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Benefiting the community by promoting and supporting interdisciplinary research at the interface of people, Earth, and the environment.

SMITHSONIAN INSTITUTION PLANS TO TAKE *SEA MONSTERS UNEARTHED ON THE ROAD*



Since its opening at the Smithsonian in 2018, millions of visitors have passed through the doors of *Sea Monsters Unearthed: Life in Angola's Ancient Seas*. Originally scheduled to close at the end of 2020, its stay in Washington D.C. has been extended four times. It is now scheduled close at the end of 2023. Once taken off display in Washington D.C., the Smithsonian Institution Traveling Exhibition Services (SITES) intends to tour it across the US beginning in 2025 until it returns to Angola in 2028. Planning, refurbishment, fabricating new cabinetry and travel cases, and fundraising will take up 2023 and 2024.

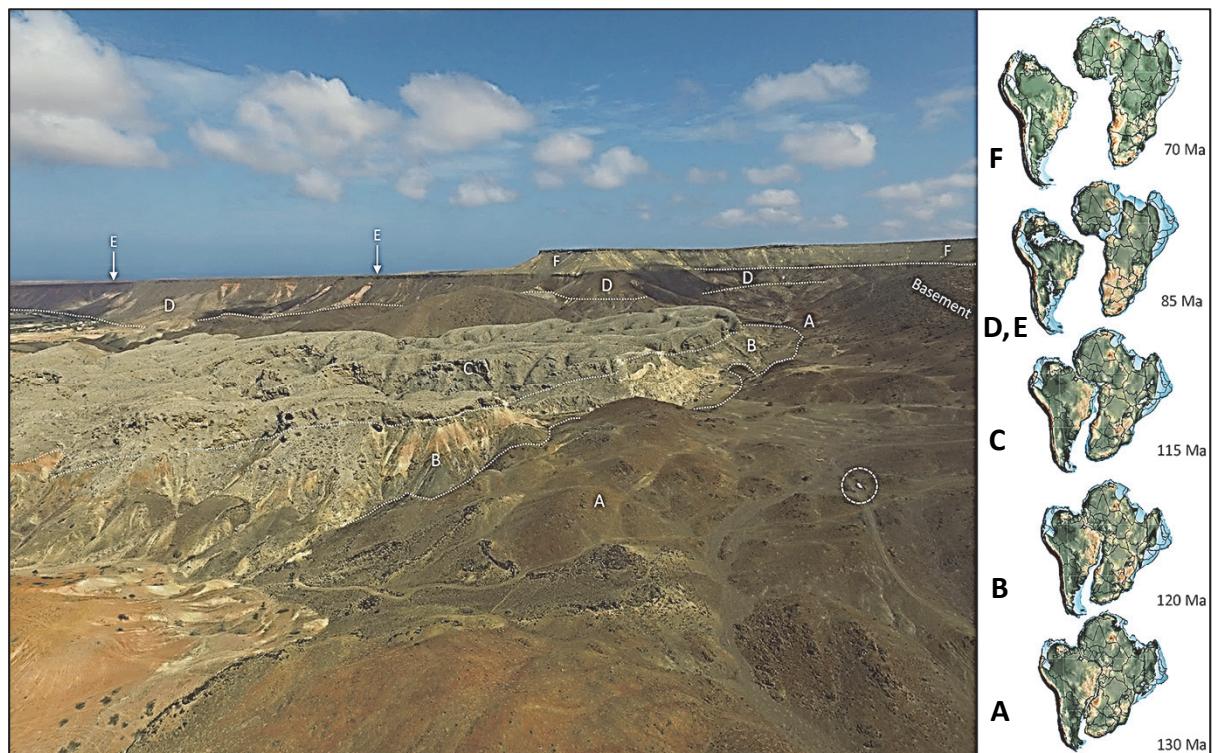
ISEM has made great efforts to share with the people of Angola the value of their fossil patrimony. They see the interest generated around the world. They understand that field collection and scientific study of fossils must be sustained to save Angola's patrimony. And there is an understanding that facilities must be built and students must be trained for careers as professionals, to sustain its scientific value.

ISEM's research group, Projecto PaleoAngola, has made great strides in documenting Angola's unique geological significance since 2005, four decades after the acceptance of plate tectonics. Now, a coalition of geoscientists from Angola, Namibia, Netherlands, Norway, Portugal, UK, and US have documented the opening and growth of the South Atlantic Ocean, which can be seen in outcrop in Angola but nowhere else. The starting point is the puzzle-like fit of Africa and South America, which every child in the world can recognize, and ends with the ocean of today. These outcrops are globally significant geological heritage.

We have also embarked on an effort to promote the creation of a UNESCO Geopark in southern Angola. The purpose of UNESCO Geo-parks is to create sustainable development, inclusive of all stakeholders, based on sites of globally significant geological heritage. Only two geoparks are currently designated in all of Africa. Angola should have the third because its rock record of the opening of the South Atlantic and its fossils, as shown by the Smithsonian exhibit, are elements of globally significant geological heritage. Both are central to sustainable development, to education, to tourism, and to Angola's international reputation. Obtaining UNESCO Geopark status can take five years or more. But we have that time.

INTERNATIONAL GEOLOGICAL SIGNIFICANCE: ROCKS SHOW THE OPENING OF THE SOUTH ATLANTIC OCEAN

- A.** Volcanic rocks and rift sediments from early stretching of continents, 130 Ma (truck for scale in white circle).
- B.** Post-rift pond and river sediments of the Atlantic Basin before flooding, 120 Ma.
- C.** Thick salt from evaporation of sea water leaking into Atlantic Basin, 115 Ma.
- D.** Conglomerates, coastal sands, and marine limestone capped by (E) post-salt volcanics, 85 Ma.
- F.** Open marine conditions with sea monsters. Atlantic continues to grow as it is doing today.

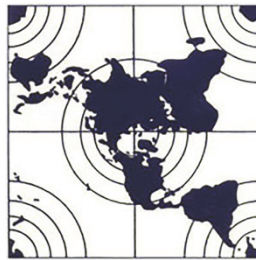


ISEM ENERGY ROUNDTABLE



ISEM continued its tradition of invitational Energy Roundtables dating back to the 1980's. The **2022 Roundtable** was held at Moody Gardens Hotel in Galveston from April 21 to 24. The theme was **"The Challenges for Alternative Energies and the Role of Oil and Gas to Reach Carbon Emissions Goals."** Participants (left) included executives, technical experts, consultants, and graduate student in geothermal energy **Nnamdi Okeifufe**.

The Roundtable was expertly organized by **Mike Forrest** (right) and was joined by **Maria da Cruz**, President and CEO of the US-Angola Chamber of Commerce, and **Gil Henriques** of the World Bank.



ANGOLA'S ANCIENT SEA MONSTERS AND SPIRITS

Louis Jacobs and **Myria Perez** ('18, Geology and Anthropology), shown at left giving pony ears with SMU alum **Barbara Broussard** ('07, Advertising and Photography), took part in a young professionals education evening in the Smithsonian's Q?rius Science Education Center on November 30. The sold-out event took *Sea Monsters Unearthed: Life in Angola's Ancient Seas* as its theme. Myria was the undergraduate representative to the Smithsonian Core Planning Team for the exhibit and now she is employed there.

For other examples of ISEM educational outreach see:

<https://kimura146.rssing.com/chan-38021707/index-latest.php>

<https://blog.smu.edu/research/2012/10/31/smu-professor-louis-jacobs-honored-with-prestigious-award-from-texas-science-teachers/>



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Thank you for your support and continued interest in ISEM!

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ISEM SUPPORTS STUDENT RESEARCH



Freshman **Rhuani Ahluwali** (Earth Science) in Dr. Alex Chase's lab, is investigating soil microbial communities. By sampling across both space (~1mi transects) and time (across annual seasons), she is working to understand how microbial taxa respond to changes in moisture, temperature, and flooding with respect to soil chemistry. This work involves field sampling, environmental DNA monitoring, and targeted isolation for ecologically relevant microbes.



Senior **Dylan McAden** (Earth Science) and Sophomore **Peter Mendiola** (Finance and Earth Science) are building protective cradles for Cretaceous marine reptile fossils prior to their return to Angola.



Sophomore **Mahima Quazi** (Earth Science) is working on a collaborative project with Dr. Xiao Yang and others to harmonize zooplankton time series data from lakes across the world, a project of the Global Lake Ecological Observatory Network. The ultimate goal is to explore zooplankton response to environmental change such that they can be used as indicators of environmental stress.



Freshman **Haley Schwenn** (Earth Science and Journalism) and Freshman **Ava Spratt** (Political Science and Pre-Law) prepare Cretaceous marine reptile fossils from Angola with Shuler Museum volunteer, **Bill Johnson**.



Sophomore **Peyton Dersch** (Anthropology) is transcribing early SMU 1980s radiocarbon data.



Ph.D. candidate **Anne Parfitt** (Anthropology) uses the Anthropology XRF spectrometer to collect data on Paleoindian stone artifacts.

Dr. Matthew Boulanger

Archaeologist **Matt Boulanger** combines evolutionary theory, physical geography, landscape ecology, and geoscience to understand ancient human behavior. He works with students in applying X-ray fluorescence (XRF) to obsidian and using the resulting elemental compositions to interpret resource gathering practices by the people of Pot Creek Pueblo at SMU-in-Taos (<https://doi.org/10.1007/s12520-022-01590-7>). In addition, Matt discovered old records from SMU's long defunct radiocarbon lab preserved on tape reels from the days of an old mainframe computer. The radiocarbon lab is long gone, but the records have immense scientific value as the original source for many age dates still in use. Matt and his team of students are working to have the old tapes transcribed into modern archival data files.





CONTRIBUTIONS IN SCIENCE

In July of 1858 the first public explanations of “Evolution by Natural Selection” by Charles Darwin and Alfred Russell Wallace were presented to the Linnean Society of London, but because neither of the authors could attend, the papers were read by pinch-hitters. In June of 2019 another meeting was held at the Linnean Society of London, which resulted in the book *The origin and Early Evolutionary History of Snakes* ([Cambridge.org/snakes](https://www.cambridge.org/snakes)). Five of the authors contributing to that volume have ties to SMU.

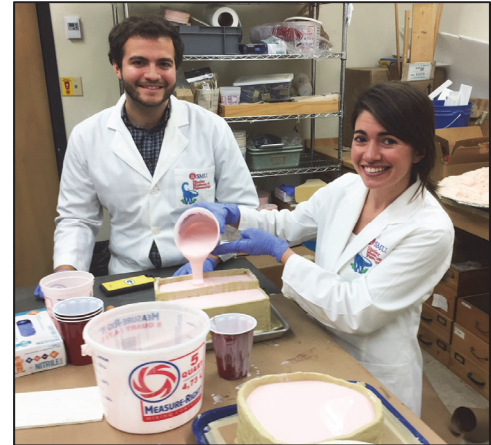
Jason Head received his master’s and PhD from SMU. For his master’s thesis, he studied a dinosaur from near DFW airport and named it *Protohadros*. It is on display at the Perot Museum. Jason is now a Professor at the University of Cambridge, where Charles Darwin studied. **Tony Fiorillo** has taken over the helm at the New Mexico Museum of Natural History and Science but he remains a Senior Fellow of ISEM and maintains his Arctic research program at ISEM. Both Tony and **Louis Jacobs** contributed to one paper in the volume. **Mike Polcyn**, Senior Fellow and co-leader of Projecto PaleoAngola contributed three papers. **Bruno Augusta** contributed two.

Bruno currently lives in Brazil, but completed the research for his papers while he was a predoctoral fellow at SMU. He is not the only student who has spent predoctoral time at SMU. **Alexandra Fernandes** and **Miguel Marx**, both members of Projecto PaleoAngola, spent time at SMU after receiving their master’s degrees. Miguel studied and published on a plesiosaur skull (<https://www.smu.edu/News/2021/Research/CT-scan-of-an-ancient-reptile-skull-reveals-little-evolutionary-change>) and Alexandra studied flying pterosaurs (<https://www.sciencedaily.com/releases/2022/11/221109151941.htm>). Both the plesiosaur and the pterosaur fossils were collected on PaleoAngola expeditions. Alexandra is pursuing a doctorate at the Bavarian State Collection for Paleontology and Geology in Germany and Miguel is at Lund University, Sweden, which was founded in 1666, a youngster compared to the University of Cambridge (1209). And the SMU connections don’t stop there. A coauthor on Alexandra’s paper is pterosaur expert **Brian Andres**, now a professor at the University of Sheffield, UK. He began his paleontological career as a high school volunteer in the Shuler Museum, in the basement of Heroy Hall.

Working cooperatively, as was the case in all the examples cited above, is satisfying and stimulating, but there are at least two factors, outside of people, that contributed to this productivity. One is the exceptional imaging capabilities here in the ISEM supported Digital Earth Sciences lab in the Heroy Building initiated and currently run by Mike Polcyn. Using CT, 3d surface scanning, and computer visualization technologies, students and researchers are able to explore the anatomy of fossils in new ways, evident in many resulting publications. The other is the collections of the Shuler Museum, which house specimens relevant to each of the studies mentioned. The collections are the additive results of many years of targeted fieldwork by faculty and students and the generosity of innumerable avocational paleontologists. In particular, the collections are tangible evidence of the significance of our geoheritage within a two-hundred-mile radius of Dallas.



Bruno Augusta



Miguel Marx , Alexandra Fernandes



Brian Andres

Jaime da Silva

Jaime da Silva, a Ph.D. candidate in mechanical engineering, and his colleagues have published two papers on photonic seismometers, which can be important for seismic measurements on asteroids or in drill holes for geothermal investigations. The first paper, published in *Applied Optics* (<https://doi.org/10.1364/AO.417187>), was selected as the Editor’s Pick. Their team was recently selected as one of ten semifinalists for the Department of Energy Geothermal Geophone Prize, each of which receives a cash prize and vouchers to work with an industry expert or national laboratory.

Jaime also participated in the production of a display window video in the *African Voices Hall* of the Smithsonian Institution. He demonstrated 3D printing of the first known Angolan dinosaur.

