SCIENTIFIC OCEAN DRILLING

CREDIT: Tiffany Liao & IODP JRSO

Digital Newsletter

the Drilling Dispatch

March 2024

SCIENTIFIC OCEAN DRILLING

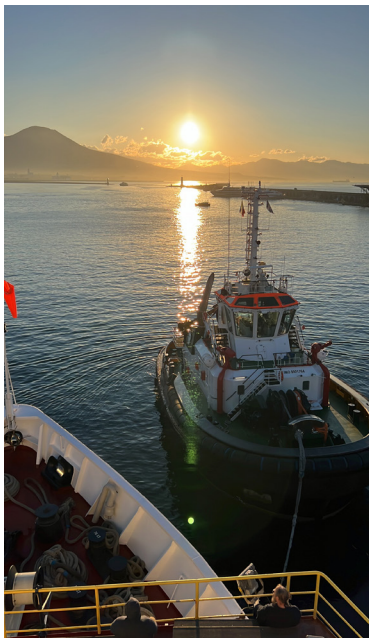
In This Issue

Happening now...
Expedition 402: Tyrrhenian Continent-Ocean Transition

Nevio Zitellini and Alberto Malinverno,
Expedition 395 Co-Chief Scientists;
Emily Estes, Expedition 402 Project Manager

written by Tessa Peixoto and Larkin Bohn, Expedition 402 Onboard Outreach Officers

So far, during Expedition 402...



LEFT: Expedition 402 participants feast at an Italian restaurant after a long day of onboarding (Credit: Tessa Peixoto). BELOW: Tugboats led the *JOIDES Resolution* out of port on a sunny morning (Credit: Tessa Peixoto & IODP).

The *JOIDES Resolution* was in dock for about five days, and in that time the crew of Expedition 401 disembarked, the ship was cleaned bow to stern, visited by four separate groups of in-person tours led by two Italian scientists (both sailed with Expedition 393, and one now currently works as a marine technician on board), and had the new Expedition 402 crew board.

The 402 science party unpacked and immediately went into onboarding meetings where we each got our shipboard emails. The first email I got was the Lead Laboratory Officer's list of best restaurants near port, which is useful because after eight hours of onboarding, we welcomed the idea of eating in town.

The ship departed Naples, Italy on February 14th, bright and early alongside the sunrise. The weather was warm and the seas were calm. We sailed away from Mt. Vesuvius to our first drilling location in the Vavilov Basin.

Fast-forward to the present, and we have already visited two different drilling sites, and are at our third location. We are ahead of schedule, but only due to the fact that our first drilling site did not go according to plan. After drilling for three days, the drill string got stuck in the borehole so we had to sever the pipe and move on. The collected samples from the first and second drilling sites are already telling an interesting story, and surprising the scientists.

The second drilling site proved prosperous for sediment, so much so that we pulled new sediment cores every 45 minutes, which really tested our sedimentology team's efficiency at describing core in a short time span. Nevertheless, after all that sediment collection we did hit hard rock and the formations are not what we expected. Thanks to our understanding of formations on land we are using the terrestrial exposures to help us understand how far back in time we actually ended up drilling! We do know that one of our sediment cores contained some gypsum crystals, which correlates that layer to the Messinian Salinity Crisis.

The science team and crew are settling into the groove of ship life. They already are getting familiar with the JR's many amenities including the ice cream machine as well as the gym. But the best part is that during the first week and half we had beautiful sunshine warm enough to bask while on Steel Beach.

When the sun goes down the science party also is getting quite good at Ping Pong. Some of them are even thinking of starting their own professional team on the side if we don't find more hard rock soon. Scientists always have a Plan A, B, and C!

At the time of writing, we have about 45 days left in the expedition. Wish us smooth sailing and good core recovery, and don't forget to follow along through our Expedition 402 blog!

TOP: Expedition Program Manager Emily Estes facilitates a crossover meeting between shifts (Credit: Tessa Peixoto & IODP). MIDDLE: Freshly recovered sediment still in the core liner (Credit: Tessa Peixoto & IODP). BOTTOM: Expedition 402 scientists spend their down time enjoying the warm sunshine on the "steel beach" above the bridge deck (Credit: Tessa Peixoto & IODP).

From the field...

Reflecting on undergraduate research experiences at the ASTEP Student Summit

Editor's note: *For years, Sharon Cooper and her colleagues have worked tirelessly to provide opportunities for undergraduate students to experience science and life at sea, through programs like JR Academy and STEMSEAS. During each expedition, students board a research ship such as the drill ship* JOIDES Resolution *or a vessel of the UNOLS Fleet to learn about marine research and science communication, and to form a network of peers around the world. In January 2024, the first ever joint research symposium was hosted by the* JOIDES Resolution *Science Operator under the umbrella of the Ambassadors for STEM Training to Enhance Participation (ASTEP) program. In this article, three students who participated in the ASTEP Student Summit share their reflections about the event.*

ABOVE: Participants of Expedition 398P: JR Academy pose on the bow of the *JOIDES Resolution* (Credit: Mike Toillion & IODP). RIGHT: Expedition 398P participants are reunited at the ASTEP Student Summit (Credit: Brancen Redman).

Written by Rylin Lofton, participant of Expedition 398P: JR Academy

I spent four days in College Station, Texas networking, fossil hunting, engaging in outreach and seeing friends. I couldn't wait to attend the summit. I recently transferred to a new university which can sometimes feel isolating so naturally I felt excited to see some of my close friends from JR Academy and do what we do best: talk about science.

Rylin (left) and two other JR Academy particpants learn about rotary core barrel drilling at the JRSO office (Credit: Rylin Lofton).

Last February I spent two weeks sailing on the *JOIDES Resolution*, a scientific ocean drilling ship that by collecting cores helps scientists study what the Earth was like millions of years ago. I got super close with my cohort but unfortunately because we live all across the country I had only seen a few of them since the expedition. Last week I got the opportunity to visit the International Ocean Discovery Program headquarters at a summit aimed to allow us alumni to network and share our stories with the next generation of scientists. This was made possible by ASTEP.

On Wednesday we toured the core repository which stores a third of the cores the IODP recovers. The cores are stored in a huge refrigerator called the reefer to help preserve them. I made sure to wear a jacket. I never realized how much core IODP had collected over the years. The repository is especially important now that the *JOIDES Resolution* is retiring; at IODP headquarters they are expecting an increase in research projects based on legacy cores from the repository.

On Thursday we shared our stories with a group of middle- and high-school girls from the SUPERGirls SHINE Foundation who are interested in STEM careers, and gave them the opportunity to ask a panel of STEMSEAS alumni questions about their experiences and about STEM. We also sat down with a few IODP scientists and we learned about their research and about how they got here.

On Friday we toured the Halbouty Geosciences Building, which houses the Department of Geology and Geophysics. Learning about research in several of the labs including the research of STEMSEAS alum and Texas A&M graduate student Brontë Heerdink. After a long few days we wanted to blow off some steam so a few of us visited a local dance hall to experience some true Texan culture. We learned two-step and line dance and we saw a lot of cowboy hats. It was so much fun! We danced, we goofed around and it almost felt like I was back on the JR, which was a blissful feeling, very nostalgic. Back together again with some of my best friends.

Written by Brancen Redman, participant of Expedition 398P: JR Academy

As the dawn of a new year graced College Station, Texas, a diverse cohort of aspiring marine scientists and instructors converged for the ASTEP Student Summit. Among us were individuals from various corners of the country, some even journeying from as far as Guam, Washington, and Maine. Despite our differences in backgrounds and career stages, a remarkable camaraderie enveloped the atmosphere, binding us together

as kindred spirits from the outset. The aspect that truly stood out amidst the summit's proceedings was the palpable warmth and friendliness that permeated every interaction. What began as mere acquaintances swiftly blossomed into deep connections, defying geographical barriers and dispelling any lingering anxieties. It was as though the miles that separated us evaporated, leaving behind a shared sense of belonging that belied our diverse origins.

Amidst the wealth of knowledge shared during the summit, what resonated most profoundly was the realization of the sheer extraordinariness of our cohort. From budding meteorologists to seasoned marine scientists, we represented a spectrum of talents and aspirations. Each conversation, workshop, and lecture served as a testament to the collective brilliance that thrived within our group, reigniting the flames of passion and ambition that first led us to the ocean's embrace.

For me, personally, the summit reaffirmed my unwavering dedication to pursuing a career in marine science. Hailing from a landlocked state and attending a university primarily known for its focus on agriculture, my aspirations often seemed outlandish to others. Yet, surrounded by individuals who shared my fervor and determination, I found solace in the realization that my dreams were not only valid but shared by many. To those who, like me, harbor dreams of exploring the depths of the ocean, I think it is possible. Regardless of your proximity to the coast or the obstacles you may face, the pursuit of a career in marine science is within reach. Let

Filled with excitement at this once-in-a-lifetime opportunity, Brancen poses with icons of scientific ocean drilling: the *JOIDES Resolution*, its unofficial mascot, Patrick the Penguin, and the Gulf Coast core repository (Credit: Brancen Redman & IODP).

the stories of our cohort serve as beacons of hope and inspiration, reminding you that no dream is too distant and no aspiration too grand. As I reflect on the profound impact of the ASTEP Student Summit, one sentiment echoes resoundingly: Keep dreaming, and aim for the stars—or, in our case, the sea. For it is through steadfast determination and unwavering passion that the boundless wonders of the ocean are brought within our grasp.

TOP: Brontë helped facilitate the Student Summit it more ways than one (Credit: Brontë Heerdink). BOTTOM: Summit participants learned about IODP research and operations at the JRSO headquarters (Credit: Brontë Heerdink).

Written by Brontë Heerdink, STEMSEAS mentor

My journey to the 2024 STEMSEAS IODP Summit was the second shortest trip out of the group. At 1.6 miles from my apartment, I was beaten by Chelsea McDonald, who lives just 1.4 miles from the core repository. During our first ice breaker, we found out that Gabby Piper, a student from the E/V *Nautilus*, managed to join us from over 7,000 thousand miles. During our second ice breaker, we lined up by education level. At this point, I found out that I was the youngest graduate student in the group. I was beaten by my Graduate Near-Peer Mentor, Jose Cuevas, and another Graduate Near-Peer Mentor, Lauren Haygood.

The STEMSEAS Student Summit was a chance to welcome students from across the United States to my corner of the world. As a local, I got to avoid the crazy winter storm that delayed many of the participants from arriving at their predetermined arrival times. As the travel day ended, I was reunited with my cohort and one of my students from the R/V *Endeavor*. The next morning marked my third visit to the core repository since I arrived at Texas A&M University in the Fall of 2020. I remember hearing about the JR in a seminar for transfer students though Dr. Julia Reece. At the end of her Sedimentology & Stratigraphy course, she brought my class to the core repository. At that time, I didn't know that I would apply to STEMSEAS, sail on the R/V *Sally Ride* and R/V *Endeavor* or go to grad school.

After the introduction and tours, the group learned about Whiskey Bridge, a significant geological site on Brazos River. This bridge was located on Highway 21… otherwise known as the road I use to go home to Austin. For years, I've been passing Whiskey Bridge without a reason to go exploring. Lucky for me, there was still a new adventure on the horizon and the weather was perfect for fossil hunting. While many students found shells and snails, I spent my time talking to other students and teaching a few of the non-geology students how to use a rock hammer. I couldn't help but reflect on my first visit to the Brazos during my Geological Field Methods course. Just twenty miles south of this bridge, I learned about cross-bedding and digging trenches for science. Needless to say, this trip to the Brazos was far more enjoyable.

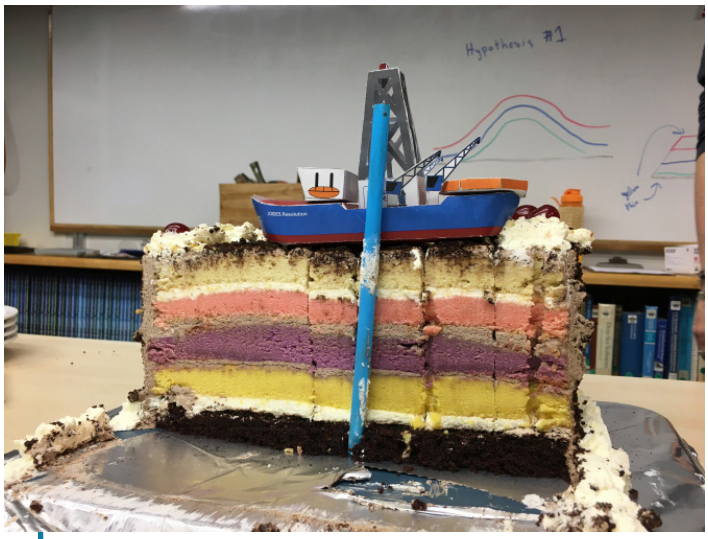
On the second day, the three groups started to mesh a bit more. In the morning there were oral presentations about outreach projects following STEMSEAS and panels on higher education. We were joined by SUPERGirls Shine, a group of middle and high school students from Houston. We spent the day using our science communication lessons to talk to a group of young people. They reminded me of when I was in middle and high school facing so many unknowns. I remembered being a middle schooler having some vague ideas about Texas A&M University. While the students were touring the facility, we got to talk to people who worked on the *JOIDES Resolution* or within IODP using skills they learned as engineers, journalists and scientists. The day ended with a pizza party and poster session.

On day three, we toured a few of the facilities on campus and ended the summit with a graduate school panel. Jose, Lauren and I talked about our GPAs, choice of school and answered questions. Dr. Reece highlighted what she looks for in a graduate application. After we wrapped up, I returned to the Halbouty Geosciences Building to show off my research. Some part of me felt like I'd finally come full circle. I was surrounded by the people who'd ushered me off the graduation stage and thrusted me into my new life. Here they were with a few more friends ready to listen to me talk about my cores. The final thing about being a local is about three weeks after the summit, I returned to IODP to have my cores photographed. It was a bit more gray and wet than the last time I was there, but most importantly, I was reminded of a few beautiful days in January.

The Student Summit was a joyful reunion for some, as well as an opportnity to make many new connections (Credit: Brontë Heerdink).

How to...
Create a SciOD coring cake

written by Maya Pincus (USSSP)



A frosted layer cake is an excellent analogy for the layers of sediment and rock under the ocean floor (Credit: Carol Cotterill & IODP).

Whether you're looking to illustrate an abstract concept to a group of students, or simply eager to impress at an upcoming dinner party, you can't go wrong with a Scientific Ocean Drilling Coring Cake.

Let's face it: What we do is a little obscure. Most people [unfortunately] don't spend their days thinking about what's below the ocean floor, and when they do, they assume it's just a pile of boring mud and rocks. Students in particular may struggle to visualize the intricacies of sedimentary layers and oceanic basalt flows, especially if they have not yet had the opportunity to see complex geology on land.

A SciOD Coring Cake is the perfect visual analogy to help everyone understand what you do (and it's a very fun treat). When a cake is covered in frosting, it's impossible to know what it looks like inside until you cut into it. Drilling into the ocean floor is the same: Even with high-resolution seismic imaging of the layers below the surface, the only way to know their precise thickness, composition, and age is to bore into the depths and recover samples for observation and analysis.

In this activity, you will construct a cake layered with different colors, textures, and thicknesses, to represent layers of sediment and rock beneath the ocean floor. You will then use a straw to drill into the cake and collect cores to reveal the cake's hidden geology.

Materials

- 1 recipe vanilla cake
- Food coloring
- Frosting (vanilla and chocolate)
- Wide straw (this will be the "drill" that bores into the cake. Bubble tea straws work well for this)
- Dowel (this will help push the core out of the drill. Depending on the size of your straw, a pencil or chopstick could work well here)
- OPTIONAL: Additional spreads such as fruit preserves, peanut butter, or chocolate hazelnut spread
- OPTIONAL: Decorations such as gummy fish, cookie crumbs, shredded coconut

Make the cake

- **Step 1**: Prepare the cake batter as instructed by the recipe.
- **Step 2:** Separate the batter unevenly into several smaller bowls. Each bowl will become one layer. Bowls with more batter will become thicker layers, and bowls with less batter will become thinner layers.
- **Step 3:** Use food coloring to dye each bowl of batter a different color. For a more realistic look, consider blending colors to make shades of brown and gray, or using a small amount of cocoa powder.
- **Step 4:** Carefully pour each portion of batter into a separate cake pan. Bake at the recommended temperature. Note: Due to the varying thickness of the layers, timing will vary. Watch the oven carefully!

Construct the cake

- **Step 5:** Once the cake layers have cooled, gently remove them from the pans. Helpful hint: Use a serrated knife to ensure that each layer is flat. This will help them stack better!
- **Step 6:** Stack the layers, with your choice of binding in between. You can stick to frosting (use food coloring to make it more visually interesting), or other spreadable foods like fruit preserves, peanut butter, or chocolate hazelnut spread. Consider adding cookie crumbs or shredded coconut to change the texture.
- **Step 7:** When all layers have been assembled, frost the outside of your cake. For the most accurate representation, use blue frosting on the top of your cake, and brown frosting on the sides.
- **Step 8:** Decorate your cake! Consider placing gummy fish on top, or cut up green fruit roll-ups to make seaweed. Stick cookie crumbs to the sides of the cake for a sandy look.

Ready! Set! Drill!

- **Step 9:** To increase interest and generate excitement, encourage your audience to predict what the cake looks like on the inside.
- **Step 10:** Carefully insert the straw into the top of the cake, and slowly push down until you hit the bottom. Gently pull the straw back out. The straw should now be filled with a core of cake layers. Note: You may need to practice this a few times to get it right.
- **Step 11:** Use the dowel to carefully push the core out of the straw. If you're feeling ambitious, fill out a visual core description record!

FEATURED VIDEO

Reentry Funnel Installation: A view from the JR

Many expeditions rely on the deployment of a reentry cone, which allows the crew to pull the drill string up from the ocean floor, change the drill bit, then reenter the same hole to drill even deeper. It may seem like an impossible feat, but this video shows how it's done.

For your calendar

- **FOCUS Virtual Workshop Series: Identifying key science questions within U.S. scientific ocean drilling priorities**
  (6 & 20 March 2024; virtual; learn more)
- **Provide input to the Decadal Survey of Ocean Sciences committee**
  (deadline: 15 March 2024; learn more)
- **Workshop on the Future of Scientific Ocean Drilling: Toward Submission of Drilling Proposals for IODP³**
  (18-20 March 2024; Nachikatsuura, Kii Peninsula, Japan; learn more)
- **Future of U.S. Marine Seafloor and Subseafloor Sampling Capabilities Workshop**
  (26-28 March 2024; Woods Hole, MA, USA; learn more)
- **Submit a LEAP proposal**
  (deadline: 15 April 2024; learn more)

SCI COMM RESOURCE OF THE MONTH

In this nonfiction graphic novel, learn how IODP scientists use clues in cores to find out what happened in Earth's past and how our planet works. Volume 2 focuses on how cores help us learn more about the causes of earthquakes, tsunami, and volcanoes. It's disasterific!

How to Read a Rock, Volume 2

Spotlight on... Dr. Donald Penman

written by Maya Pincus (USSSP)

Credit: Don Penman

The most recent meeting of the U.S. Advisory Committee for Scientific Ocean Drilling convened at Scripps University, in a conference room that was somehow still dark and stuffy despite huge bay windows overlooking the ocean. Every day, from dawn to dusk, the energetic surf was dotted with the black wetsuits of surfers, lounging on their boards in anticipation of the next big break, then cavorting and gamboling as they were gleefully carried to shore. Though the beach was close enough to occasionally catch a splash of salty spray, it was far enough that there was no chance that those who remained in the room could identify a distant black dot as one of their own, 2024-2025 Ocean Discovery Lecturer Dr. Donald Penman, just another wetsuit on a surfboard during an extended lunch break.

Don is not your average paleoceanographer.

Unlike many, who set their eyes on Earth science from an early age after years of backyard hikes and bug collections, Don entered his first year at Carleton College with the plan to major in computer science, or maybe physics. On a whim, he added an Intro to Geology class to his schedule during the spring semester of his freshman year. Seduced by outdoor labs and field trips in beautiful weather, his mind was easily changed: “I was like, ‘yeah this seems pretty cool. Let’s do this!’”

That carried him as far as his senior year of college, but he self-admittedly “lacked clear focus” in terms of what he wanted to do next. Compassionate in his hindsight, he rationalizes this stage of his life with, “Lots of reasonable people do not know what they want to be when they’re 20 years old.” There was one thing he did know, however, which was that he wanted to move to New York City. That left him with a question: What can someone with a geology degree do to cover the rent?

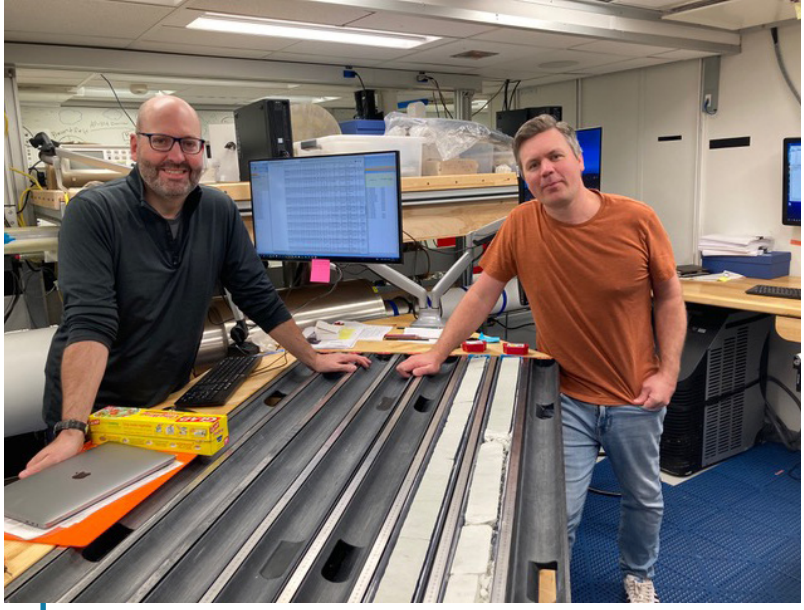
What Don may have lacked in terms of drive to excel in school, he more than makes up for in his ability to initiate conversations with new people, especially those who share his interests. Simply by asking around his network, he was able to connect with researchers at Lamont-Doherty Earth Observatory, including Dr. Sidney Hemming, which led to a job as a laboratory technician. As his new surroundings ignited a new interest in his education, Don opted to take advantage of a Columbia University benefit and enroll for free in several classes. It was at Lamont, under the tutelage of Drs. Wally Broecher, Baerbel Hoernisch, and several others, that Don’s passion for geochemistry and paleoceanography firmly took hold.

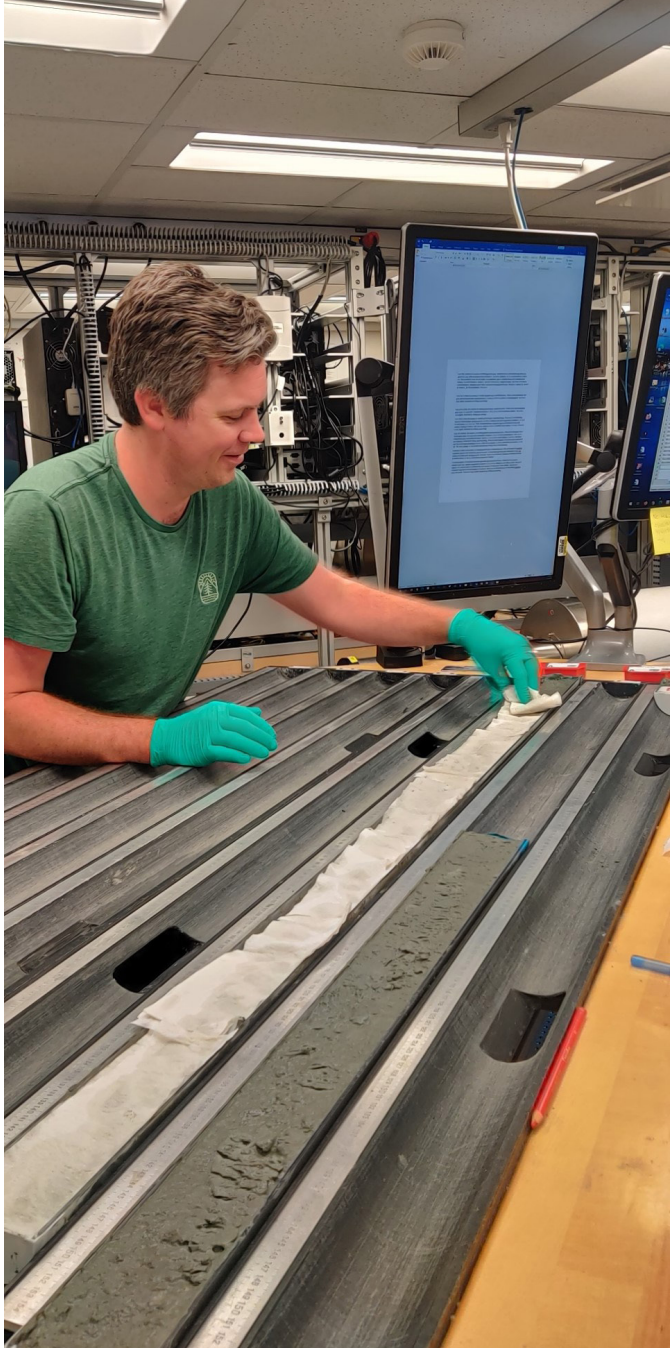
LEFT: Don discusses a sediment core with Expedition 342 Co-Chief Scientist Richard Norris and Pincelli Hull (Credit: John Beck & IODP/TAMU). RIGHT: Don uses the portable hand-held X-ray fluorescence device to analyze the mineralogy of a core during Expedition 371 (Credit: Tim Fulton & IODP JRSO).

There was just a small complication to his role as a lab-tech-turned-learner: Was he considered an undergraduate or graduate student? On one hand, it didn't really make sense for him to take more undergraduate classes, given that he already had his degree. But on the other hand, could he really pass muster in a graduate level class? Luckily for Don, the matter quickly resolved itself. He recounts the fateful choice with a laugh, "I realized the undergrads had to do problem sets every week, and the grad students just had to read a paper and talk about it, so I was like 'okay, I'm a grad student!'" Just as compassionate then as he is now, Don made a point to be the last person in the class to sign up for a topic to present on, as he didn't want to "steal" a favorite choice from one of the traditionally enrolled students. When it was his turn, he saw that a single mysterious option remained: "There were just these four letters there. It just said 'P-E-T-M' and I had no idea what that meant. I was like '*pettim*? What the &@#$ is *pettim*?!' I'm like, 'okay, I guess I'm gonna talk about the *pettim*!'"

What started as casual indifference in support of his peers quickly turned into the rabbit hole that whisked Don away to the rest of his career. As he began his research, he learned that those four letters stood for Paleocene-Eocene Thermal Maximum, and designated a "really interesting climate and carbon cycle event." One of the papers Don read to prepare for his presentation was authored by the accomplished researcher Dr. Jim. Zachos, who happened to be at Lamont around that time to give a talk. Again Don's comfort as a conversationalist changed the course of his life. One thing led to another, and the next thing he knew, he was applying to the University of California, Santa Cruz to do a PhD with Dr. Zachos, focusing on none other than the PETM.

This was Don's first exposure to scientific ocean drilling, and the wealth of paleoclimate information that can be found in deep sea sediments. It was also his first opportunity to sail aboard the *JOIDES Resolution*. As one of the only grad students sailing on Expedition 342: Paleogene Newfoundland Sediment Drifts, Don had a unique perspective that guided how he worked. "I was very much junior, trying to keep my head down, learn, and help out here and there where I could." But because of that, "I learned so much and met so many great people as well."





Don kept busy at the core description table during Expedition 392 (Credits: Don Penman & IODP; Debradita Jana & IODP).

One of the great people he met, Dr. Celli Hull, would end up as his postdoc advisor at Yale University for the next five years. In this new role, Don threw himself into the secrets of Earth's past environments, and had the chance to sail again on the *JOIDES Resolution* as a sedimentologist, this time for Expedition 371: Tasman Frontier Subduction Initiation and Paleogene Climate.

Now, as an assistant professor at Utah State University, Don is pushing the bounds of what he can learn from the deep. By his own description, Don's research falls "firmly into the paleoceanography and paleoclimatology community." In a sentence, he "reconstructs Earth history to tell the story of our planet, through the perspective of climate and oceans." The way he does this distinguishes him from many others in his field, specifically in that his success comes from intertwining three disparate methods of research. For one, he goes out to sea to analyze his samples as close to in situ as possible, characterizing the lithology and collecting microfossils in sediment samples. In these core samples, he seeks records of climate and oceanographic history "with an eye toward ancient intervals and events that can inform our understanding of the Earth system, and how it responds to greenhouse forced warming and rapid change." He is guided by the understanding that "these ancient events are a natural experiment that we can use to contextualize current anthropogenic climate change, and the perturbations we're inflicting on Earth and its climate and the carbon cycle."

Back in his lab onshore, Don is solidly a geochemist, performing analyses to interrogate a slew of isotopes and trace elements in his microfossil samples. While the majority of his PhD and postdoc research centered around foraminifera, "one of the most important tools we have for reconstructing ancient climates," Don now asserts that "radiolarians are my new favorite microfossil." In contrast to the carbonate shells of foraminifera, whose carbon and oxygen isotopes reveal important clues to ancient temperature and climate, siliceous microfossils offer new clues into the carbon and silica cycles, a supplement that provides a more well-rounded picture of Earth's past environments.

The interesting thing about ancient silicon is what it can tell us about interactions between the atmosphere, land, and oceans. Through the process of chemical weathering, atmospheric carbon dioxide reacts with silicate rocks, sucking CO_2 out of the atmosphere to eventually be buried as carbonate sediments, and releasing silica from the rocks. Runoff carries the silica to the ocean, where it is dissolved and incorporated into the shells of siliceous microorganisms and eventually buried as siliceous sediments. The element germanium is found in varying abundance in different silicate sources, so Don measures the ratio of germanium to silicon in siliceous microfossils to inform how silicate weathering changed over time. This in turn acts as a proxy for climate, because weathering occurs faster under a warmer, CO_2-rich atmosphere. As a relatively novel technique, "there is a lot of uncharted territory there," and given the abundance of siliceous microfossils in legacy cores, Don is "looking forward to getting my hands on and generating records from that stuff for decades to come."

Computer modeling is the third technique that Don employs to make his research more robust. From his days as an almost-computer science major, he is comfortable with the kind of coding that allows him to write his own "quite simple" geochemical box models to study the silica cycle under different conditions. Besides, "it's a fun thing to do on a snowy day in northern Utah—you go invent a fake ocean world and manipulate it."

As much as Don downplays his three-pillar strategy, saying "it probably reflects that I get bored pretty easily and I can't stick with one technique and do the same thing every day," he also recognizes that "it's really great because it keeps me engaged. Without those disparate interests I wouldn't derive as much satisfaction from my research as I do." Don is doing his part to share this satisfaction with the next generation of geoscientists, mentoring masters and PhD students, and touring the country with his Ocean Discovery Lecture about two major Cenozoic warming events, the Paleocene-Eocene Thermal Maximum and the Middle Eocene Climatic Optimum.

He also brings his surfer's spirit wherever he goes, most recently on *JOIDES Resolution* Expedition 392: Agulhas Plateau Cretaceous Climate. On this third expedition he found himself as one of the more senior sedimentologists, the only one who had sailed multiple times before. For Don this was a responsibility he took seriously, "helping these [younger] folks along and trying to guide the ship a little bit." He also took his downtime seriously, using the rare free time to write poems for the 3.9.2.haiku project ("I always like telling people that I'm a published poet."), play in a band with two fellow scientists ("If you want some… color… to put in this piece, you could write about my band!"), and Zoom with his then-two-year-old daughter ("It was pretty tough on my wife, she's the real hero of that cruise for me"). When he's not at sea or in the lab, he likes to work in the greenhouse he built in his backyard, where he managed to keep several species of vegetables alive through the freezing Utah winter.

If Don seems like a colorful character in the scientific ocean drilling community, it may just be a reflection of the field that shaped him. Yes, he has a deep appreciation for "the huge variety of people that you meet and interact with and work with, from all over the world, from all sorts of backgrounds and career stages and specialities," and suspects that he "wouldn't be such a collaborative scientists if it weren't for the experience of going to sea with these people." But also, "I just feel so lucky that I get to interact with and work with people who are obviously so smart, so creative in the ways that they think about ideas, but also such characters too. You meet some weirdos, in a good way, in this line of work, and I love that about the drilling program!"

Spotlight on... Dr. Peter Vrolijk

written by Maya Pincus (USSSP)

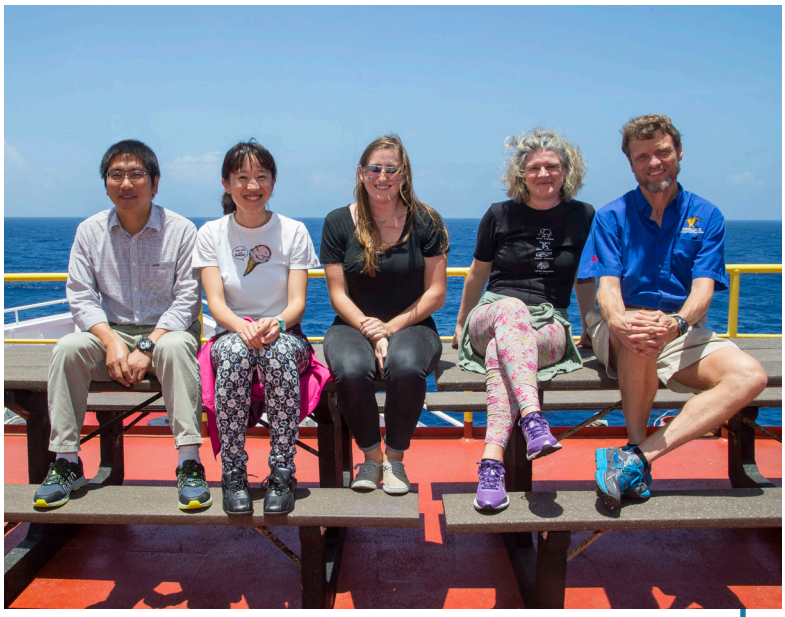
Credit: Peter Vrolijk

Peter Vrolijk is the odd man out in the 2023-2024 cohort of Ocean Discovery Lecturers. While his peers are renowned for the strides they make in academia, Peter is an industry man with a penchant for difficult problems. What drives him is a love of solving novel puzzles. Whereas many of those involved in scientific ocean drilling are motivated by the applications of their work, Peter has been known and lauded for his "thinking skills and value as a researcher." His contributions to the field get at the question of "How do we develop systems and observation methodologies that improve our chances of making scientific ocean drilling more successful in meeting scientific objectives?" He is energized by risky investigations that push boundaries. Overall, Peter's work lays the foundation for the groundbreaking discoveries that have made the International Ocean Discovery Program and its previous iterations notorious.

From a young age, Peter had "some sort of notion" that he would pursue an education and career in Earth science, though initially he was not sure if it would be geology, oceanography, or even meteorology. The first nudge that sent him toward geology was a 1974 issue of Scientific American that featured plate tectonics, which at the time was a groundbreaking achievement in human understanding of the planet. In Peter's words, "Being exposed to this overwhelming change in the way people looked at the Earth was influential and motivating to become part of." When he was offered an opportunity to participate in research as an undergraduate at the Massachusetts Institute of Technology, which was "rare in the 1970's," Peter's future as a geologist was set.

As a structural geologist aboard Expedition 362, Peter examined cores for evidence of faulting (Credit: Tim Fulton & IODP JRSO).

He stayed at MIT to complete his Master of Science degree, his thesis titled "Experimental study of sand transport and deposition in a high-velocity surge." From there, he went directly on to his doctoral degree at University of California, Santa Cruz, where he dove ever deeper into sedimentary structural geology while working on his dissertation, "Paleohydrology and fluid evolution of the Kodiak accretionary



TOP: Peter (second from left) and other members of the Expedition 362 science party wait for a core on the catwalk (Credit: Tim Fulton & IODP JRSO). BOTTOM: The Expedition 362 structural geology team poses for a group photo on the bow of the *JOIDES Resolution* (Credit: Tim Fulton & IODP JRSO).

complex, Alaska." Peter describes his experience with scientific ocean drilling as "bookends to my career," and it was as a PhD student that this first chapter took place. Given that his advisor was a co-chief scientist, Peter first sailed on Ocean Drilling Program Leg 110: Northern Barbados Ridge, as a structural geologist. What stood out to him during this expedition was the mentorship he received by more experienced scientists aboard the cruise. For this reason, his first time at sea was formative in more ways than one.

After two stints as a post-doctoral research fellow, working with samples from Leg 110 as a "logical follow-up to the work I had done for my PhD," Peter spent the majority of his career (over 25 years!) working as a research geologist for ExxonMobil. Specifically, he focused on mapping and characterizing fluid seeps and modeling faults, with the goal of understanding how fault deformation processes affect subsurface fluid flow. He also used some of his time at work to develop and teach courses for other employees, training them on methods to evaluate subsurface flow behavior in faulted reservoirs. Over time, Peter grew in his role not just as a research scientist, but also as someone deeply committed to giving back to his community.

Now, for someone who identifies as retired, Peter sure does keep busy. Perhaps the most grand example of this is Expedition 362: Sumatra Seismogenic Zone, which he joined as a structural geologist. In addition to his interest in the methodologies that contributed to meeting the scientific objectives, Peter felt compelled to "serve as support to help [younger participants] round out their knowledge and make it more comprehensive, to suggest things that might not occur to a grad student." This mindset comes directly from his experience being mentored during his first expedition. In the wisdom of hindsight he explains it, "As people get older, they realize mentoring is a beneficial thing to do." When he was a student there was not as much of an emphasis on mentoring as there is now: "It wasn't a thing back then, people just did it because it made sense."

Peter is also leveraging his position as an Ocean Discovery Lecturer to continue his work as an educator. At its most simple, his logic is "If I'm going to put together a presentation, I might as well do it lots and lots of times." But beyond that, he is eager to share his experience and enthusiasm with as wide a young audience as possible. Looking at his lecture schedule, it is clear that Peter is going above and beyond, taking advantage of his personal connections and at times his own finances to make possible almost twice as many lectures as is typical.

The lecture series is not the only way that Peter is paying it forward. He volunteers for MIT, interviewing college applicants because he is "very much interested in helping people who are going through the big transition from high school." One of the reasons he enjoys this task so much is that it "ends up becoming a sort of life career counseling session as well."

Even on vacation, this side of Peter doesn't take a break ("Pity the poor people who come near me," Peters says). For example, he recently visited the Perito Moreno glacier in Argentina, and was struck by the distinct uppermost Cretaceous deformed turbidites. "Everyone is off looking at the glacier and I'm over here looking at these beautifully exposed glacially polished outcrops along the lakeshore, and anyone who's near me is hearing the story about all this and the structural deformation that we're seeing and so forth." He makes a point to learn about the local geology wherever he travels, and to share it with whoever will listen. "I take that with me wherever I go."

TOP: Peter poses with a statue of the famous geophysicist Andrija Mohorovičić in Zagreb, Croatia (Credit: Peter Vrolijk). BOTTOM: Peter victoriously stands at the summit of Mount Evans after completing the Mt. Evans Ascent, "America's highest road race" (Credit: Peter Vrolijk).

In the rare hiatus Peter takes from science, he still devotes his time to service. Two of his favorite activities, especially in the warmer months of his high-altitude town in Colorado, are to volunteer for a local wilderness group to patrol trails, carry out trail maintenance, and perform basic plant treatments, and to monitor bluebird houses for the local Audubon group. What it comes down to is that he is determined to fill his time with "fun things to do," and retirement offers him ample opportunities to explore new pursuits.

Creative CORENer...
The journey of Patrick the Safety Penguin

written by Dr. Laura Guertin

Patrick the Safety Penguin secured for sailing (Credit: Laura Guertin & IODP, Expedition 390).

Affectionately referred to as Patrick the Safety Penguin, this (un)official mascot of the scientific research vessel *JOIDES Resolution* has been spotted at the base of the gangway while the ship is docked in ports around the globe. While the ship is underway, Patrick is safely tucked away and secured on the level above the Bridge Deck. Many selfies have been taken with Patrick, and just the mention of this penguin dressed in his nautical uniform brings a smile to the faces of those that have met him. But where did Patrick come from, and how did he get the opportunity to have a permanent berth* on the JR? *(*a berth with fresh air and an amazing view, no less!)*

This story begins in 2013, when *JOIDES Resolution* was transiting from Balboa, Panama, to Victoria, British Columbia (IODP Expedition 341T Transit). The JR departed Panama on February 12 and arrived in Canada on March 4. The ship remained in port until May 19, when it spent nine days at sea for Expedition 341S (SCIMPI & 858G CORK).

Victoria is the home to The Maritime Museum of British Columbia. Opening in 1955, the museum has a mission to "engage communities in witnessing and preserving maritime heritages." Since 2004, the museum has held an Annual Massive Marine Garage Sale as a fundraiser to support museum programming, exhibits, maintenance, and a variety of other projects. In 2013, the Garage Sale was held in the Pier A warehouse building at Ogden Point (the cruise ship terminal) on April 20, from 9AM to 1PM. Admission to the event was $5, and the prior year's Garage Sale had brought in $12,000 for the museum.

So what could one find at this event in 2013, the 10th annual museum fundraiser?

To learn more and find out how Patrick became a JR fixture, read the rest of the sotry on Dr. G's blog!

Google placemark at Pier A warehouse building at Ogden Point, Victoria, BC (Credit: Google Earth).

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 Project), 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** - We'll take any photos you want to share!
- **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 March 20, 2024 to be featured in next month's newsletter.

See you next month!