SCIENTIFIC OCEAN DRILLING

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Digital Newsletter

the Drilling Dispatch

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SCIENTIFIC OCEAN DRILLING

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Expedition 400: Northwest Greenland Glaciated Margin

Paul Knutz and Anne Jennings, Expedition 400 Co-Chief Scientists
Laurel Childress, Expedition 400 Project Manager

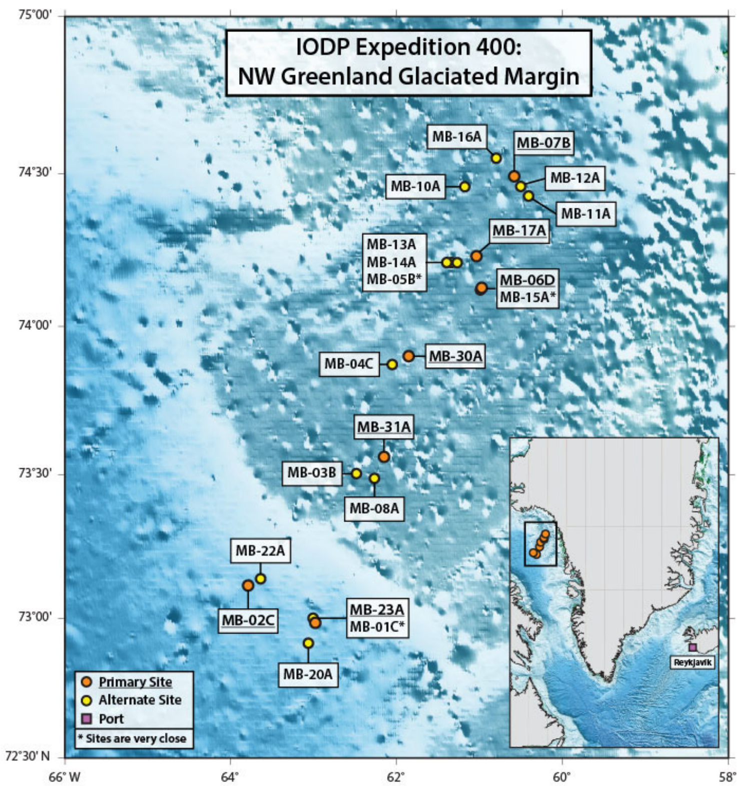
written by Elizabeth Doyle, Expedition 400 Onboard Outreach Officer

The fates of the Greenland Ice Sheet and Earth's climate system are closely bound. If fully melted, the world's second-largest ice sheet would raise sea levels over seven meters, as well as redirect ocean currents and alter climates in both hemispheres. Oceanic, atmospheric, orbital and tectonic factors influence this relationship in big and small ways. To make better predictions of future behavior, understanding the Greenland Ice Sheet's complex history and its links to Earth's climate is key. Enter IODP Expedition 400 aboard the *JOIDES Resolution*.

Just off the coast of northwest Greenland in Melville Bay, known as Qimusseriarsuarmi Kangersuatsiaq to the people of Greenland, swiftly moving glacial streams carry meltwater and sediments, from as fine as flour to gravelly coarse. Here, Expedition 400 scientists will retrieve over 30 million years of deposits, packed with miniscule marine fossils and chemical signatures. Together, these hold clues to the ice sheet's past.

Led by Co-Chief Scientists Anne Jennings and Paul Knutz, Expedition 400 plans to recover sedimentary cores at seven sites, potentially penetrating over 900 meters into Greenland's shelf margin. The science team's drilling strategy along the planned transect is to compile a continuous depositional sequence of the Late Cenozoic era, going back to the Oligocene/Early Miocene epochs.

TOP: Greenland Ice Sheet and glaciers flow towards the ocean, carrying sediments to be deposited in the ocean (Credit: Michelle Pratt & IODP). BOTTOM: Expedition 400 Outreach Officers Beth Doyle (right) and Michelle Pratt (left) explore icebergs in Disko Bay, Greenland (Credit: Michelle Pratt & IODP).



Locations of Expedition 400 proposed primary and alternate sites. Inset shows operational area (Credit: Knutz, P., Jennings, A., and Childress, L.B., 2022).

Eastern Baffin Bay is an ideal site for this study. The northwest Greenland shelf region has undergone multiple glaciations with major outlets into the bay creating, large-scale sedimentary features called trough mouth fans. The relatively shallow depths of these fans, along with amenable ocean temperatures and reduced sea-ice, thanks mainly to the northbound West Greenland Current, make for ready drilling access. Extensive high quality seismic data guided the selection of coring sites and shed light on the transport modes at play in this dynamic depositional setting.

New technology empowers this expedition. Until now, investigations of ice-ocean-climate interactions have consisted of seabed mapping, shallow coring and seismic stratigraphy correlated to exploration wells. Advances in drilling techniques, methods of dating sediment, and crucial proxies now make more effective drilling possible.

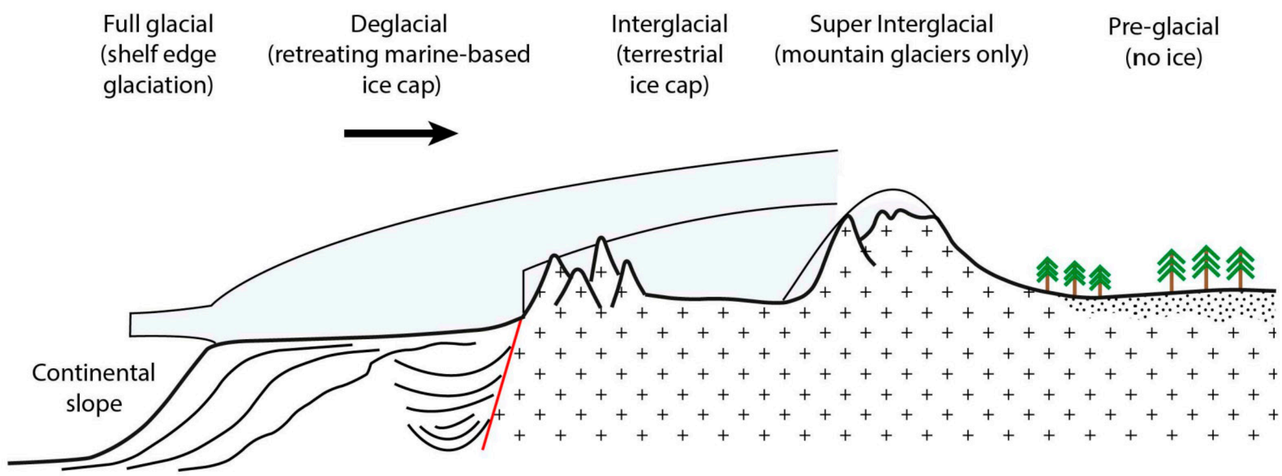
The potential scientific contributions of Expedition 400 could not be more timely, given the ice sheet's acute sensitivity to warming oceans. The long-term, high-resolution sedimentary records near the major glacial melt outlets of eastern Baffin Bay will supply important insights into the ice sheet's past responses and effects and serve as a near-future predictor. Specific Expedition 400 scientific objectives include:

1. Understanding how the northern Greenland Ice Sheet responds to extreme interglacial warmth.

2. Testing the hypothesis that the northern Greenland Ice Sheet underwent significant melting at intervals that match the frequency of changes in the Earth's orbit that occur at intervals between 100,000 and 40,000 years.

3. Understanding the relationship between glacial inception in northwest Greenland and long-term carbon dioxide trends and variations.

Using the core samples, the research team will document details of Greenland's pre-ice past, the ice sheet's evolution to full-ice as well as glacial-interglacial fluctuations. Notably, this includes periods in the past 2.5 million years when central Greenland seems to have been completely ice-free.



Five conceptual stages of the Greenland Ice Sheet through the late Cenozoic (approximately the last 30 million years) (Credit: Knutz, P., Jennings, A., and Childress, L.B., 2022).

The team has zeroed on key environmental parameters to track, the proxies used to track them and the hypothesized parameter response to each stage of the ice sheet. Fundamentally, it's the sedimentary features and mineral composition that reveal the land source, weathering intensity, rate of transport and mode and setting of deposition. The accumulation rate of these sediments is a proxy for current strength. Current direction can be determined as well.

Other valuable components within the sediment flesh out the story. For example, when icebergs melt, the embedded sediment, including large "dropstones" sink to the sea floor. This ice-rafted debris signals the extent of iceberg production. Isotopes reveal the extent of land exposure and can tell if ice cover was present. Microfossils and biological residue are a treasure trove of environmental indicators all their own. Minute skeletons of calcareous foraminifera and siliceous diatoms, as well as pollen and even leaf waxes provide the scientists evidence about climatic changes on land and at sea.

The Expedition 400 sediment cores will help scientists know more about the tipping points in the climate system and how the polar regions of Earth will respond to human-made greenhouse gas emissions. As demonstrated time and time again by International Ocean Discovery program expeditions, understanding the past is key to predicting the future.

* * *

To learn more about Expedition 400: Northwest Greenland Glaciated Margin and stay up-to-date on the expedition's progress, visit the *JOIDES Resolution* and International Ocean Discovery Program websites. Stay up-to-date with expedition news on Twitter, Facebook, and Instagram.

From the field...
Onshore outreach in Denmark and Greenland

written by Michelle Pratt, Expedition 400 Onboard Outreach Officer

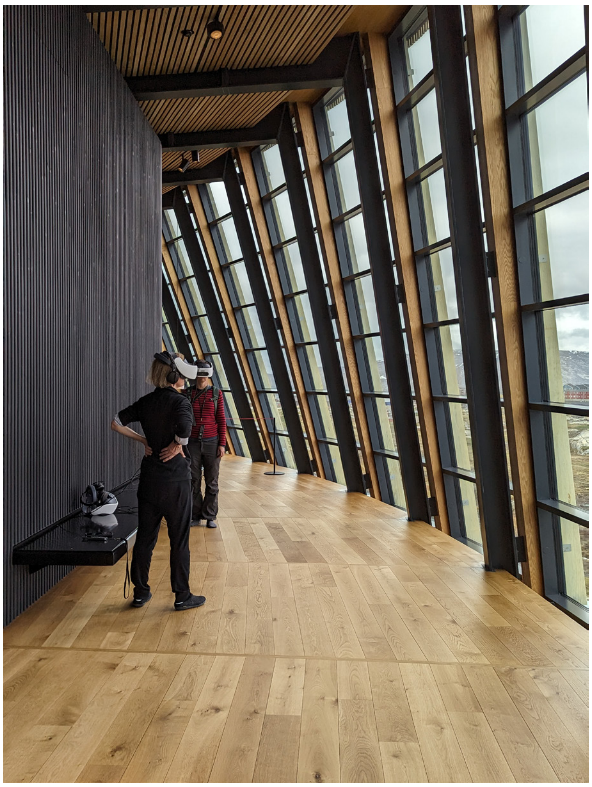
Typically, in *JOIDES* publications we're sharing exciting science about the ocean floor, core drilling, and significant findings that broaden our understanding of earth science. Many International Ocean Discovery Program (IODP) expeditions aboard the *JOIDES Resolution* are focused on scientific objectives primarily related to the ocean floor or the Earth's layers below.

Expedition 400 is one of the unique expeditions with a significant connection to the closest landmass, Greenland! Expedition 400 will be drilling for glacial sediments that used to be on top of the landmass and are now on the ocean floor. How did rock from the top of Greenland end up on the ocean floor? The power of the ice sheet, gravity, glaciers, and lots of time.

The Greenland Ice Sheet is almost 10,000 feet thick in places (almost two miles), and gravity is constantly pulling it downhill and towards Greenland's coasts. As the ice sheet moves towards the ocean it flows as rivers of ice called glaciers. As glaciers flow across the landscape, they churn and roll just like a river, carving massive mountains into smaller rock and glacial sediments. At the end (toe) of the glacier, huge chunks break off called icebergs. These icebergs float in the ocean, moving with the ocean currents, while also gradually melting and releasing dirt and rocks that settle on the seabed.

In July 2023, Expedition 400 Outreach Officers Beth Doyle (@sagasnorth) and Michelle Pratt (@pursuingseven on Twitter and Instagram), traveled to Denmark and Greenland to learn more about Greenlandic

LEFT: Beth and Michelle arrive at the Nuuk airport in Greenland (Credit: Michelle Pratt). RIGHT: Colorful buildings in Ilulissat with icebergs floating in Disko Bay (Credit: Michelle Pratt).



TOP: Beth and her daughter Margaret prepare to run the Greenland half marathon (Credit: Michelle Pratt). BOTTOM: Beth and Michelle explore the East Grip Field Research Station in virtual reality at the Ice Fjord Centre in Ilulissat (Credit: Michelle Pratt).

people's connection to the Ice Sheet and experience the glaciers and icebergs that hold sediments which will be an important part of the discoveries to be made on Expedition 400. Here they share their travel experiences.

In Denmark, Michelle and Beth were able to meet with officials at the Geological Survey of Denmark and Greenland (GEUS), which is also the home office of Expedition 400 Co-Chief Scientist, Paul Knutz. They did some pre-expedition planning for communications about the expedition and enjoyed the welcoming office environment, complete with a classic local pastry, danishes. They also enjoyed taking in some of the sights of Denmark's capital city, Copenhagen, and got their first taste of being onboard a ship together during a short ferry ride to explore neighboring Sweden for the day.

Then on to Greenland! First stop, Kangerlussuaq which is currently the only International Airport in Greenland (though two are under construction in Nuuk and Ilulissat). Kangerlussuaq is a hub of sorts for Greenland, and this includes the science support station for many science operations happening on TOP of the ice sheet, including the United States' Summit Station and Denmarks' East Grip. They met with several operations personnel who are also colleagues of Michelle's from her time in Antarctica, and got a tour of the science support facilities. Kangerlussuaq is one of the warmest places in Greenland, and at least during this time it was also the only place in Greenland they were swarmed by mosquitoes. Today, the huge Greenland Ice Sheet terminates a few miles from town, but historically it covered this whole area and carved the ~120 mile long fjord that connects Kangerlussuaq to the ocean. It was impressive to see from the air flying in, as the approach is directly up the fjord.

On to the capital city of Nuuk, home to approximately 20,000 Greenlandic people and the largest city in the country of almost 60,000 people. Here, Beth and Michelle met with officials at the Greenland Institute of Natural Resources as well as Arctic Hub, whose mission is to enhance interdisciplinary international cooperation related to Arctic research, education, and innovation in Greenland. As a fun part of the adventure, Beth and her daughter Margaret ran in the Nuuk Half Marathon! This was a fun day to be part of local culture, and following this event Beth and Michelle have also planned a Marathon Around Greenland aboard the *JOIDES Resolution*. This will be a fun event where schools, family, and friends can join the scientists and crew in a virtual race around Greenland during the 2-month expedition. Stay tuned for how to be involved.

The Nuuk skyline is like a postcard—filled with colorful buildings constructed on Greenland's hard rock, snow capped mountains, glacier-carved fjords, and small arctic flowers clinging to bits of soil dancing in the wind. Dominant in the skyline around Nuuk is Sermitsiaq, an impressive mountain peak whose pointed peaks clearly escaped the erosive forces of the ice sheet and glaciers. How can you tell? Glaciers don't leave pointed peaks, they smooth and round out all the surfaces as they glide overtop. Up close, you can see the bottom half of the mountain is rounded and shaped by glaciers, but the pointed peaks were preserved and make an impressive skyline over Nuuk today.

TOP: Sermitsiaq peeks out between the clouds (Credit: Michelle Pratt). BOTTOM: Michelle and Beth stand on glacially striated rocks overlooking Nuuk (Credit: Michelle Pratt).

Where Nuuk was important in meeting Greenlandic people and learning more about the history and culture of Greenland, their next destination, Ilulissat, was important in learning about the Greenland Ice Sheet. Located in another of Greenland's many glacial-carved fjords, Ilulissat is famous for its massive icebergs that float in Disko Bay. The relatively new Ice Fjord Centre has a striking exterior design and impressive interpretation within. Putting on virtual reality goggles, Beth and Michelle were transported on top of the Greenland Ice Sheet to East Grip, Denmark's scientific research station. There they learned about important scientific research being conducted with another type of core samples - ice cores. It may come as a surprise, but the *JOIDES*' famous sediment cores from the ocean floor use the same principles as ice cores—drilling to extract samples of material for further scientific study. Both ice cores and sediment cores seek to learn more about Earth's secrets, locked either in gas bubbles and sediment layers in the ice, or in the layers of sedimentary deposits that have been deposited on the ocean floor by millions of years of glacial processes. Two types of coring technology meet on Expedition 400!

As avid outdoor enthusiasts, Michelle, Beth, and Margaret all agreed that one of the favorite activities they did was a four-hour hike that was easily in their unofficial list of top 10 hikes around the world. From the town of Ilulissat, the hike took them through several dog mushing kennels, which reminded Michelle of home in Alaska. Then post-holing up a chute still filled with spring snow even into July, this is where the hike turned from interesting to amazing as they walked along the edge of the iceberg-filled fjord. Be sure to watch their hiking video of this adventure, pictures and video are definitely worth 1,000 words.

With the foundation laid for Expedition 400, Michelle and Beth are anticipating a successful voyage aboard the *JOIDES Resolution*. They are excited to join Co-chief scientists Paul Knutz and Anne Jennings, along with a talented group of international science specialists and an experienced crew. As Outreach Officers, Beth and Michelle will be sharing this expedition with you as we all learn more about the secrets of Earth's past locked in the glacial sediments on the ocean floor in Baffin Bay off the west coast of Greenland.

How to...

Request a replica core model for your classroom

written by Maya Pincus (USSSP)

They say *the best geologist is the one who has seen the most rocks*, but not everyone has an opportunity to travel the world seeking novel lithologies before they go off to university. This is especially true in the field of scientific ocean drilling, where each expedition can only support about 30 scientists, and the invaluable samples recovered from the seafloor are kept safely curated in the core repositories.

However, the U.S. Science Support Program offers a unique opportunity for learners of all ages to study ocean cores through the replica core model loan program. Educators can borrow replicas of some of the most impactful cores, including the Cretaceous Impact Core (ODP 171B), the Glacial / Interglacial Core (IODP 303), the Palmer Deep Core (ODP 178), the Saanich Inlet Core (ODP 178), and the Tahitian Sea Level Change Core (IODP 310). The replica core models will be shipped to you free of charge, with a return label included. Involving students in authentic, hands-on geology has never been easier!

- **Step 1**: Navigate to the "For Educators" page on the *JOIDES Resolution* website.
- **Step 2:** Select "Teaching Kits and Cores."
- **Step 3:** Read the descriptions of the five available replica cores to decide which is best in the context of your learners and curriculum.
- **Step 4:** Complete this form to request a replica. NOTE: If you would like to request more than one replica core, fill out the form once for each replica you would like to borrow.
- **Step 5:** Review the recommended lesson plans and other affiliated resources to find learning materials that will appropriately complement the replica core in your classroom. If you have any questions about teaching with the replica cores, or want some suggestions, contact mpincus@ldeo.columbia.edu.
- **Step 6:** When you are ready to return the relica core, adhere the return label (included in the shipping tube) to the outside of the tube and bring to your nearest FedEx mailing location.

FEATURED VIDEO

Core Description

Shipboard sedimentologist and USAC member Dr. Cecilia McHugh explains the process of core description, and why it is so important to geological research.

For your calendar

- **Submit an abstract for AGU 2023 fall meeting**
  (Deadline: 2 August 2023; learn more here)
- **Establishing early-career scientific ocean drilling learning communities workshop**
  (8-10 August 2023, College Station, TX)
- **Apply for IODP workshop on *NanTroSEIZE Synthesis***
  (Deadline: 15 August 2023; learn more here)
- **Apply to sail on Expedition 406: New England Shelf Hydrogeology**
  (Deadline: 16 August 2023; learn more here)
- **Developing Strategies for the Scientific Investigation of Sediment Drifts on Campeche Bank, Gulf of Mexico**
  (16-18 August 2023; Mexico City, Mexico)

SCI COMM RESOURCE OF THE MONTH

Before we can bring cores back to the lab for more detailed analyses, we rely on visual observations to interpret our samples. In this activity, students will be able to use the visual identification key and record sheets used by scientists aboard the JOIDES Resolution to identify and describe one or more core sections. This lesson pairs perfectly with a replica core!

Visual Core Description

Spotlight on... Kayla Hollister

written by Maya Pincus (USSSP)

Credit:
Kayla Hollister

It can be argued that geology, especially climate science, is a matter of tracing patterns backward in time, until we understand what series of events led us to where we are today. This is not dissimilar to exploring the journey that brought Kayla Hollister to the University of Notre Dame, and her recognition as a 2022-2023 Schlanger Fellow. In her own words, "a lot of people don't believe this," but even before she was thinking about college (let alone a doctorate degree), Kayla knew her path was in geology.

It started with a career test. Usually the recommendations of those unreliable advisors are predictable: *social worker* to those who score highly in "priotizing social harmony and cooperation," or *accountant* to the perfectionist. But Kayla's result was special: "The first option that came out was volcanologist." And rather than being put off by the unusual suggestion, Kayla thought "Oh! Sure, why not!"

This meant that by the time she got to college at the University at Buffalo, the local college that was "basically in my backyard," she had already planned to take a geology class. It was immediately apparent to Kayla that the UB geology department was "super awesome and welcoming, and the faculty was really, really kind." A 100-level class titled "Climate Change" in her second semester sealed the deal. It wasn't quite the same as pursuing a profession in volcanology and natural hazards, but "somehow I got hooked into climate."

Perhaps it was her professor's disposition: his knowledge and enthusiasm for the subject kept Kayla curious and engaged. It didn't hurt that he frequently spoke about his field work, showing pictures of "crazy places like Greenland, and there's ice everywhere…" This kind of adventure appealed to Kayla, so when her advisor asked if she wanted to fill an empty spot on a trip to Greenland, "there was no doubt in my mind. I was like, 'um *yeah*! Heck yeah I do!'" The result? "It was the best experience ever. Super cool."

Kayla drops an anchor to hold a coring platform in place during fieldwork in Greenland as an undergraduate student (Credit: Dr. Elizabeth Thomas).

LEFT: As part of her Masters research at UB, Kayla uses a hammer and chisel to sample organic material deposited in glacial loess, in order to investigate changes in climate during the Pleistocene (~2 million years ago to 12,000 years ago) (Credit: Dr. Elizabeth Thomas). RIGHT: Kayla poses at Big Bend National Park while accompanying undergraduate students on a geology field trip as part of her duties as a Teaching Assistant at Notre Dame (Credit: Kayla Hollister).

The more time Kayla spent in school, the more deeply she fell in love with climate studies. She was drawn to "how intricate the climate system is, so trying to learn about it is just really appealing to me." Her current research revolves around paleoclimate reconstructions in deep time, using core samples collected during Expedition 361 from the narrow channel between Madagascar and eastern Africa. Usually when people think about interrogating marine sediments for climate clues, they think about microfossils like foraminifera, which preserve evidence of atmospheric and oceanic conditions in their shells. This is not what Kayla is doing.

Instead, Kayla investigates the past by studying leaf waxes, organic compounds from plant matter that get transported from land into the ocean and deposited on the marine floor. The waxes can be thought of as little time capsules, recording ancient environmental conditions through hydrogen isotopes in the water. It's a fascinating system. Though "it's a bit of a complex transport, the record of [the leaf waxes] is really impressive. You reconstruct different aspects of the water cycle, just using these hydrogen isotopes." To better detail to the regional climate story at this time, she analyzes alkenones as an additional proxy to reconstruct sea surface temperatures.

What may sound like a deep dive into the exceptionally esoteric actually has profound implications. The organic compounds in Kayla's samples were forming right around the time that the earliest hominids were evolving in southeastern Africa. At this stage in prehistory, "their movements were really impacted by changes in precipitation, which can change the aridity, the vegetation that's growing on the landscape." In other words, what Kayla learns from her synthesis of marine and terrestrial hydroclimate data can help us understand where the first humans went, and why. Not only does this paint a more thorough picture of why we exist as we do in the world today, but it also allows us to predict how changing climate will impact us in the future.

Listening to Kayla talk about her work is an opportunity to be enveloped in the excitement of a confident young scholar quickly becoming an expert in her field. It's impressive to learn from her not just about the science she does, but the ways in which she uses paleoclimatology as a tool to develop novel ideas about past and future climate change.

The nature of this work also speaks to Kayla's character. For each of her samples, she devotes months of wet lab geochemistry to extract the compounds she seeks. The procedure to do this is relatively standard, but also opaque, as she never knows if she will find what she's looking for until she runs her meticulously extracted samples through a mass spectrometer. But that doesn't deter her. Wise beyond her years, she faces it optimistically: "You have to trust that the science is working, because you can't really see the results for so long." And so far, her hard work has paid off, with "pretty good" success rates.

Perhaps the greatest impact of Kayla's work is not what her findings offer to science but how they are shaping her own path. As she looks toward the completion of her degree and what comes next, one thing on her mind is science policy. She describes it matter-of-factly, "Reconstructing climate obviously has a really big purpose, but we need more effort to tie the science part of it in with the policy part to try to make it more well-known and accessible to people, and not have it feel so far-fetched." She is dedicated to "trying to build the bridge between what these scientists are saying and how to relay that information to the general public in a way that's understandable." As climate change intensifies, a pressing global issue is the need for large-scale relocation as more of our highly-populated areas become inhospitable. If there's one thing that comes out of Kayla's work, she hopes it's insight to inform how we manage the effects of climate change in our future.

TOP: Kayla smiles through the Buffalo half marathon last May (Credit: Kayla Hollister). BOTTOM: As an undergraduate student at the University at Buffalo, Kayla samples quartz from boulders dropped by the Greenland Ice Sheet for dating the retreat of the ice sheet (Credit: Dr. Elizabeth Thomas).

Spotlight on...
Anya Hess

written by Maya Pincus (USSSP)

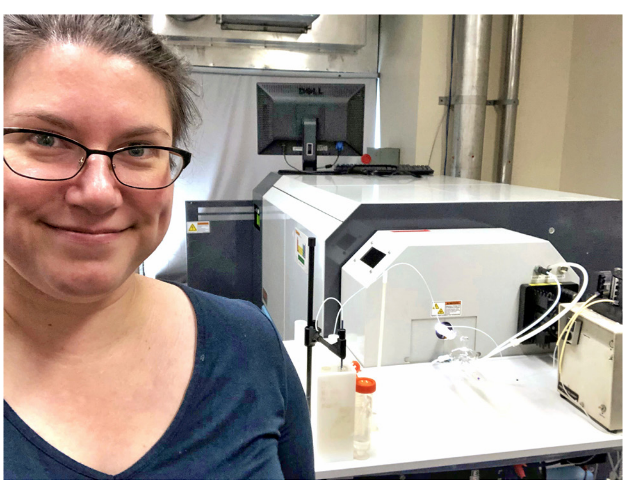
Credit:
Anya Hess

The oceans are losing oxygen. Over the past 50 years, oceanic deoxygenation has occurred at a rate of about 2% per decade in most places. But in some areas, like the eastern tropical Pacific Ocean, the process is taking place twice as fast. This alarming fact leads to a lot of questions: *Why is this happening? Has it ever happened before? What does it mean for the future of our planet?* Thankfully, we have 2022-2023 Schlanger Fellow Anya Hess to help us figure it out.

It all started with an unusually dark package of sedimentary rock. As part of her undergraduate research at Bucknell University, Anya investigated an organic-rich shale that formed in an anoxic environment. Reflecting on how that experience influenced her career, she admits "I just find these [chemically unique] systems really cool. They're inhospitable environments, apocalyptic-type settings."

But it wasn't just her scientific curiosity that got her here. For someone who has known since high school that she wanted to study geology, Anya has experienced a lot. Falling in love with Earth Science during high school ("I was shocked to hear that my friends didn't like the class as much as I did!"), she went off to college with a major in geology already in mind. The research she did during that time sparked a curiosity that made her yearn for more. She went straight to the University of Kansas to complete her masters degree, where she ended up taking her talent for problem solving in a new direction: "I never intended to go to that, but the college I went to for my masters has a lot of people go into the oil industry."

There is a lot of overlap between scientific ocean drilling and industry. What brought Anya there is that she found the work "really interesting." Every day brought a new challenge, and she learned a library of skills. She drilled and cored, interpreted wireline logging data, and synthesized it all to map the subsurface geology in three dimensions.



So how did Anya end up in the lab of seasoned scientific ocean driller Dr. Yair Rosenthal at Rutgers University? After a couple years working in oil and gas, she "realized that I really wanted to be doing something that was good for climate change." For Anya, that meant going back to school for a doctorate degree in paleoceanography.

Anya prepares to analyze the trace elemental composition of foraminifera on the mass spectrometer (Credit: Anya Hess).

Now, Anya continues to solve novel problems while applying a diverse set of skills. Her primary research focuses on interpreting ancient oxygen concentrations through an iodine/calcium proxy. The Middle Miocene Climatic Optimum was a time about 16 million years ago when the global climate was unusually warm, a possible analogue for what Earth will be like beyond the year 2100 given the current environmental trends. Her studies, which you can read about in a recent publication in Nature, indicate that the equatorial Pacific Ocean was more rich in oxygen than it is now, which was a "weird, but interesting" discovery, especially given the fact that warming is typically associated with depleted oxygen, as we are seeing today.

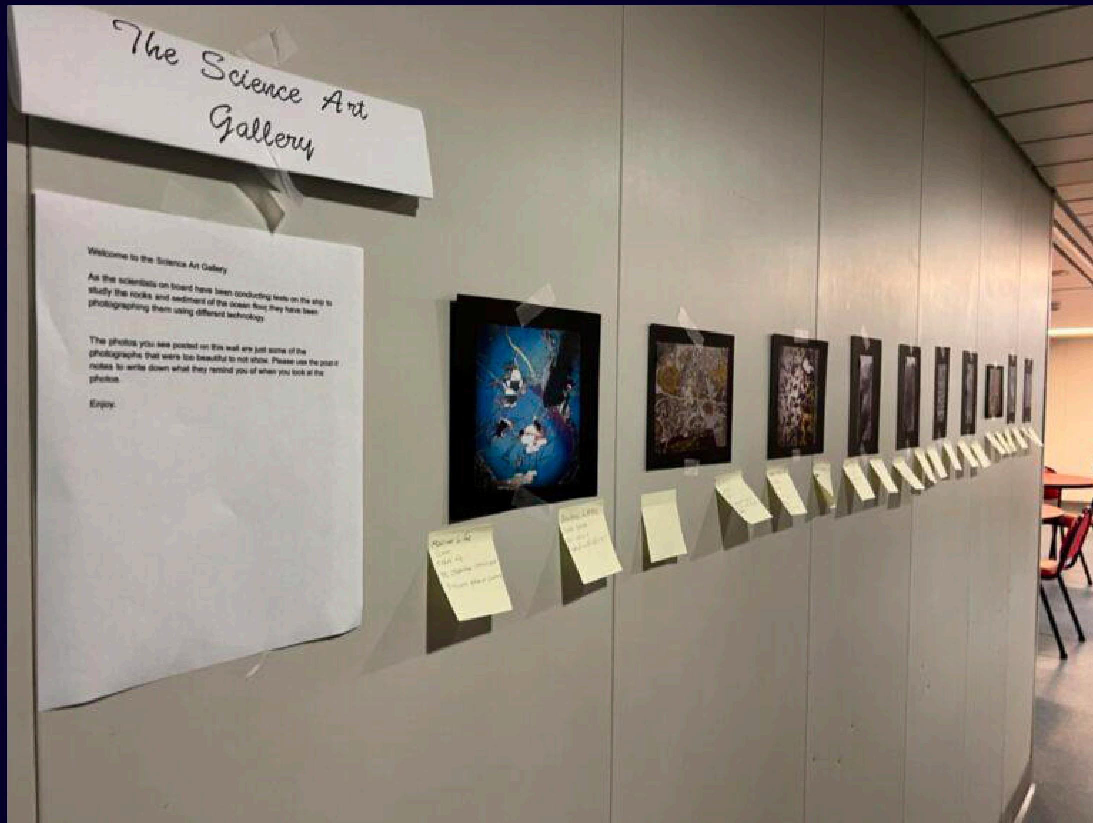
TOP: Anya uses a microscope to view foraminifera collected during Expedition 138 (Credit: Anya Hess). BOTTOM: Anya images a foraminifer on the scanning electron microscope in her lab (Credit: Anya Hess).

For her Schlanger Fellowship research, Anya is comparing the oxygen deficient zone (ODZ) in the Arabian Sea, maintained by the South Asian Monsoon, to the eastern equatorial Pacific ODZ to better understand the factors that influence the formation of these inhospitable waters. This is important work. The eastern equatorial Pacific is so depleted in oxygen that larger life forms cannot survive there. If the zone expands, or more of them crop up, entire ecosystems will be disrupted. Of course this is concerning from an environmental standpoint, but even the skeptics stand to suffer. The fish many humans depend on for food (including "my favorite sushi fish, tuna" notes Anya) are at risk. Understanding the oxygen deficient zones of the past is critical to managing them today.

The depth of knowledge required to do this work cannot be understated. Since beginning her PhD, Anya has learned complex geochemistry and climate modeling, applying proxies to interpret the past and predict the future. Her path has had its fair share of challenges, but thanks to her own persistence and help from other scientists, Anya is starting to "feel like I'm part of the community now, the paleoxygenation world." Perhaps most admirably, Anya is making sure to pay it forward. She has mentored several undergraduate students, and serves on scholarship committees for the Association for Women Geoscientists.

There's another important significance to Anya's work. All of her research is based on samples from previous expeditions that have been archived in the core repositories. As the current phase of IODP comes to a close, it is vital that we find creative ways to answer new questions from samples already at hand. We're lucky to have Anya as an exemplar of this new future of scientific ocean drilling research.

Creative COREner



An Art Gallery In The Middle Of The South Atlantic

To the trained scientist, a photomicrograph of a thin section or an x-ray image is a way to track down the intricate details of a samples to better understand its origin and formation. To a lay person, it can be abstract art begging for interpretation (Credit: Tessa Peixoto, Expedition 393).

Find us on the web!

You don't need to wait for next month's newsletter to keep up-to-date with our adventures in science! We update our blog and social media regularly. Get involved, and stay in touch!

Twitter: **TheJR**

Facebook: **JOIDES Resolution**

Instagram: **joides_resolution**

Web: **https://joidesresolution.org**

Call for contributions

If there's one thing that can be said about the International Ocean Discovery Program (and the Integrated Ocean Drilling Program, and the Ocean Drilling Program, and the Deep Sea Drilling Program), it's that we are a tight-knit community. Just as much as this newsletter is for you, we want it to be from you, too! In future editions we will highlight our readers by featuring the following community contributions:

- **From the Field** - Have you had an experience with scientific ocean drilling that you want to share? Write a piece to tell us your perspective "from the field" for our next edition. Bonus points if you include some pictures!
- **Scientist Spotlight** - Do you know someone who's making waves in the ocean drilling scene, whether it's a grad student or accomplished scientist? Send us a nomination! Briefly tell us why this person deserves a shout-out, and ideally how to get in touch with them. Self-nominations are also accepted.
- **Photo Montage** - Thanks to everyone who submitted photos for past themes! For the next issue please send in your photos that illustrate the theme **Selfies at Sea**.
- **Creative COREner** - Scientists are creators too! Send in your paintings, drawings, digital designs, poems, short stories, sculptures, or any other ocean science art you've made.

Send your contributions (and questions and concerns) to **mpincus@ldeo.columbia.edu** no later than August 20, 2023 to be featured in next month's newsletter.

See you next month!