chamber called a batholith from the Precambrian age
- Made of igneous rock
- Plants and animals struggle to survive within the shallow depression of the granite

### State of Transformation/Red Flags & Solutions

- Weathering and Erosion
  - Small pieces (approx. cm to metres) of granite are being broken away
    - Signs will be set up to alert the public of the dangers
- Exfoliation Sheets
  - Breaking away and are sliding down the dome
    - Safe Distance from potential falling rocks
- Tourist Attraction
  - Threat towards extremely sensitive water pools on enchanted rock
    - Signage will be put in place to inform/warn the public



## Conclusion

After conducting our research, we came to the coherent conclusion that our rail line we would be established through Austin, Dallas, Houston, and San Antonio. Our goal is to connect the geological sites, but because many of them are unsuitable for construction, we will proceed with certain conditions. We will resolve this issue by installing flash flood warning systems, safety signs, barriers, hiring environmental engineers to periodically monitor water conditions, and using a extensometers and lidar tools to detect movement in rock formations.

## References

<http://kathmandupost.ekantipur.com/news/2017-07-03/govt-to-install-more-early-warning-systems.html>  
<http://www.austintexas.gov/departments/barton-springs-pool>  
<http://www.beg.utexas.edu/people/linda-mccall>  
[https://www.jsg.utexas.edu/student/eric\\_goldfarb](https://www.jsg.utexas.edu/student/eric_goldfarb)



Enchanted Rock



Inks Lake

GeoFORCE Express



Ellins, Katherine K., Dana L. Thomas, Daniel Campos, Sarah W.M. George, Eric Goldfarb, Alissa Kotowski, Linda McCall, Nick Soltis, Eric Stocks, and Vanshan Wright (2018). Using the STAR Legacy Cycle to promote student-centered field learning in GeoFORCE and STEMFORCE 12th grade summer academies. Paper 252-2, Geological Society of America Abstracts with Programs. Vol. 50, No. 6, doi: 10.1130/abs/2018AM-323816

George, Sarah W.M., Ellins, Katherine K., and Eriksson, Susan C., 2018, Photographs and sketches in tandem: A multifaceted approach to focusing the untrained eye (invited presentation). Paper 31-6, Geological Society of America Abstracts with Programs. Vol. 50, No. 6, doi: 10.1130/abs/2018AM-321055

Thomas, Dana L., Katherine K. Ellins, Daniel Campos, Sarah W.M. George, Eric Goldfarb, Wonsuck Kim, Alissa Kotowski, Linda McCall, and Vanshan Wright (2018). Student exploration of geoscience careers through challenge-based field learning in GeoFORCE and STEMFORCE 12th grade summer academies. Paper 252-13, Geological Society of America Abstracts with Programs. Vol. 50, No. 6, doi: 10.1130/abs/2018AM-323939

Kotowski, A.J., Wright, V. D., Soltis, N., Ellins, K., 2018, Engaging high school students from underrepresented minorities in the geosciences through graduate student-led, challenge-based learning, Abstract TBA, scheduled for 2018 Fall Meeting, AGU, Washington, DC, 11-15 Dec.

Italicized names are students.





**GEOFORCE OUTREACH**

# GeoFORCE Outreach Program



GeoFORCE participates in community outreach events each year to broaden our impact. We partnered again with Shell to engage with Houston students and families at the Houston Hispanic Forum Career and Education Day. Houston-area GeoFORCE high school students helped lead a hands-on activity simulating searching and drilling for oil in the subsurface. In addition, Stanley Stackhouse, a Jackson School alumnus at BXP Ltd., and Stephanie Suarez, a GeoFORCE alumnus and University of Houston Master's student, joined Shell employees on a panel to talk about their careers.

In February, we had the unique opportunity of being an exhibitor at the American Association for the Advancement of Science (AAAS) Family Science Days, part of this year's AAAS Annual Meeting held in Austin. We also welcomed visiting students from across Texas to our table at Explore UT in March. At these events we engaged students in a hands-on activity for learning about how water moves through different sediments. GeoFORCE College students volunteered to help visitors at our booth at both of these outreach events. Offering volunteer opportunities like these is a great way for us to stay engaged with GeoFORCE students throughout the year.



# GeoFORCE College Program

**T**he GeoFORCE College Program aims to support current undergraduates, graduate students and recent graduates in their academic and professional endeavors. It starts while students are still in high school, during their junior year, and continues throughout the college application period and into the beginning of their first year. Dr. Dana Thomas became the Program Coordinator for GeoFORCE College in December 2017, and Edgar Garza continues to provide scholarship support. To provide critical information to GeoFORCE high school students, we offered Transition to College workshops in the spring and during the 12th Grade Academies at UT Austin. Nearly 100 students, as well as numerous parents, received valuable advice from GeoFORCE staff and current college students on applying to college, finding scholarships and seeking out financial aid. With these efforts we are maintaining our commitment to ensure that every GeoFORCE student graduates from high school and attends college.

**600**

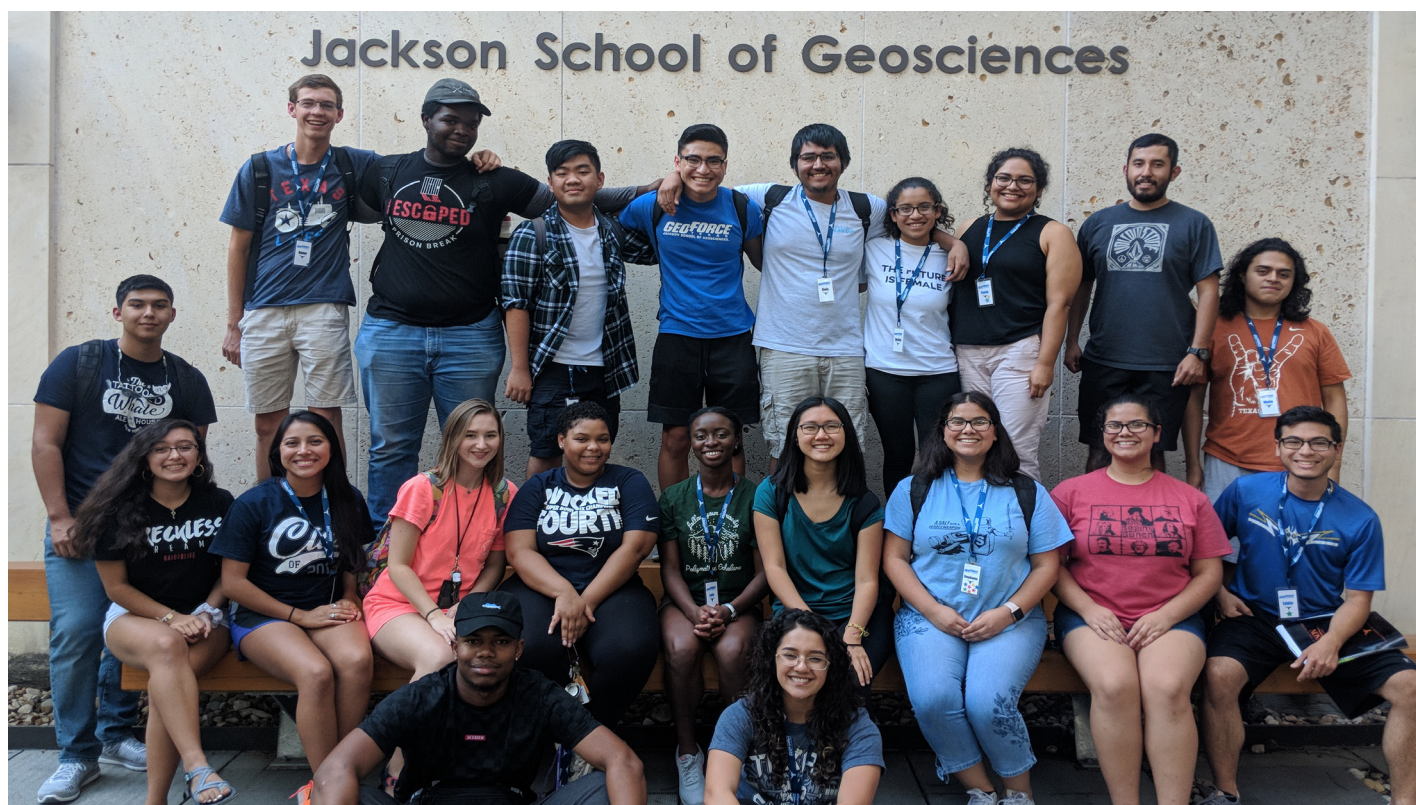
There are currently about 600 GeoFORCE students in undergraduate and graduate degree programs, and we continue to visit campuses across Texas to foster GeoFORCE student communities.

There are currently about 600 GeoFORCE students in undergraduate and graduate degree programs, and we continue to visit campuses across Texas to foster GeoFORCE student communities. As part of the 2017-2018 mentorship program at UT Austin, students learned about UT programs from guest speakers, including Earth and Energy Resources Program Director Richard Chuchla and UTeach Coordinator Annette Hairston. Jackson School Master's student Mario Gutierrez, who is now at ExxonMobil, gave a presentation on professional development. Dr. Thomas also connects students to summer research and internship opportunities, and several GeoFORCE students' stories are presented in this report. GeoFORCE College students highly value the opportunity to be summer counselors for the high school field experiences. Several geoscience and petroleum engineering majors served on trips this summer, including Hector Jett Black, Raeann Garcia, Juan Carlos Gonzalez, Nicole Gonzalez, Cheyenne Hibbits, Emma Johnson, Priscila Paez, Theresa Perez and Marlowe Zamora.

The number of GeoFORCE students earning undergraduate and graduate degrees in geosciences is increasing. In 2017-2018, at least fourteen GeoFORCE students earned their Bachelor's degrees in geoscience bringing the total geoscience degrees earned to 54. Four students are entering geoscience Master's programs at University of Texas at Austin, Auburn University, University of Texas at El Paso and University of Arkansas. Jordan Oefinger (B.S. Geology, UT Austin, GeoFORCE Class of 2014) is conducting her Master's research at University of Arkansas with Professor Glenn Sharman, after the two met in a 12th Grade GeoFORCE Academy in 2017 for which Sharman was the Instructor and Oefinger was a Counselor. A student from the first GeoFORCE cohort, Marissa Vara (B.S. Geology, UT Austin, GeoFORCE Class of 2009) completed her M.S. in Paleoclimatology, from Louisiana State University this summer. As more students complete their degrees, more GeoFORCE students are also entering the workforce. David Splawn (B.S. Geology, Texas A&M, GeoFORCE Class of 2014) began a position with ExxonMobil as a geoscience technician with the West Africa New Opportunity team. Other student careers are profiled throughout the report.



# GeoFORCE Math and Science Institute



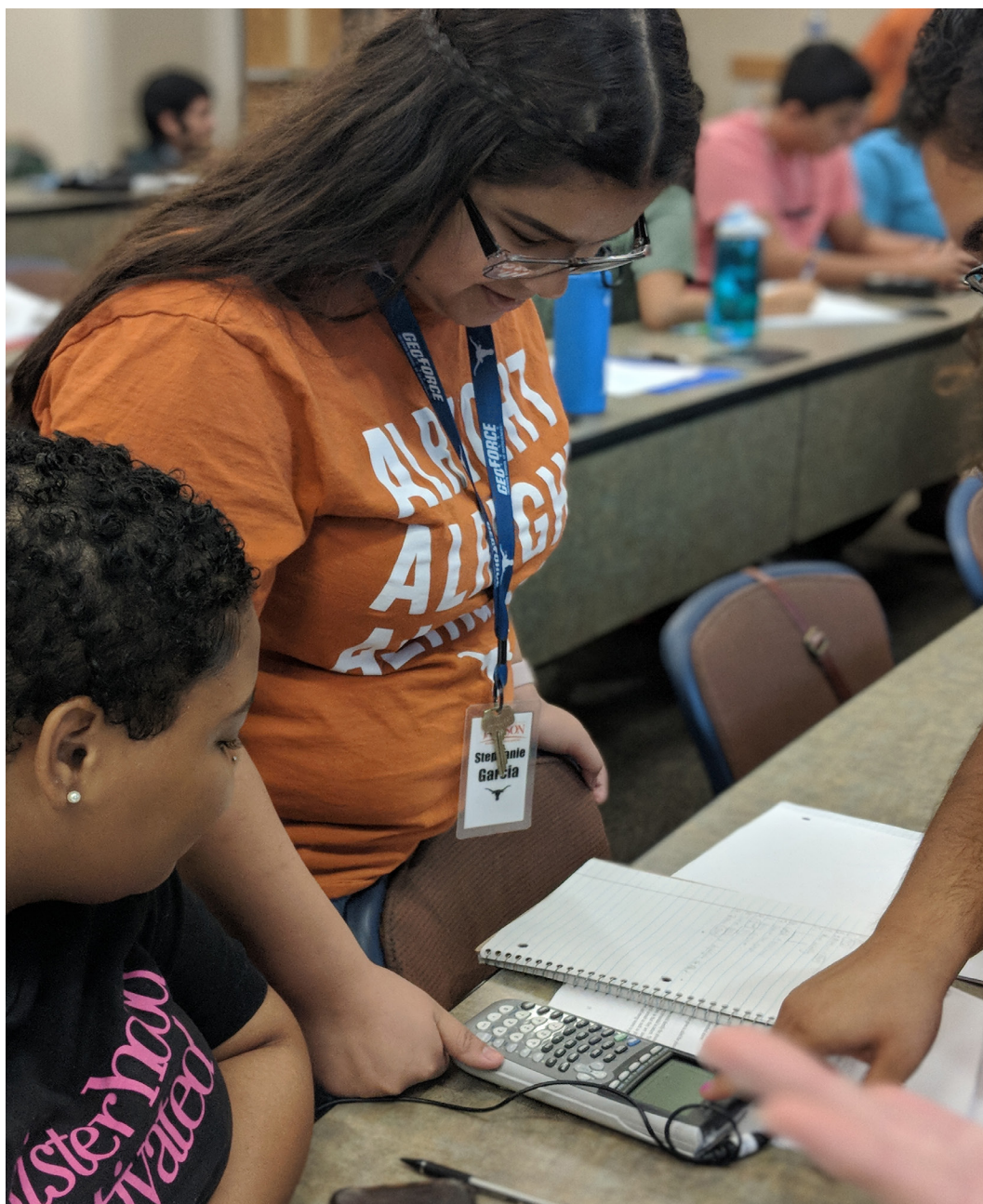
The first-ever GeoFORCE Math and Science Institute was held August 12-17, 2018 at the University of Texas at Austin. Seventeen incoming college freshman and one rising college sophomore challenged themselves in the classroom to prepare for their math and chemistry courses. UT faculty, graduate students and GeoFORCE undergraduates served as Instructors, Teaching Assistants, and Peer Learning Assistants (PLAs), respectively. Professor Mark Daniels, UT Department of Mathematics and Associate Director UTeach, encouraged students to understand the “hows and whys” of math by working problems and doing hands-on activities.

"The demos kept me captivated, and even the more abstract topics such as quantum mechanics were interesting because she gave **engaging** lectures".

One student explained, “Having the instructor make us think of the bigger picture and ask ‘why’ helped me get into the mindset of a college student.” Professor Kate Biberdorf, Department of Chemistry, brought excitement and enthusiasm to each chemistry section with demonstrations such as popping helium-filled balloons with different salts to display electromagnetic radiation.

“The demos kept me captivated, and even the more abstract topics such as quantum mechanics were interesting because she gave engaging lectures,” said a student. By going over learning styles, note-taking techniques, study strategies and other college skills, the students also got a jump-start on becoming a college student. One student noted that “the most valuable aspect had to be the feel of what it’s going to be like to be a college student.

The next few weeks are going to feel like a crazy blur, and...I’ve gained a bit of understanding as to what I can expect in classes, new connections with professors, studying habits, and even just simple email etiquette...I will be way more prepared than I would be had I not attended this.” Each student expressed their gratitude to the sponsors and to the individuals who donated to a fundraising campaign through HornRaiser, UT’s official crowdsourced funding platform, and they strongly encouraged the continuation of the Institute.





THE UNIVERSITY OF JACKSON  
JACKSON  
SCHOOL OF BUSINESS

JACKSON  
Kaylyn  
Gonzalez



**FINANCIAL DATA**

THE UNIVERSITY OF TEXAS AT AUSTIN  
**JACKSON**  
SCHOOL OF GEOSCIENCES

**GEOFORCE**  
TEXAS  
JACKSON SCHOOL OF GEOSCIENCES

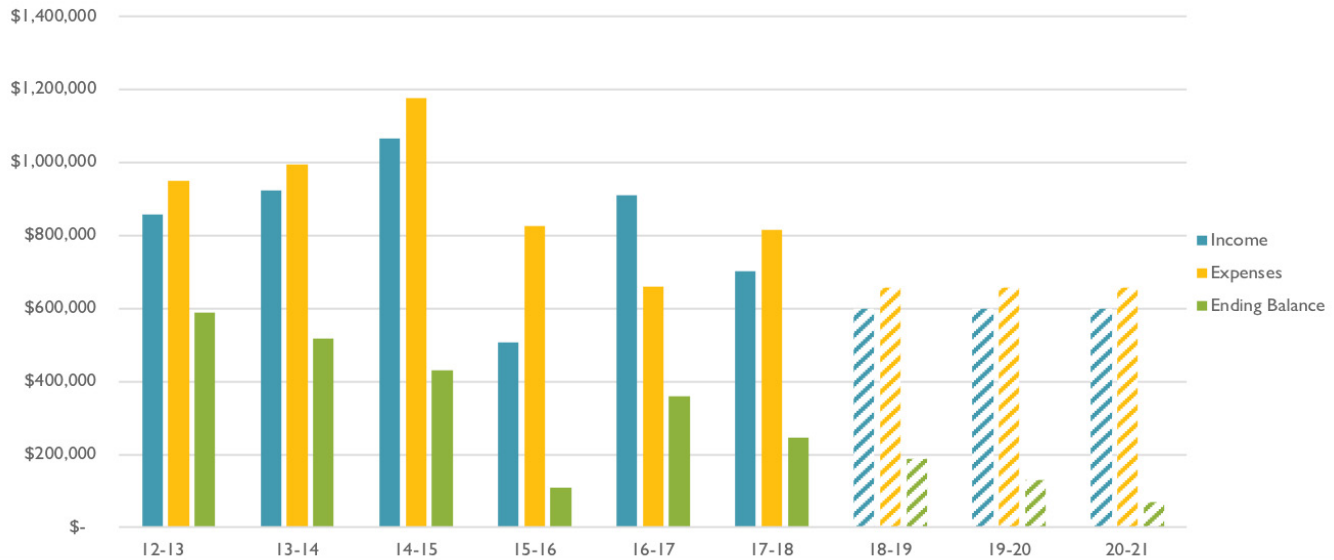
JACKSON  
Janel

## GeoFORCE Financial Status

GeoFORCE started providing visual “snapshots” of income versus expenses versus the ending balance to provide an “at-a-glance” understanding of the history and projections of GeoFORCE finances. This was done at the request of advisory members to make the big picture of finances easier to read with a glance. In the staff and operations chart, the commitment of the Jackson School is clear as staff and operational support has remained and is projected to remain over \$500,000. The sponsor funded programs chart make it easy to see the impact of the plan put forward in 2012-13 to replace the Houston and Southwest Young Geos with a new more expensive Academy of 40 students each year comprised of students from Houston and Southwest. The plan was that the current Houston and Southwest Academies would be continued in addition to the third mixed Academy, with increased spending on GeoFORCE Grads.

The advisory committee was presented with data about the greater effectiveness of the Academy program versus the Young Geos. The data showed that all Academies were in the field for seven days while Young Geos time varied from two to four days in the field. Academies allowed more time for learning and building self-efficacy as geoscientists and more time for participants to create a community that encouraged high rates of students continuing in GeoFORCE for four years. The chart shows that combined with the increase in spending in the GeoFORCE Grads program (students who completed the final Academy but had not started college), expenses increased the next two years as the remaining Young Geos continued until they completed all four years while adding a combined Academy in 2014 and 2015. As the Young Geos phased out and the decision was made to not add more combined Academies in the current oil and gas price environment, expenses declined and are projected to remain constant by running a Houston Academy and Southwest Academy at each grade level. Any future considerable increases in the market value of oil and gas will allow for reconsideration of returning to the 2012-13 plan to run three Academies at each grade level.

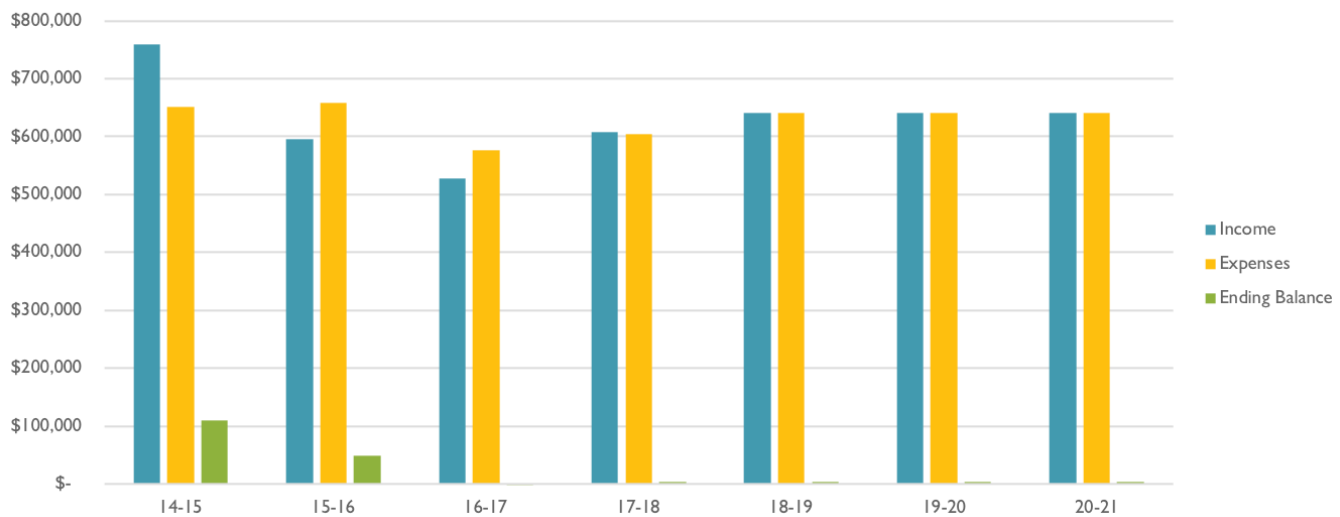
### GeoForce - Programs (Sponsorship funded)



Note1: Income is in fiscal year when funds arrive (e.g. \$200K of FY1516 gifts arrived in FY1617)

Note2: Expenses are in fiscal year when payments are made (e.g. some Summer FY1617 expense payments occur in FY1718)

### GeoForce - Staff and Operations (Jackson / Other Endowments Funded)



Active FY1617 Contracts and Grants are:

Summer STEM - 26321526 (GEOF-MOORE TXWC 09-30-16)

Summer STEM - 26321630 (GEOF-MOORE TXWC 09-30-17)

# 2018 GeoFORCE Donors



## GeoFORCE Donors

Dana L. Thomas  
Dr. Robert L. Boyce  
Mr. David Luke Gorney  
Mr. Ben P. Hooper  
Mr. Edward C. Cazier III  
Mr. Charles A. Caughey  
Mr. Richard J. Chuchla  
Mr. William D. Demis  
Ms. Gretchen M. Gillis

## Graduate Student Executive Committee

George and Mary  
Josephine Hamman Fo  
Ms. Alison M. Hansen  
Ms. Maren Gabriella  
Mathisen  
Mrs. Linda H. McMillan  
Mr. Douglas N. Toepperwein  
Mr. Dennis R. Trombatore

## Undergraduate Geological Society

Ms. Susan L. Wygant

## Friends of GeoFORCE Endowments

Dr. Samuel L. Moore  
Ms. Tiffany S. Hedayati-  
Benavides  
Mr. Chris S. Lerch  
Mr. William N. Agee, Jr.  
Ms. Christine M. Skirius  
Ms. Annell R. Bay and  
Dr. Robert K. Suchecki

## HornRaiser

Mr. Olufemi Agunbiade  
Kristen Barazi  
Ms. Alisha Battle  
Mrs. Johnna Corder Beltran  
Felix Adrian Benavides  
Ms. Michelle Berry  
Ms. Linda Black  
Mr. Daniel Steven Campos  
Dolores Campos  
Ginny A. Catania  
Mrs. Ann S. Cochran  
Ms. Connie Dong  
Kiara Jeannelle Gomez  
Mr. Brad Hart  
Mr. Danny Haskin  
Mr. Sean Hensarling  
Boe Jensen  
Ms. Misha Laird  
Ms. Kimberly Lau  
Dr. Samuel L. Moore  
Rosalind E. Moreman  
Ms. Sarah Moreman  
Dean Sharon Mosher  
Thao Nguyen  
Mrs. Lauren C. Oefinger  
Mr. Abayomi I. Olufowoshe  
Mrs. Ana C. Pape  
Mr. Luis Alberto Picatoste  
Vasquez  
Claire Phillips Pluim  
Mr. Francisco A. Ramirez  
Reynaldo Ramirez, Jr.  
Ms. Daniella Marie Rempe  
Mr. Enrique Reyes Jr.  
Marisol Reyes  
Ms. Mylinda Rosen  
Ms. Susan G. Rosenbaum  
Mrs. Eleanor A. Saathoff  
Mr. Federico Salinas  
Mrs. Georgia B. Sanders  
Ms. Susan Collins Starks  
Mr. Richard Tesson  
Ms. Margaret V. Tran  
Mr. Ramon H. Trevino  
Mr. Joshua L. Ward  
Ms. Jill Whatley  
Ms. Toya Wilson  
Ms. Molly Witter  
Ms. Patricia Zamora

# ExxonMobil



## Schlumberger

## HALLIBURTON

GEORGE AND MARY  
JOSEPHINE  
HAMMAN FOUNDATION



Texas Workforce  
Commission



Jackson School  
Undergraduate  
Geological Society

Jackson School  
Graduate Student  
Executive Committee



### Individual Friends of GeoFORCE

The outreach staff bring a diverse background to help evolve our program to better prepare out students for the future.

Dr. Sam Moore

Director of Outreach and Diversity

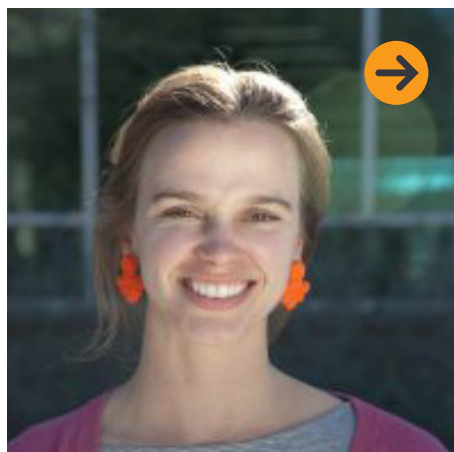
For more than 20 years Dr. Moore has provided leadership in engaging faculty with K-12, undergraduate, and graduate students. Along with GeoFORCE, Sam also oversees Jackson School outreach programs to increase participation in the geosciences.



Lindsay Stephens

Senior Program Coordinator

Oversees the GeoFORCE College Program, which includes statistics, college leadership opportunities, and scholarship management. Served as a field experience evaluator.



Dana Thomas, Ph.D.

Coordinator for College Transition

Student Success, and Learning Experiences Primary contact for graduating seniors and college students; develops and evaluates learning experiences for students and educators.



Edgar Garza

Outreach Program Coordinator

Coordinates the GeoFORCE College program and scholarship program. Assists with the High School Program, along with GeoFORCE's social media presence. Also serves as a field experience evaluator.



Alison Hansen

Administrative Assistant (PT)

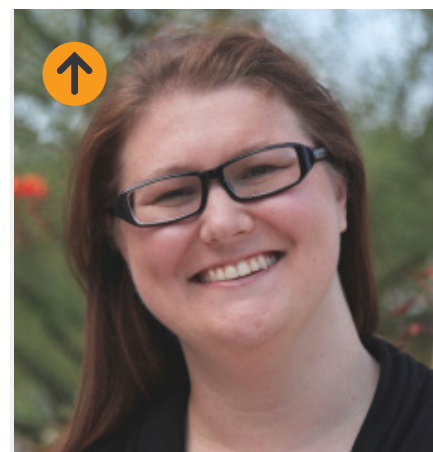
Coordinates all aspects of the accounting and human resources process to ensure the program runs smoothly.



John Hash

Program Coordinator

Coordinates the Houston Academy field courses, assists with development activities for GeoFORCE and college transition initiatives for the College program.



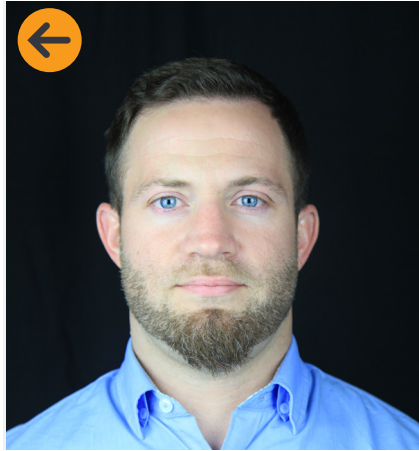
# OUTREACH STAFF

---

Matt Hofer

High School Program Coordinator

Oversees logistics and operations for all high school program field courses and events. Coordinates the Southwest Academy field courses.



Daniel Campos

Office Assistant

Maintains office operations by handling logistical and organizational support tasks. Ensures trip supplies and equipment are properly maintained and serviced.



Selene Alba

Media Coordinator

Assist in all aspects of media for GeoFORCE, including, video content, digital design, social media and website and layout design.



