

Art Miller



Research Oceanographer, Senior Lecturer in Climate Sciences at Scripps Institution of Oceanography and Director of the Climate, Atmospheric Sciences, and Physical Oceanography CASPO Division

Climate change is one hot topic! Art Miller is a physical oceanographer who studies oceanic influences on climate variability using a combination of computer simulation models and observational analysis. He also is increasingly involved in working with biologists to try to understand how physical oceanographic changes affect oceanic ecosystems.

What inspired you to work in your current field?

Growing up in Cleveland, Ohio, in the 1960's and 1970's, environmental pollution was a big problem. My high school science teacher got me interested in the studying rivers, lakes, and the ocean.

Please describe the path that led you to where you are now (including schools, internships)

Starting with an undergraduate B.S. degree in Oceanography at the Florida Institute of Technology, I went straight for the Ph.D. at Scripps Institution of Oceanography, UCSD, in Physical Oceanography. For my post-doctoral appointment, I won a fellowship to study ocean-atmosphere interactions in the Climate Research Group at Scripps, which was a major move to the building across the street from where I did my Ph.D. After that, I stayed on as a Research Oceanographer. I was a Visiting Scholar for 6 months at Los Alamos National Laboratory, where they have a climate research team. I also visited the NATO Undersea Research Centre for two years in Italy, where I developed an interest in ocean data assimilation.

What experiences helped prepare you for your career?

Taking lots of extra math and physics classes in high school and college was very important.

Please share any funny/inspiring stories or favorite things about your career.

One of my students featured me in a "Climate Rock Star" video, as part of their summer internship here in the IGERT program.

Do you have advice for middle school and high school students interested in a career in science?

Take the hardest problem-solving classes in math, physics, chemistry and biology, wherever you can, as much as you can, every step of the way.

Are there any resources you would recommend for students looking at a career in ocean and earth science, especially at UCSD and SIO?

There is so much information on the web pages of SIO and other great institutions for everyone to read.

Favorite quote?

"In seminars, cocktail parties, and similar occasions where groups of students meet with professors, ruthlessly repress any temptation to remain silent. Even if what I say is stupid, there is still the possibility of its appearing profound."

- Pierre van den Berghe, Academic Gamesmanship



Catherine (Cat) Nickels

PhD Candidate, Integrated Oceanography Division

I'm finding out what blue whales eat, down to the level of specific species of krill (tiny shrimp), and then investigating whether what we know about those food species can tell us something about where and when we should expect to find the whales.

What inspired you to work in your current field? I grew up on the New Jersey shore with a marine scientist father, and went to a marine science-focused high school, so I have been interested in the ocean for as long as I can remember. I am most interested in the tiny animal zooplankton that are a food source for many of the other animals in the ocean. Zooplankton are small, but very important.

Please describe the path that led you to where you are now: I started studying marine science in high school, and continued in college with a double major in Marine Science and Performing Arts: Theatre. After graduation, I came out to San Diego to gain laboratory experience as a volunteer at SIO. I worked on a project for a graduate student studying with my current advisor, which helped me narrow down my field of study when applying to my PhD program.

What experiences helped prepare you for your career? During high school, I competed in the National Ocean Science Bowl, which was a great opportunity to learn a broad foundation of ocean science basics and practice speaking about them confidently in public. During college, I sought out summer field courses. The Sea Education

Association has programs at both high school and college levels where students can do actual research at sea while sailing on a Tall Ship.

Please share any funny/inspiring stories or favorite things about your career: I love going to sea, and am the most proud of having lead two research cruises as chief scientist. Most of my time is spent back in the lab analyzing the samples collected on comparatively short research cruises, but the trips also help me connect to the ocean and the animals that I am studying. The ocean can feel abstract when you are looking at data on a computer screen, but is very real when you are surrounded by it.

Do you have advice for middle school and high school students interested in a career in science? Laboratory or field experience is very helpful. At best, you find something you love to do, and at worst you learn what you don't like to do, which is just as important.

Are there any resources you would recommend for students looking at a career in ocean and earth science, especially at UCSD and SIO? Attending this or other programs at the aquarium is a great start! For students in high school, join your school's National Ocean Science Bowl team if there is one, or work with a teacher to start one.

Favorite quote?

"Interesting reaction. But what does it mean?!" Jack Skellington; The Nightmare Before Christmas

"We will never fully understand the variability of life in the oceans. But please don't fault us for trying." Edward Brinton



Jim Swift

Research Oceanographer in the SIO Climate, Atmospheric Sciences, and Physical Oceanography department, Scientific advisor and a data group director in SIO's Marine Operations and Shipboard Technical Support division.

"Climate, Atmospheric Sciences, and Physical Oceanography is the largest department at Scripps Institution of Oceanography. We are an active community of 42 professors and researchers, 20 post docs, and 47 grad students. Fourteen staff members assist the researchers in submitting over 100 proposals a year to over 26 agencies and managing roughly \$48 million a year in extramural funding all in the pursuit of understanding the oceans and skies."

I study the relationship of the subsurface waters of the Arctic Ocean and Nordic Seas to the global circulation and changes of the World Ocean. I am also interested in the operational science of making very high quality ocean measurements and in handling and interpreting those data. I have spent approximately three years at sea on 35 oceanographic expeditions in most of the oceans, with emphasis on the Southern and especially Arctic Oceans.

I help to coordinate very high quality repeated measurements of the World Ocean to learn more about decadal changes in ocean water properties. I have also brought interpretative tools to the oceanographic community through my Java OceanAtlas (JOA) application and associated data sets, which are used in research and teaching programs.

In the early 1980s I saw the potential of the Arctic Ocean as an active contributor to the global "deep conveyor belt" ocean circulation but was stymied in exploring this further by the inadequate data available. Since that time, and with a great deal of work done by many colleagues, agencies, and institutions, much has been accomplished. My ongoing research projects include studies of the Arctic Ocean and bordering regions such as the Nordic Seas.

I am also an amateur musician, and especially enjoy my position as second bassoonist in the La Jolla Symphony, which is an excellent community orchestra affiliated with UCSD. I take a practice bassoon with me to sea, and have played it on the ice at the North Pole (2005) and in sight of the Scott "Discovery Hut" near McMurdo Station, Antarctica (2011).

What inspired you to work in your current field?

In my junior year of college, two of my roommates were taking a course which had a unit on underwater engineering, and that included mention of oceanography. Inspired, I asked my faculty advisor if physics majors could be oceanographers and he said "sure". So I applied to grad school in oceanography. I had a long term, 'way back of the mind interest in the polar regions - I have no explanation for this - and I also enjoyed the outdoors. And so when I later found my way into the "Arctic group" in the Department of Oceanography at the University of Washington, I felt at home. You might say I never left.

Please describe the path that led you to where you are now:

I was an undergraduate at (Case Western Reserve University) in physics, partly because it was one of the more nearly open curricula, with many elective courses instead of a preponderance of required courses. As noted in some of the other responses here, in my junior year of college I got the idea to go to grad school in oceanography. I was drafted and did two years of service, after which I was a grad student at the University of Washington for just over seven years. Professor Joseph Reid at UCSD/SIO offered me a post-doctoral research position after I received my PhD. Later I was offered a research faculty position at SIO. In 1985 the University of Washington hired me onto their research faculty, and two years after that SIO lured me back to San Diego with the position I have enjoyed here for 30 years.

What experiences helped prepare you for your career?

My high school senior AP English class teacher was instrumental in helping me develop writing skills. In college my three-year physics lab sequence (which had increasingly-arduous lab report requirements) taught me the basics of proposing, designing, carrying out, and reporting experiments. In my senior year of college, I worked with moon dust from Apollo 11, which turned into a graduate-level research project and gave me the self-confidence I needed to go on to graduate school. In graduate school, I soon came across an area of oceanography which provided enjoyment and satisfaction. I did a separate Masters project before working on my PhD, and that helped me develop skills

and confidence. It was not always easy going, but by the time I completed my PhD I was off and running.

Please share any funny/inspiring stories or favorite things about your career:

True story: It is not always easy to find one's way. About three and one half years into my PhD research, I had completed most of what I had originally wanted to do, and as far as I was concerned, it seemed to amount to nothing much. I had showed how the patterns of temperature and salinity north of Iceland changed through the seasons, and had calculated the seasonal volume changes in the water masses. It was almost done, and it was totally blah as far as I was concerned. I was devastated. I decided I could wrap things up into a nice report ... and then do what? Quitting graduate school seemed a very real possibility. I finally went to my graduate advisor. I began to lay out my troubles, my uncertainties, my feelings that it was over. He suggested that we take a walk. The University of Washington has a beautiful arboretum just a short walk from the oceanography buildings, and we headed there. This was a long walk, and I relaxed a bit. I still felt lost, though lost with a good friend beside me. We came to a dock by the water at Union Bay and sat, looking out. He asked me a few questions about my work, and he got me to really talking about it. He asked something about whether I'd found anything unusual. For some reason this odd bit about the characteristics of the sea surface in winter matching the characteristics of the summer water column came to mind. I told him about it. He said something like "does that ring any bell, like with something we talked about in my class?". And I saw it! I had learned exactly where the intermediate depth waters of the Iceland Sea had come from, and could even calculate their seasonal production. And so forth. I could see exactly how to write a "real" chapter of my dissertation, one that wasn't just introduction, which was how I judged all the other work. What a feeling! And what an advisor!

Favorite thing: Working at sea with a team of researchers, technicians, crew, and students, especially in the Arctic Ocean. The oceans are endlessly fascinating, and the comradeship of working together this way has been endlessly rewarding.

Do you have advice for middle school and high school students interested in a career in science?

Concentrate on learning the basics. Certainly, take some fun courses of interest, including in the sciences, but have the basic mathematics and science down cold. Also pay close attention to learning how to write. In college be sure to be an intern - even an unpaid one - working for/with a scientist, for example in a laboratory. It is those science-related experiences outside of the classroom that provide inspiration, direction, and valuable experience, not to mention references.

And don't worry if you do not know what, specifically, you would like to do. Just concentrate on the coursework and the opportunities of interest that come along outside of the classroom, and your career will start to take shape. And remember: You

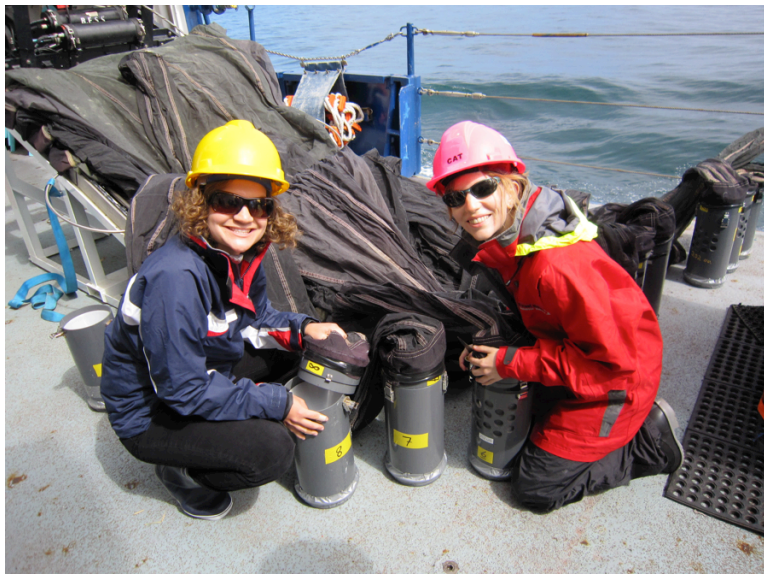
can always change scientists, jobs, internships - even majors.

Are there any resources you would recommend for students looking at a career in ocean and earth science, especially at UCSD and SIO?

There are tons of great "outreach" web sites at UCSD - almost every research program has one. You can use the "Scripps Scholars" site to read about SIO researchers, and often find a link to one or more of their web site. Also, be brave and send an emails to scientists. One might lead to something you find interesting. UCSD is chock full of scientists doing almost every type of research under the sun. When you get to college, start an internship with a scientist, such as working a handful of hours per week during the school year and, if possible, a summer job, even if it's an unpaid one.

Favorite quote?

This is a tough one. Hmmm ... OK, this is obscure, but in 1909, in one of the most famous historical papers in physical oceanography, Norwegian oceanographers Bjorn Helland-Hansen and Fridtjof Nansen found a region between Greenland and Norway where relatively salty water at the sea surface got so cold and dense in winter that it sank to the bottom of the ocean 4000 meters below, and they made a wonderfully unequivocal statement, "the formation of cold, heavy bottom-water was here directly observed on the very sea-surface, as was previously expected, and the question of the process of its formation is thus finally settled beyond all doubt". In the 1970s I felt there was still a vital issue in doubt, but in a way which inspired my research. When I solved that problem in 1982, I felt as if I were standing on the shoulders of giants. The obvious care with which Helland-Hansen and Nansen had done their groundbreaking work, together with the confidence of their bold statement, made for great inspiration.



Jenni Brandon

PhD Student, Biological Oceanography

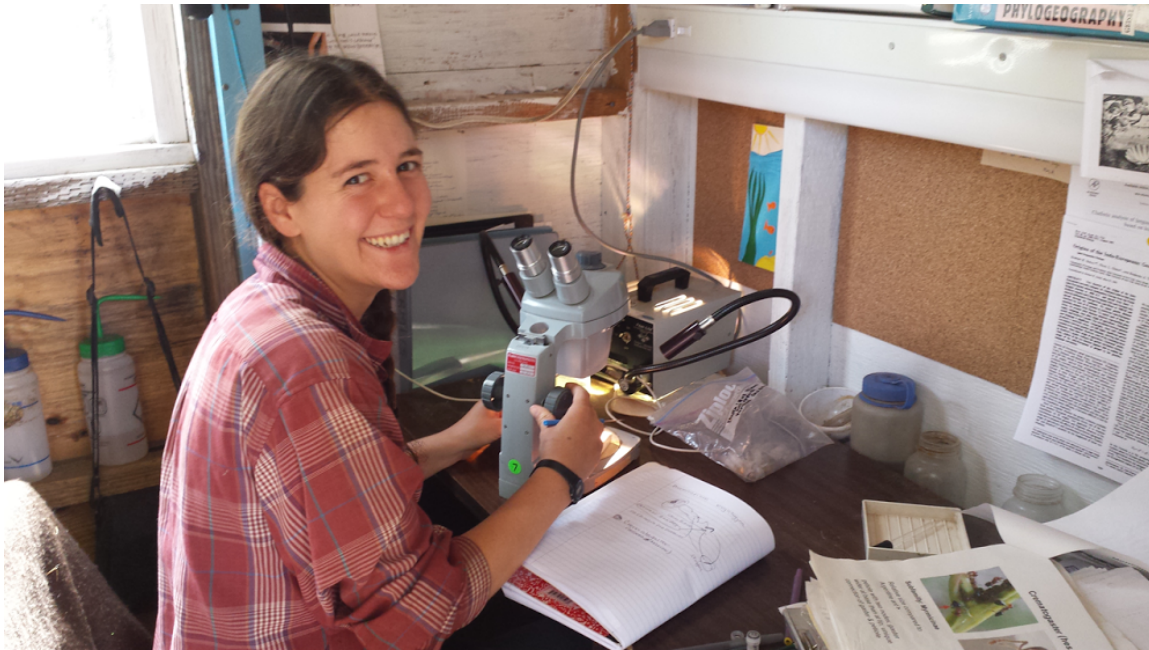
I study plastic pollution in the Pacific Ocean, and how tiny pieces of plastic affect small animals and the ecosystem

What inspired you to work in your current field? I read an article about the “Great Pacific Garbage Patch” and I couldn’t believe that our trash was having such a negative impact on animals way out in the middle of the Pacific

Please describe the path that led you to where you are now: I always liked science classes, but I liked a lot of other classes too. I went to college at Duke University, where I planned to be a medical doctor. But while I was there I fell in love with ecology and marine biology. I studied at the Duke Marine Lab, and began preparing to come to graduate school.

Please share any funny/inspiring stories or favorite things about your career: I love going out to sea on our research vessels! That’s my favorite part of my job. You never know what you’re going to see, or what’s going to happen. The ocean will surprise you everyday.

Do you have advice for middle school and high school students interested in a career in science? Be curious. Spend time outdoors asking questions about the world around you. Pay attention in science class, but in English class too. You write a lot as a scientist!



Jess Davids

Graduate Student, UCSD Division of Biological Sciences: Section of Ecology, Behavior, and Evolution

I study native bees in San Diego. My latest project focuses on the interactions between native bees and the native plants on which they specialize.

What inspired you to work in your current field?

I love being outdoors! As an ecologist, I can learn more about the world around me by going out into the world and exploring.

Please describe the path that led you to where you are now:

I started out wanting to be a marine biologist. I even worked at an aquarium during the summers between college! During my third year of university studies, I was recruited to work in the lab where I am currently a graduate student. While I am not doing what I thought I would, the same reasons that I loved marine biology are applicable to native bees and plants.

What experiences helped prepare you for your career?

I have had so many inspiring mentors! My love of insects, sense of adventure and willingness to work hard have helped me greatly.

Please share any funny/inspiring stories or favorite things about your career:

I have not been stung by a bee since I started studying them!

Do you have advice for middle school and high school students interested in a career in science?

The difference between exploration and science is simply writing it down! Start your own lab notebook. Begin to learn the meticulous process of documentation. It really is important. This sounds daunting, but this can even start in your kitchen. Write down all changes that you make to a recipe and in what ways it changed the final product. Science!

Are there any resources you would recommend for students looking at a career in ocean and earth science, especially at UCSD and SIO?

Find good mentors! Ask thoughtful questions and listen to their answers. Go online, look at lab websites, and email scientists questions about their research. Be mindful of your spelling and maintain a respectful tone and format in all communications.

Favorite quote?

"Outside of a dog, a book is a man's best friend. Inside of a dog it's too dark to read." - Groucho Marx



Katherine Zaba

**PhD Candidate, Physical Oceanography Research Division,
Scripps Institution of Oceanography, UCSD**

Katherine is a third year PhD student in the field of physical oceanography at Scripps Institution of Oceanography. For her research, she uses data from autonomous underwater gliders, called Spray gliders, to analyze the California Current System. She is interested in understanding how climate variability affects our coastal ocean; for example, what are the regional effects of El Niño and La Niña events?

What inspired you to work in your current field?

Broadly speaking, I was looking for a career that would allow me to merge my interest in mathematics with my interest in the environment. As a student, I had a strong affinity for math and physics. As a native Californian and world traveller, I grew to love the outdoors by spending countless days in both coastal and mountainous settings. I developed a curiosity about the dynamics of the planetary environment and a fascination with describing, and ultimately predicting, its patterns through a mathematical framework. Originally, I wanted to be a meteorologist, but a series of oceanography-related research, internship and job opportunities led me into the field of physical oceanography.

Please describe the path that led you to where you are now:

For my undergraduate education, I attended the University of California at Los Angeles, where I double majored in Applied Mathematics (B.S.) and Atmospheric, Oceanic & Environmental Sciences (B.S.). Immediately after graduating from UCLA, I travelled to Tanzania to participate in Theiss Research's Zanzibar Project, which focused on observing and modeling the

dynamics of the Zanzibar Channel. When I returned to the US, I interned at Applied Operations Research, Inc., a naval contractor. After a few months, the internship transitioned into a full-time position as physical sciences analyst. Interested in expanding my knowledge about physical oceanography, gaining sea-going fieldwork experience and participating in innovative research, I applied to graduate schools. Currently, I am in the third year of my PhD program at Scripps Institution of Oceanography.

What experiences helped prepare you for your career?

Each academic, research and job experience along my path has been beneficial towards my career aspirations. My undergraduate education provided me with a strong technical background in math and relevant physical sciences. My experience with the Zanzibar Project introduced me to sea-going fieldwork and collaborative, international research. My job experience at AOR, Inc. improved my proficiency in data analysis and computer scripting. It also introduced me to the technology and application of underwater gliders, which are now the basis of my PhD thesis. My experience as a graduate student at SIO has been invaluable. At the forefront of physical oceanographic research, SIO provides students with the opportunity to take on interesting research projects and work with leading experts in the field.

Please share any funny/inspiring stories or favorite things about your career:

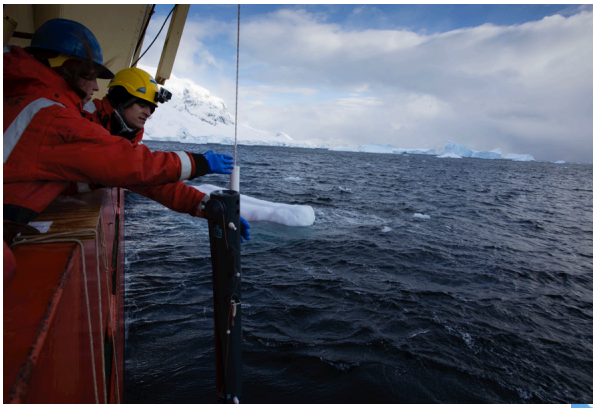
One of the perks about being an observational physical oceanographer is the opportunity to explore distant parts of the world. Various fieldwork opportunities have taken me to remote islands that I had previously never even heard of, like Zanzibar and Palau!

Do you have advice for middle school and high school students interested in a career in science?

In your studies, try to establish a strong foundation in core subjects like math, physics, biology and/or chemistry. In your free time, get in touch with scientists who work in the field that interests you. If possible, you could do “informational interviews” with professional scientists to get a feel for what it is like to work in the field. Scientists are excited to talk about their research ... and who knows, it might lead to volunteer or internship opportunities!

Favorite quote?

“Twenty years from now you will be more disappointed by the things that you didn’t do than by the ones you did do. So throw off the bowlines. Sail away from the safe harbor. Catch the trade winds in your sails. Explore. Dream. Discover.”
– Mark Twain



Lauren Manck

Graduate Student, Marine Chemistry and Geochemistry

All living things need a proper amount of nutrients to stay healthy, including microorganisms living in the ocean! We can eat our fruits and veggies in order to get enough vitamins and minerals, but single-cellular organisms that live in the ocean have to take them up directly from their surroundings. I study how bacteria in the ocean manage to obtain the nutrient iron – even when it is really hard to find – and how this bacterial activity affects the cycling of this important nutrient in the ocean.

What inspired you to work in your current field?

I love learning about how the world works on a molecular level and marine microbes make for some of the coolest chemists around. But besides being just fascinating organisms, the activity of these tiny marine microbes has big effects on global ocean productivity and biogeochemical cycling. Therefore, the better we understand how they function, the better we will understand the functioning of our world's ocean ecosystems.

Please share any funny/inspiring stories or favorite things about your career:

My favorite part of being an oceanographer is definitely the opportunity to go work at sea! We set up our entire lab on a research vessel and live and work on the ship for weeks at a time. It is definitely a unique experience and is always lots of fun!



Lihini Aluwihare

Associate Professor, Scripps Institution of Oceanography

Things are always changing in the ocean, and no one knows that better than Lihini Aluwihare. Lihini's research involves the chemical composition of organic matter and its essential cycling in the ocean.

What inspired you to work in your current field?

The potential for discovering new things about the earth, my high school chemistry teacher and a summer experience at the Woods Hole Oceanography Institution.

Please describe the path that led you to where you are now (including schools, internships)

I was always fascinated by nature – I grew up in Central Africa (Zambia) learning the name of every bird and antelope, going to national parks whenever possible and being immersed in a life that was very much connected to nature.

My parents made it clear that education was the only chance that I had for a life that was better than the one that they could provide for us, so I was very single-minded about figuring out how to get the best education out of what was available to me. I had some amazing chemistry teachers at my boarding school outside London (where I was on a scholarship)

I loved my organic chemistry classes at Mount Holyoke College and I knew then (and even before) that I wanted a PhD in chemistry (Marie Curie was my inspiration for that!). Both here and in high school I benefited greatly from an education that was designed to make women successful by building their confidence and encouraging them to pursue a career that they loved.

I was fortunate enough to have the opportunity to participate in the Summer Student Fellow program at WHOI and that is where I fell in love with oceanography, and that is where I chose to stay for my PhD (the Massachusetts Institute of Technology/Woods Hole Oceanographic Institution joint program in Oceanography).

Farooq Azam (at SIO) also taught me the importance of finding a job in a field and in a place that would continue to inspire you and to which you always want to return.

What experiences helped prepare you for your career?

Having self-confidence, being independent minded, and having teachers that taught me to love chemistry. Being able to write well helps a lot but I had to learn that on the job!

Please share any funny/inspiring stories or favorite things about your career.

Don't be afraid to change your mind:

I had already accepted Columbia University for a PhD in organic chemistry just before I spent a summer at WHOI. During that summer I realized that I would enjoy oceanographic research more, and so, I figured out how to apply (in 2 weeks) and be accepted into the MIT/WHOI joint program. At the same time, I had to find the courage to withdraw from a program that I had committed. I felt bad about that, but I have never regretted that decision.

Similar circumstances led me to accept a job at SIO. I had already accepted a job elsewhere before SIO arrived at a decision, and I was under tremendous time pressure to do so. However, when SIO offered me the job I realized that this was the place where I wanted to be. Again, I have never regretted that decision although I agonized about withdrawing my acceptance.

I have been less bold lately, but I do think that it is important to know yourself well enough to know which circumstances will allow you to keep growing first as a person and second, in your career.

Do you have advice for middle school and high school students interested in a career in science?

A career (whatever it might be) gives you the independence to live the life that you want for yourself and not the life that someone else decides that you should live. If you love what you do (for example, science) – then you will find a way to be good at it.

Are there any resources you would recommend for students looking at a career in ocean and earth science, especially at UCSD and SIO?

Find someone at UCSD/SIO to help you with a science fair project, look for labs that bring high school students in during the summer for internships, learn to write well!



Mariela Brooks

**PhD Candidate, Geosciences Research Division, Scripps
Institution of Oceanography, UCSD**

The chemistry of the ocean is highly dependent on the chemistry of the atmosphere. As a major greenhouse gas, it is important to understand the current global trends of CO₂ within the ocean and atmosphere. About 30% of the CO₂ being added to the atmosphere as a result of fossil fuel burning is absorbed by the ocean, which results in chemical changes within the ocean. Mariela's research is focused on measuring seawater CO₂, its isotopes, and related values to investigate biological productivity and changing ocean biogeochemistry to learn more about the global carbon cycle and carbon storage in the ocean and how it might be changing.

What inspired you to work in your current field?

I have always been in love with the ocean. I am from Hawaii and spent most of my free time when I was growing up at the beach camping, surfing, and exploring, so I've always felt a connection to the ocean and the outdoors. I was also really lucky and had some great science teachers early on in school who inspired me and helped me discover how much I enjoy tackling challenging questions figuring out how things work. When I realized that I could merge science and my love for the ocean through oceanography/marine chemistry, it felt like the perfect combination.

Please describe the path that led you to where you are now:

When I started looking into undergraduate programs I was interested in finding a way to combine my interests in scientific research with my passion for the

outdoors. I was able to do this through the Physics B.S. program at Portland State University (PSU) with an Environmental emphasis. While completing my degree, I decided I wanted to gain some research experience so I explored the work being done in various labs. When I found one that sounded interesting, I asked if there was a project available that needed a volunteer and I began working as an undergraduate research assistant with Dr. Andrew Rice in the Department of Physics at PSU investigating atmospheric CO₂ and other trace gases. After receiving my undergraduate degree, I worked as a laboratory technician with Dr. Rice working with seawater samples from the Florida Everglades. This project gave me a lot of hands-on lab experience and also took me into the field to collect water samples from the Florida Everglades. This position introduced me to analytical chemistry and the world of oceanography and marine chemistry. It also solidified my desire to apply to graduate school to be able to continue doing research in this area which really resonated with my interest in getting involved with projects that focus on environmental stewardship and scientific research.

What experiences helped prepare you for your career?

Working in a lab during my undergraduate program and gaining research experience was tremendously helpful in teaching me important analytical and research skills and also helped me learn how to work with a wide variety of people. Additionally, it was very beneficial for me to take some time to work as a laboratory technician before entering the graduate program at Scripps to determine that grad school and scientific research were the right choices for me.

Please share any funny/inspiring stories or favorite things about your career:

With the work that I do, I am continuously presented with the opportunity to learn new things every day and work with people who are tremendously knowledgeable and skilled.

I also get to work on figuring out the answers to interesting questions about the fascinatingly intricate ocean-atmosphere system and share these discoveries with others.

Do you have advice for middle school and high school students interested in a career in science?

Ask questions.

Be your own advocate, if there's something you want to do or are curious about, ask people (professors, grad students, organizers etc) how you might be able to get involved.

Volunteer in a variety of settings to help you discover what you really enjoy, it might surprise you to discover how many different choices you have once you start looking.

Are there any resources you would recommend for students looking at a career in ocean and earth science, especially at UCSD and SIO?

Seek out volunteer opportunities if there is a topic that interests you. There are a lot of labs that might have small projects available, and the Birch Aquarium also has a lot of opportunities to learn more about ocean science opportunities.

The NSF-REU (Research Experience for Undergraduates) is also a great way to gain research experience during your undergraduate studies.

Favorite quote?

“With every drop of water you drink, every breath you take, you’re connected to the sea, no matter where on Earth you live.” – Sylvia Earle



Melissa Miller

Marine Technician, Shipboard Technical Support

I go to sea on research vessels and run scientific experiments, collecting data about the chemical properties of seawater including nutrients, salinity, and dissolved oxygen. I also help launch and recover scientific instruments from ships into the ocean in order to collect samples.

What inspired you to work in your current field? The ocean feels like the last unexplored place on Earth, and I like to think of myself as an explorer. I've always loved visiting the ocean and aquariums. In college I studied biology so I could learn more about the natural world around me. I never get tired of being at sea, so I know it's the right job for me.

Please describe the path that led you to where you are now: I went to college at UCSD and took a few classes at Scripps. I wanted to do more ocean science work so volunteered at the Birch Aquarium, which led to a volunteer opportunity to go to sea on a research cruise. Once I did that, I knew I was hooked and decided to look for a full-

time job. I've been working at Scripps ever since. Gaining experience little by little has been the key for me, I always make sure people know that I am interested in learning new skills.

What experiences helped prepare you for your career? Knowing that I never get tired of seeing or being near the ocean, even now when sometimes that's all I see for a few months at a time, helps me know that I'm in the right line of work.

Please share any funny/inspiring stories or favorite things about your career: I love working with different scientists, all of whom are trying to understand different things about the ocean and the planet. Being around people who are so dedicated to exploration and learning new things inspires me. An oceanography job takes you around the world, so I've gotten to see so many countries that I would never otherwise have gone to.

Do you have advice for middle school and high school students interested in a career in science? Stay involved with the field you think you may be interested in, even if it's just on a volunteer or hobby basis. Meeting people interested in the same things is important. Be prepared to gain experience by working as a volunteer or an intern. Take advantage of opportunities when you're in school and can meet people and get experience.

Are there any resources you would recommend for students looking at a career in ocean and earth science, especially at UCSD and SIO? UCSD has great classes for people interested in science careers, and there's many that are taught at Scripps as well. Don't be afraid to talk to professors or higher-level students who are doing work that sounds cool to you. People love talking about their work. There are so many opportunities once you're in college, internship and terms abroad that can take you to different countries and introduce new topics.

Favorite quote? "Not all those who wander are lost." J.R.R. Tolkien



Nick Tuttle

Graduate student in Marine Biology, Center for Marine Biotechnology and Biomedicine

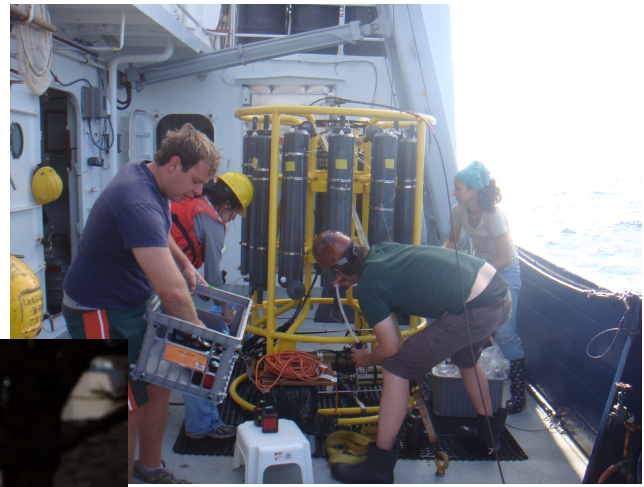
It turns out that tiny organisms like bacteria produce tons of really useful chemical compounds, also called natural products, that humans can use as medicines. In fact, many of the antibiotics that we take when we're sick or the treatments we receive for cancer come from natural sources! I work with one genera of bacteria called *Salinispora*, that produces numerous chemicals some of which have antibiotic or anti-cancer properties. I try to understand how these compounds benefit the bacteria in their environment as well as how we can use things from the environment to trick the bacteria into producing more natural products.

What inspired you to work in your current field? From a young age I knew I wanted to study the oceans. My favorite animal in fifth grade was a manatee. I still remember for Christmas one year my grandmother "adopted" a manatee from a conservation center for me. What I didn't realize is that this meant she donated some money to help protect the manatees, instead I thought I'd be getting a sea cow in the mail. I sat by the door for the next two weeks waiting for my manatee to arrive. I was slightly devastated when I realized that I'd never actually get my own sea cow, but learning about how they were endangered really motivated me to take interest in our oceans. It wasn't until college that I realized the importance bacteria play in our lives. Once I learned that bacteria can naturally make many of the compounds we use as pharmaceuticals I was hooked. I combined my love for the oceans with my interest in microbiology and that led me to SIO.

What experiences helped prepare you for your career? The best prep I had for my career were the numerous internships I signed up for during college. I was fortunate enough to have lots of opportunities to work in the field throughout college including working at the Philadelphia water department, volunteering with MOTE aquarium studying manatees, living in Costa Rica studying leatherback sea turtles, and several others. These experiences helped me narrow down my interests as well as build a strong resume so that I could get in to SIO.

Do you have advice for middle school and high school students interested in a career in science?

Ask lots of questions and try to think critically in your day to day life. I believe building a scientific mind set at a young age will help you no matter where you end up. Also look for volunteer opportunities every summer and even during the school year. Our laboratory has had numerous high school interns that have volunteered over the summer. By getting involved you'll not only help yourself get into college but you'll make sure you actually like working in the sciences.



Peter Franks

Professor, Integrative Oceanography Division, Scripps Institution of Oceanography

What inspired you to work in your current field?

I was always interested in physics, but ended up studying biology for my undergraduate degree. I missed the physics and math. When I discovered Oceanography I found it was the perfect field for me: it combined my interests in biology, physics, math and computing in a way that let me ask questions that pure biologists or physicists didn't.

Please describe the path that led you to where you are now.

I obtained an undergraduate degree in Biology from Queen's University in Canada. My honors thesis was on sparrows. Almost on a whim, I applied to the Oceanography program at Dalhousie University in Canada, where I was accepted and obtained a master's degree in Biological Oceanography. There I created a computer model of a giant oceanic swirl called a "warm-core ring", showing how the circulations in the ring affected the growth of phytoplankton. I then moved to the US to do my PhD in the Woods Hole Oceanographic Institution/Massachusetts Institute of Technology Joint Program in Oceanography. I studied the dynamics of Harmful Algal Blooms in the Gulf of Maine, and discovered that these blooms were moved hundreds of miles along the

coast, in a previously unknown coastal current. From there I moved to Oregon to do a postdoc in Ocean Modeling at Oregon State University, where I was in the Physical Oceanography group. Finally I was offered a position as Assistant Professor at the Scripps Institution of Oceanography, where I have been for the last 22 years.

What experiences helped prepare you for your career?

I spent a lot of time outdoors when I was young – camping and canoeing. Being immersed in nature definitely shaped my career path. When I was in university I volunteered in scientist's labs, and sought out opportunities to do research with my professors. While I was in high school and university I took a lot of math, physics, chemistry and biology courses. They certainly helped a great deal in helping me get into graduate school, and achieve my goals to be a scientist.

Please share any funny/inspiring stories or favorite things about your career.

Ironically for an oceanographer, I get seasick. I have quite a few stories about that, but they don't bear repeating here.

As a high-school student, and even while I was in university I really had no idea what I wanted to do with my life. It wasn't until I was working at a biology station doing research for my honors thesis that I overheard a conversation about a graduate program at Dalhousie University. The only things I heard about it were that it was called "Oceanography" and that it was hard to get into. I had considered going into Marine Biology, but Oceanography sounded much cooler! I applied to the program, got accepted, and the rest is history.

Do you have advice for middle school and high school students interested in a career in science?

Take as many math and science courses as you can. Look for opportunities to volunteer in people's labs. Get lots of experience. Learn a bit about how academia works. Talk to graduate students and professors when you can.

Are there any resources you would recommend for students looking at a career in ocean and earth science, especially at UCSD and SIO?

The SIO Graduate Department has a lot of good resources concerning graduate school in oceanography. Other graduate departments at UCSD will have similar resources available. Many departments organize volunteer programs for high-school students, and they are well worth looking into.

Favorite quote?

If a cluttered desk is a sign of a cluttered mind, then what is an empty desk a sign of?

<http://scrippsscholars.ucsd.edu/pjfranks>

Rachel Labbé-Bellas

Communications and Outreach Coordinator for Gulf of California Marine Program/MBRD (Aburto Lab)

I have two heads. One is a lab manager for the Aburto Lab, where I help researchers and students with administrative and field support. I also write the annual and midterm reports for the organizations who give us money to do our science. The other hat I wear is the Communications and Outreach Coordinator for the Gulf of California Marine Program, which is based out of the Aburto Lab but includes team members from both US and Mexico. I coordinate the social media outreach, educational outreach, and communications outreach with the fishing and conservation communities that our program works with in Mexico.

What inspired you to work in your current field? I love marine science, but I really didn't want to do just research. I wanted to connect science to society, so working with donors and communities to communicate our work to the public is my passion.

Please describe the path that led you to where you are now: I love to travel, speak different languages and work with warm water marine environments. During my studies, I lived and studied in Panama and then in Brazil where I completed my Masters in Ecology. Learning to adapt to new environments, working with people from different cultures, opened my horizons to work globally with cross-border organizations that are promoting ocean conservation while sustaining services that oceans provide to humans.

What experiences helped prepare you for your career? My years living in different countries, field semesters in Barbados, Panama, and Brazil and my field volunteer experience in Philippines and Ecuador with sharks and whales. I am good at speaking to many different types of people about what I do and the purpose of protecting the ocean.

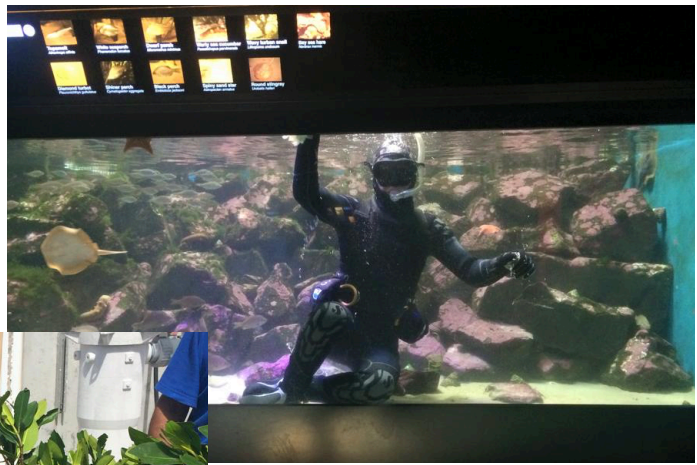
Please share any funny/inspiring stories or favorite things about your career: I have been chased by an Anaconda in the Brazilian jungle, smacked in the face by a flying fish, slipped my foot into my running shoe and almost squished a baby bat, come face to face with a big eye Thresher shark, and almost kissed my Master's advisor in Brazil on the first day meeting him since I didn't know they kiss on both cheeks instead of one.

Do you have advice for middle school and high school students interested in a career in science?

Go to new places, meet new people, practice different skills, be multi-disciplinary. Today's work environment is mixing, so the more flexible and adaptable you are, the better it is to have a big picture mentality.

Are there any resources you would recommend for students looking at a career in ocean and earth science, especially at UCSD and SIO? [Volunteer](#), learning another language, travel and work in another country to learn about the different ways of doing science and communicating it.

Favorite quote? Everything you do in life will be insignificant, but it is very important that you do it. – Mahatma Ghandi



Ryan Schaeffer

Tropical Aquarist

I take care of all the tropical animals at Birch Aquarium

What inspired you to work in your current field?

I grew up next to the Ocean and have always been interested in the creature who make their home in the ocean.

Please describe the path that led you to where you are now:

I was fortunate in that I was exposed to aquaria at a very young age and was lucky enough to go to a high school that has their own aquarium facility. With that early exposure I knew what I wanted to do as a career. After high school I moved to the island of Oahu, Hawaii for college and work. After 3 years in Hawaii I transferred to Saint Mary's College in the San Francisco Bay Area I continued to work for Aquarium of the Bay in san Francisco until graduating and getting a job here at Birch Aquarium!

What experiences helped prepare you for your career?

Getting an early exposure to aquariums at a young age inspired me to take the path I am on today. Learning to SCUBA dive was also a major experience that has helped prepare me for my career.

Please share any funny/inspiring stories or favorite things about your career: My favorite thing about my job is when I hear children visiting the aquarium

getting excited about some of our smallest, usually over looked, animals. To me that is one of the main reasons I have this job, to inspire and excite the younger generations about the ocean creatures in hopes that they will take that experience with them and inspire them throughout their life to want to protect our oceans.

Favorite quote?

“If there is magic on this planet, its contained in water”

-Loren Eiseley



Till Wagner

Postdoctoral Scholar, Climate Atmospheric Science and Physical Oceanography

I study the physics of the ice in the northern and southern polar regions, and how the ice is connected to other parts of the climate system, such as the ocean and the atmosphere. I'm in particular interested how the ice is affected by climate change.

What inspired you to work in your current field?

I was looking for a job where I could combine physics and math with learning about the Earth, and where I can travel, do field experiments, lab experiments, pen-and-paper mathematics, and use the amazing powers of modern computing.

Please describe the path that led you to where you are now:

I did kindergarten through high school in Germany (with 1 year exchange to Ecuador). Then I went to the UK, where I first did my undergraduate and Master in Physics and Philosophy. After that I got a Master in Mathematics and eventually a PhD in Mathematics. I moved to San Diego 3.5 years ago to work at Scripps as a Postdoc Researcher.

What experiences helped prepare you for your career?

I had some good physics and math teacher at school, and I've always loved to travel. I also always really enjoyed outdoorsy things, in particular everything about the ocean. I grew up ~1000 miles from the next big sea, so that probably contributed to my excitement.

Please share any funny/inspiring stories or favorite things about your career:

I was once a scientist on a TV show in which we looked at how icebergs melt. When we got to the iceberg I was amazed by how big it was, so I said, "I knew it was going to be big, but this is massive". Not a particular smart line. But the TV crew was filming and caught this on camera, and they ended up using it for the show's trailer. So for a few weeks everybody around me was commenting on my ridiculous line. My housemates at the time gave me a mug that had "I knew it was going to be big, but this is massive" written on it.

Do you have advice for middle school and high school students interested in a career in science?

Make sure you learn as much math as you can! It might not look like exciting science at a first glance, but it's the language that scientists speak to carry out science. I didn't know that until pretty late, and I wish somebody had told me earlier.

Are there any resources you would recommend for students looking at a career in ocean and earth science, especially at UCSD and SIO?

I think maybe the best resources are the scientists themselves. Most of us are really excited if students are interested what we do, so if you send a scientist an email, or call them up, they may well be up to talk to you and explain their work and give you advice (they might also be too busy, but don't let that put you off!)