

October 2019 News Notes

- Alumni Change Lives
 - Peru Ice Core Expedition
 - Gulf Coast Research Program
 - Missing Mountain Snow
 - Meteorite Shower to Ice Age
 - “Malachite” by Caleb Forrest
 - Eastern Section AAPG Meeting
 - National Fossil Day
 - Field Work in Ireland
 - Bownocker Lecture
 - Sedlacek Promoted
 - SES on the Road
 - Alumni Spotlight
-

Alumni Change Lives

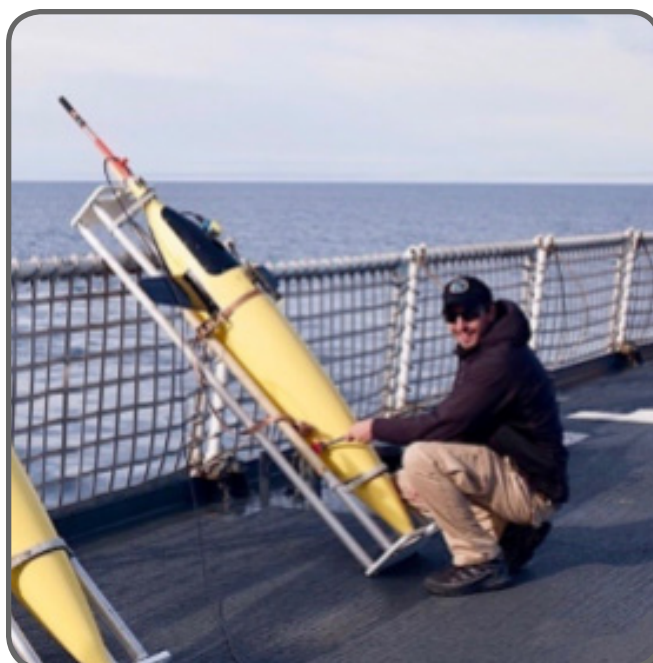
Jason Otero Torres is a PhD student in Geodetic Sciences at Ohio State working with Dr. C.K. Shum and sponsored by the National Geospatial-Intelligence Agency (NGA). Below, he describes how the Friends of Orton Hall fund allowed him to share his research with the scientific community and further his studies.

This summer, I received an award from Friends of Orton Hall (FOH) to participate in two conference trips: the International Association of Great Lakes Research 2019 in Brockport, N.Y. and the 27th IUGG General Assembly 2019. In the IGLR2019, I gave a talk on the feasibility of using satellite altimetry to validate or enhance the Great Lakes datum. For this collaborative work, we tested three water level reconstruction methods and selected the optimal one to create a water level surface. Our hope is to include our results as geopotential solutions in terms of spherical or ellipsoidal harmonics on global or regional gravity models in the future.

In the IUGG2019, I co-authored a talk by Dr. C.K. Shum about estuary and river tides. Here, we presented the feasibility of empirically estimating estuary and river tides over the coastal region of Bangladesh. During the conferences, I was able to meet colleagues and researchers from cross-disciplinary fields. In sum, it was a fantastic experience and I would like to sincerely thank FOH for supporting these trips.

The School of Earth Sciences relies on the generous support of our alumni and friends to provide programs, scholarships and facilities that enrich the experience of our students, provide life-changing opportunities, and enable world-changing discoveries.

If you are interested in giving to support the Friends of Orton Hall or other funds, please visit our [giving page](#).



Peru Ice Core Expedition

An expedition to drill ice cores from Earth's highest remaining tropical glacier — Mount Huascarán in Peru — was cut short last month after a protest by local residents forced researchers to abandon their mountain camp.

The protestors accused the team of being a front for a mining company; a claim that the scientists, led by glaciologist Lonnie Thompson of Ohio State University in Columbus, deny.

Despite the conflict, the researchers managed to extract four ice cores before being evacuated by helicopter. These samples could reveal new details about changes in atmospheric greenhouse-gas levels, temperature and land use in the Andes Mountains and the adjacent Amazon basin over the past 20,000 years. The climate record preserved in the cores could also strengthen predictions about the effects of glacial melting, which has put communities downstream at risk of water shortages and catastrophic landslides.



The ice cores from Mount Huascarán could reveal new details about temperature changes in the Andes Mountains and the adjacent Amazon basin since the last ice age. Credit: Vladimir Mikhalev

The team's expedition began in early July with the goal of sampling ice from two sites on Mount Huascarán, Peru's tallest mountain. Even before Thompson's team was forced to leave the mountain, he saw the trip as a "salvage mission". That's because Mount Huascarán's ice is thawing rapidly, a process that is releasing trapped air bubbles that glaciologists use to reconstruct the past climate.

The project is personal for 71-year-old Thompson, who began studying glaciers in Peru in 1974 and has seen them shrink steadily since then. He compares his trips to dwindling glaciers to visiting a loved one with terminal cancer. "I can monitor and document the rate of retreat," he says, "but unfortunately cannot stop its demise."

The recent conflict was not the first time Thompson has faced sceptical local residents. Tribal leaders forced him to descend Jaya Peak in New Guinea in 2010, and in 1997 residents of Sajama, Bolivia, required that he donate to their library, hire local porters and participate in a ritual that involved sacrificing an alpaca before he could drill on Mount Sajama.

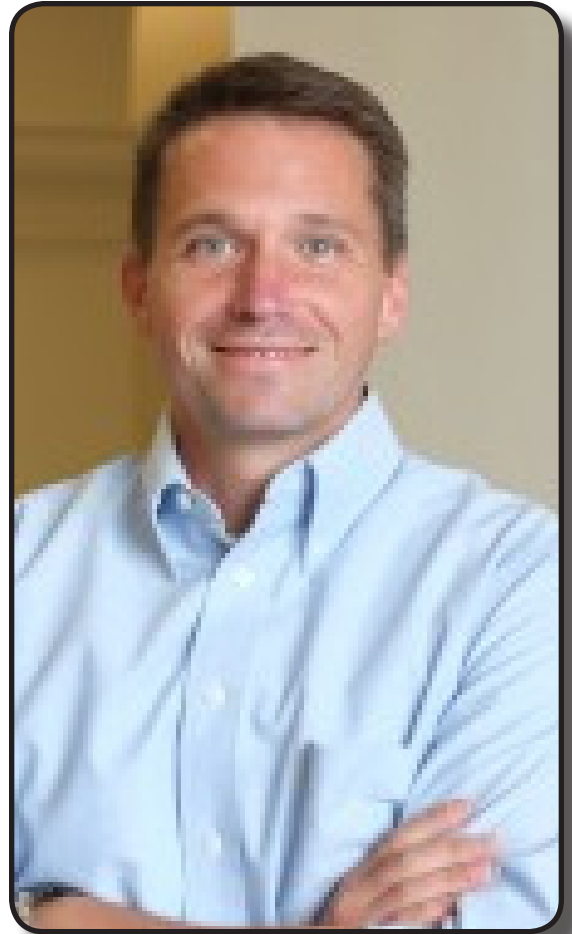
Thompson sees a positive side to communities' protectiveness towards their peaks. "Glaciers are sacred places," he says. "If every mountain had a village that was trying to protect it, we wouldn't have the environmental problems we have today."

National Academies Gulf Research Program

Recently, SES Professor Derek Sawyer was named to the National Academies of Science, Engineering and Medicine's 2019 Gulf Research Program [Early-Career Research Fellows List](#).

The National Academies describe the individuals they seek to showcase: "Our Early-Career Research Fellows take risks on research ideas not yet tested, pursue unique collaborations, and build a network of colleagues who share their interest in improving offshore energy system safety and the well-being of coastal communities and ecosystems".

Dr. Sawyer is an assistant professor in the School of Earth Sciences at The Ohio State University. He received his Ph.D. in geological sciences from the University of Texas at Austin, his M.S. in geosciences from Penn State University, and his B.S. in marine sciences from Eckerd College. Previously, Dr. Sawyer worked for ExxonMobil in offshore drilling in the Gulf of Mexico and other locations to plan and execute safe well designs and assess hazards for safe subsea development projects.



At Ohio State, Dr. Sawyer's research focuses on natural hazards of submarine landslides, tsunamis, earthquakes, and hurricanes. He examines them with indirect and direct methods, including geophysical data, borehole logs, sedimentary cores, numerical modeling, and physical experiments. Study sites span the range of shallow water coastal environments to deepwater continental margins and sedimentary basins in a range of tectonic settings.

Congratulations Dr. Sawyer! To learn more about Dr. Sawyer's research, visit his website [here](#).

Mystery of the Missing Mountain Snow

Via *Nature Research Highlights*, covering a *Water Resources Research* [paper](#): Scientists could be seriously underestimating the amount of snow stored atop mountains — an important source of water for people around the world.

Mountain snowpack is notoriously hard to calculate because satellites can't measure snow depth. Melissa Wrzesien (Ph.D 2018) and her colleagues studied four global data sets that quantify mountain snowpacks. The four data sets agree reasonably well with each other — but they do not agree with high-resolution simulations of snow across several North American mountain ranges, such as the Cascades.

The simulations suggest that 40–66% more snow is frozen in those mountains than scientists had realized. If that pattern holds true globally, then the data sets could be missing as much as 1,500 cubic kilometres of mountain snowpack.

If melted, that snow would supply an amount of water equivalent to 4% of that carried by the world's rivers.



Snow coats the Cascade Range in the United States. Modelling suggests that snowpack in the Cascades and other mountains has been underestimated. Credit: Ding Ying Xu/Alamy

From Meteorite Shower to Ice Age

A multi-authored international study with Prof. Birger Schmitz of Lund University, Sweden as senior author and key investigator, and Stig M. Bergstrom of SES as one of the co-authors, entitled “An extraterrestrial trigger for the mid-Ordovician ice age: Dust from the breakup of the L-chondrite parent body” was published on September 18 in [Science Advances](#).

This novel idea has attracted a great deal of attention as shown by the fact that it has been discussed in more than 100 newspapers worldwide (e.g. N.Y. Times Sept. 19, 2019). Based on very extensive studies centered on unique meteorite-bearing sections in Sweden but also involving successions in China, Siberia, and United States, the authors propose the new idea that enormous quantities of extraterrestrial meteoric material transported into the Earth’s atmosphere during a couple of million years caused a global temperature reduction resulting in an ice age and a global sea level lowering that is recognized as a prominent stratigraphic gap in Middle Ordovician shallow-water successions in North and South America, northern Europe, Siberia, and China. The authors also note that this event also took place during part of the Great Ordovician Diversification Event which involved a major turnover of the marine faunas.

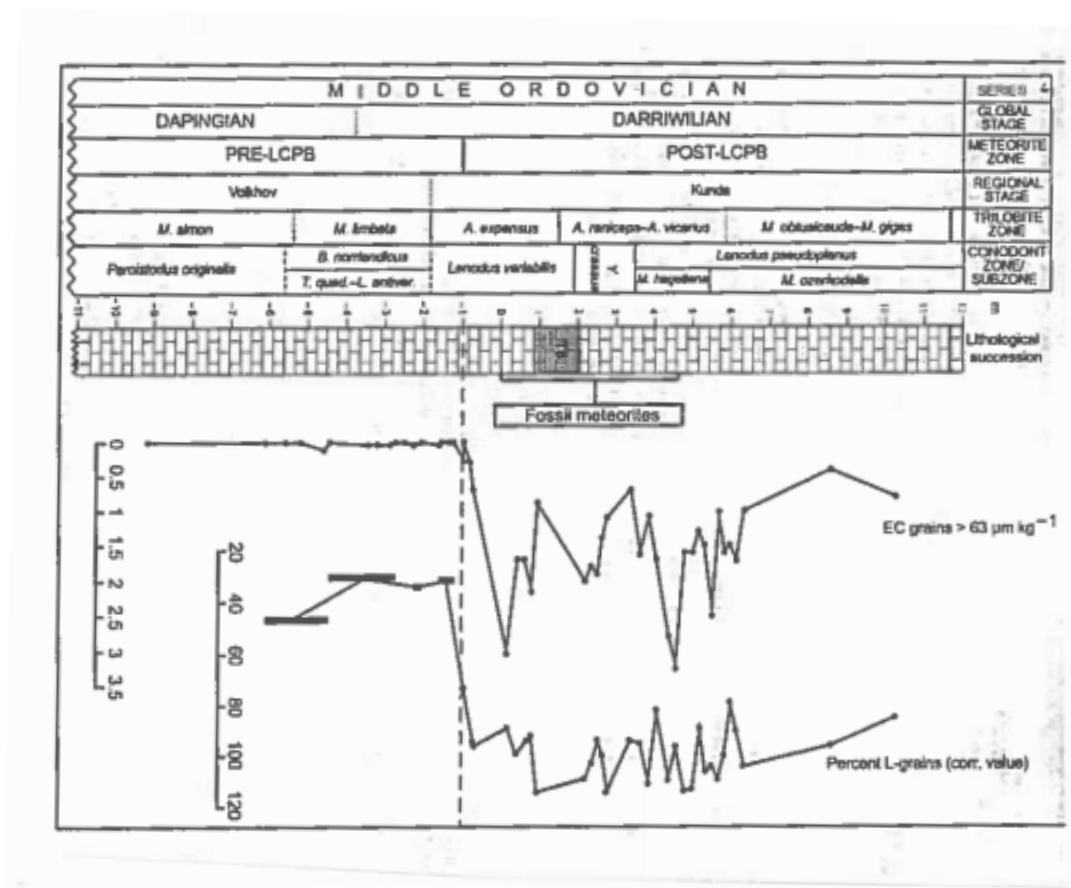


Diagram showing the enormously increase of extraterrestrial material in a 7 m thick interval in the Swedish Kinnekulle succession.

“Malachite” by Caleb Forrest

Caleb Forrest, first year Honors student majoring in Earth Sciences, wrote the poem “Malachite” as his assignment on pet minerals that Professor Anne Carey assigns to her students in Earth Sciences 1121H each year. The assignment was to write an essay about a mineral chosen by drawing from a hat. Students were encouraged to be creative and use humor. Caleb’s submittal stood out as the first time a student had written geopoetry to fulfill the assignment.

“Malachite” by Caleb Forrest

Is my pet mineral’s name just Greek to you?
That’s just fine, because it is for me, too.
Malachite means mallow, for a flower-like green
That resembles my mineral’s vitreous or silky sheen.
Its monoclinic crystals are not always distinct,
But malachite’s atoms in an octahedron are linked.
With a 3.5 to 4 on the Mohs’ Hardness Scale,
Malachite leaves behind a green streak that’s pale (Klein, 2008).
Its perfect cleavage often goes unseen,
And when polished it’s known for striations of green.
To identify my pet, just check for effervescence
Or botryoidal form that mimics grapes in presence (Schumann, 1992).
Interested in my pet? You want to know more?
Its specific gravity is also 3.5 to 4.
Known for containing copper, carbonate, and hydroxide,
Identifying its chemistry would label it an oxide.
Within limestone or sandstone it begins to take shape.
Often, as a stalactite, from a copper vein it will drape (Schumann, 1992).
Malachite was once used as a type of copper ore
But today its beauty is what the world wants it for.
As a pigment or gem my mineral is prized.
Most often from the Congo’s mines it’s excised (Klein, 415-416).
In short, here’s what everyone should know:
If you seek my pet, to Africa you’ll go.
You’ll know it best by the bright green hue,
And the reaction to acid is definitive, too.
As a perfect crystal my pet is rare,
But it still has plenty of beauty to share.
If a copper ore is truly what you desire
You should have searched for my pet in the century prior (King, 2019)!
If you want a pet mineral that’s pretty, useful, and fine
You can’t have malachite, because this one is mine!

Eastern Section AAPG Meeting

SES's Mark A. Kleffner and Stig M. Bergström gave a poster presentation at the recent (October 12-16) Eastern Section AAPG meeting in Worthington, Ohio. They presented their poster, "Curious Case of Lack of Strata Assignable to the Pterospirifer celloni Superzone (Telychian, Llandovery, Silurian) in the Eastern Portion of the Midwestern Basins and Arches Region (New York, Ohio, Kentucky, and Indiana)," during the Tuesday morning poster session of the meeting.

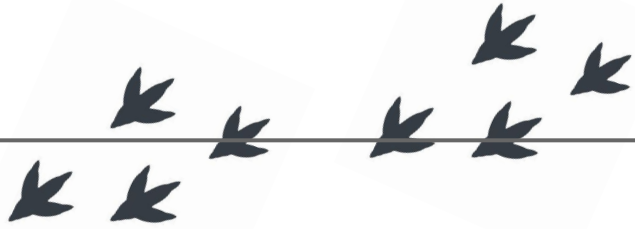
The posters document the nearly complete absence of any strata assignable to that zone, which corresponds to a Telychian interval considered to be one of fairly high sea level globally. The researchers concluded that tectonic activity along the Appalachian Orogenic Belt must have played an even more important role than eustasy in the stratigraphic record of the eastern portion of the Midwestern Basins and Arches Region in New York, Ohio, Kentucky, and Indiana during the 1.5 to 3.0 million years of time represented by the Pt. celloni Superzone.



SES's Mark Kleffner & Stig Bergström at the Eastern Section AAPG meeting.

National Fossil Day

Dinosaurs, trilobites, children, OH MY!



The Orton Geological Museum hosted the its first ever National Fossil Day event on October 16, 2019. National Fossil Day is an annual celebration sponsored by the National Park Service held to highlight the scientific and educational value of paleontology and the importance of preserving fossils for future generations.

This special celebration not only celebrated National Fossil Day but also the 1-year anniversary of the installation of *Cryolophosaurus ellioti*.

Over 600 attendees from all over the state of Ohio joined museum staff and student volunteers for a night of paleontology themed activities, and a talk by Dr. David Elliot on his famous dinosaur discovery.

Brutus Buckeye even made an appearance in honor of National fossil Day!

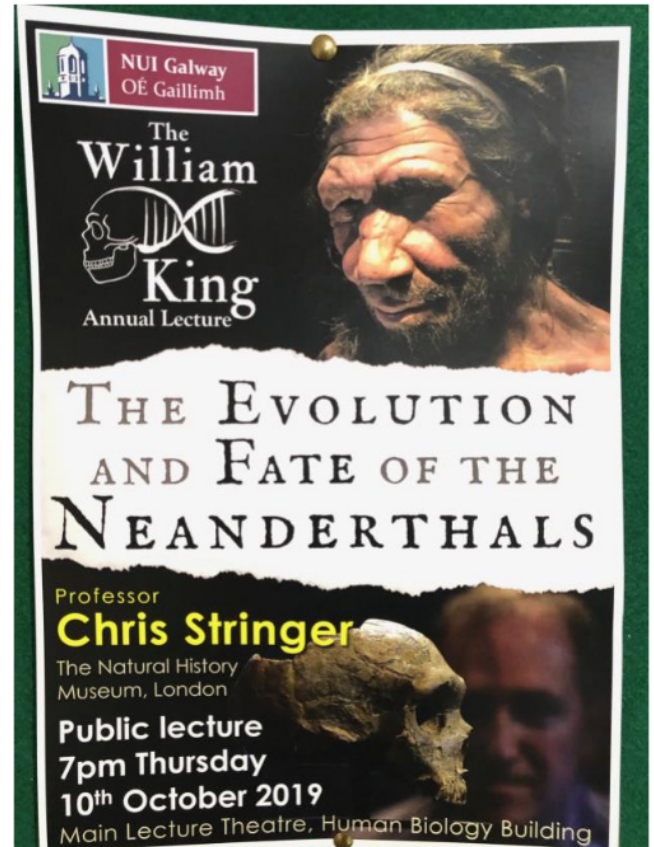
The Orton Geological Museum Staff, Dr. Loren Babcock, Dale Gnidovec, Dr. Jill Leonard-Pingel, Prescott Vayda, Casey Saup, and event architect Molly Hunt are very pleased with the attendance and look forward to next year's celebration of National Fossil Day!

Field Work in Ireland

As part of a continuing collaboration with colleagues at the National University of Ireland Galway (NUIG) that began with Professor Berry Lyons' Fulbright Fellowship at NUIG in 2018, Devin Smith, MS 2019, spent ten days in Ireland in October 2019 sampling the Shannon River and some of its tributaries.

Devin arrived at Ohio State in Summer 2017 with University Fellowship from the Graduate School. She received her BA in Environmental Science at Villanova University in 2017 where she worked under the direction of Steve Goldsmith, Earth Sciences MS 2005 and Ph.D. 2009. The fieldwork initiates Devin's dissertation research with Professor Anne Carey. Smith, Carey, and Lyons traveled together to Galway, Ireland in mid-October, over a period of time that included fall semester, break to conduct field work and plan future sampling as part of NUIG's Nuts&Bolts study of riverine transport of nutrients to Ireland's estuaries. The three from SES collected river water samples to be analyzed for a variety of geochemical constituents including stable isotopes of water, major cations and major anions, nutrients, nitrogen isotopes, and dissolved organic carbon.

Shown in the photos (taken by Anne Carey) are Devin Smith and Berry Lyons sampling along the Clare River at Claregalway, County Galway, and Devin sampling at Shannonbridge, County Offaly, on the River Shannon's lower reaches. While at NUIG, the three enjoyed the opportunity to hear Christopher Stringer of the Natural History Museum, London, give a presentation entitled "The Evolution and Fate of the Neanderthals" as NUIG's William King annual public lecture for 2019.



Bownocker Lecture

On September 26th and 27th Dr. John Grotzinger from Caltech and NASA's Jet Propulsion Lab presented the two 2019 Bownocker Lectures. A member of the National Academy of Sciences and Chief Scientist for the Mars Curiosity Rover, Dr. Grotzinger is a sedimentologist and stratigrapher whose pioneering work focuses on the early environmental evolution of both Earth and Mars. He has published over 200 articles, including more than 30 in Science and Nature.

After instituting our revamped advertising strategies with input from our Alumni Advisory board, the public lecture on the evening of the 26th was extraordinarily well-attended with over 600 people from all over Ohio in the audience. We invited students and researchers from institutions around the state as well as establishing an intensive social media, radio, and print marketing campaign to encourage the general public to join us in learning about Martian geology.



Alexa Sedlacek promoted to Assoc Professor

SES Alumna Alexa Sedlacek (PhD 2013) was promoted to Associate Professor rank with tenure this Fall at the University of Northern Iowa.

Alexa's research has focused on paleoclimate during the Permian-Triassic mass extinction, as well as Devonian stratigraphy and carbonate sedimentology. She is also the recipient of numerous teaching honors. Congrats on your promotion Lex!



SES on the Road

The School of Earth Sciences and related Ohio State centers had a strong showing at the GSA meeting in Phoenix as well as at the eastern AAPG meeting in Worthington, Ohio. SES excelled in the exhibition areas, as well as in the scientific parts of the conference.



SES booth at the Phoenix GSA meeting which also hosted the Byrd Polar and Climate Research Center display panel.



School of Earth Sciences booth shared with the Orton Geological Museum at the Eastern American Association of Petroleum Geologists meeting in Worthington Ohio. Mike Kositzke manned both Center of Energy Research, Training, and Innovation (CERTAIN) and the Subsurface Energy Materials Characterization and Analysis Laboratory (SEMCAL) booths.

ALUMNI SPOTLIGHT

JEROME M. HALL, M.Sc

Exploration Geologist,
Shell Oil Company

Jerome.Hall@Shell.com

WHERE HAS YOUR DEGREE TAKEN YOU?

I did my M.Sc. field work in Antarctica; I was recruited to join Shell in my final year but delayed that offer to follow my wife to Michigan where I worked for Google on their Book Search Project. After she completed her degree, we both accepted offers to Shell and moved to Houston. While at Shell (since 2009) I have worked exclusively in our Exploration organization and have filled the roles of both geologist and geophysicist.

My teams thus far have included doing drilling operations on a discovered field in the Gulf of Mexico, planning and drilling oil wells in the Niobrara shale oil play in Colorado, and most recently I have worked on exploratory activities in the deepwater basins of offshore Brazil.

HOW DID YOUR EXPERIENCE AS AN SES STUDENT AT OSU PREPARE YOU FOR YOUR CAREER?

The subsurface community at Shell in Houston is composed of geoscientists from many different schools and backgrounds. I am glad for the well-rounded nature of my M.Sc. at OSU, with a strong focus on the fundamentals and exposure to the different sub-disciplines.

Exploration geoscience in the energy business is a very integrated approach and requires a firm understanding of physics, historical geology, tectonics, sedimentology, stratigraphy petrology and chemistry. I strongly believe that my competence as an explorer is based not on specialization, but an integrated understanding and the capability to apply that knowledge to the subsurface.

MOST MEMORABLE EXPERIENCE AS A STUDENT?

My field work with Terry Wilson in Antarctica, and the shared experiences and memories of her working group while I was at OSU.

*Seek out paths
and opportunities that
speak to you, challenge
you, and allow you to
shine and enjoy your
work and your life.*



THE OHIO STATE UNIVERSITY
COLLEGE OF ARTS AND SCIENCES

SCHOOL OF
EARTH SCIENCES