

Hi Reddit! We're scientists aboard the NOAA Ship Okeanos Explorer on a mission to answer your questions about our deep-ocean exploration missions. Ask Us Anything!

NOAAgov¹ and r/Science AMAs¹

¹Affiliation not available

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Abstract

Hi Reddit! We are Derek Sowers (NOAA seafloor mapping expert), Kasey Cantwell (NOAA ocean explorer), Cheryl Morrison (research geneticist, USGS), and Leslie Sautter (geologist, College of Charleston). We are joined by the Mission Team on board NOAA Ship Okeanos Explorer to answer your questions about our current expedition exploring deep-sea habitats of the southeast U.S. Continental Margin. Throughout the expedition, we are using remotely operated vehicles (ROVs) to explore the seafloor and video streams from the ROVs are being transmitted via satellite from ship to shore. This means anyone with an Internet connection – including YOU! – can tune in LIVE with scientists from around the world, sharing an unprecedented glimpse of never-seen-before deep marine habitats. We expect to encounter large, diverse coral and sponge communities; uncover important deep-sea ecosystems; explore historical shipwrecks; map the seafloor; and learn more about the geologic history of the area. Information collected during the expedition will expand our knowledge of these unknown and poorly known deepwater areas and to provide data for decision makers. We're here from 2 - 4 pm ET to answer your questions about our deep-ocean exploration missions. Big thanks to everyone who joined us today! We had a great time responding to all the great questions about ocean exploration! The Windows to the Deep 2018: Exploration of the Southeast U.S. Continental Margin expedition is just getting started, so be sure to visit the pages below to follow along as we explore submarine canyons, submerged cultural heritage sites, deep-sea corals and sponge habitats, inter-canyon areas, gas seeps, and more! Live video of dives (daily, June 14 - July 1, from ~8 am to 4:30 pm ET): <https://oceanexplorer.noaa.gov/livestreams/welcome.html> Windows to the Deep 2018 web coverage: <https://oceanexplorer.noaa.gov/okeanos/explorations/ex1806/welcome.html> Expedition images/videos: <https://oceanexplorer.noaa.gov/okeanos/explorations/ex1806/logs/photolog/welcome.html> Bios of the explorers on the current mission: <https://oceanexplorer.noaa.gov/okeanos/explorations/ex1806/background/explorers/explorers.html> Home page of the NOAA Office of Ocean Exploration and Research website (so you don't miss future expeditions): <https://oceanexplorer.noaa.gov/> Time to get back to exploring!

[REDDIT](#)

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NOAA.GOV [R/SCIENCE](#)

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Live video of dives (daily, June 14 - July 1, from ~8 am to 4:30 pm ET): <https://oceanexplorer.noaa.gov/livestreams/welcome.html>

Windows to the Deep 2018 web coverage: <https://oceanexplorer.noaa.gov/okeanos/explorations/ex1806/welcome.html>

Expedition images/videos: <https://oceanexplorer.noaa.gov/okeanos/explorations/ex1806/logs/photolog/welcome.html>

Bios of the explorers on the current mission:

<https://oceanexplorer.noaa.gov/okeanos/explorations/ex1806/background/explorers/explorers.html>

Home page of the NOAA Office of Ocean Exploration and Research website (so you don't miss future expeditions):

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How much plastic debris do you encounter on the surface and through the ROV dives? I've seen a density of up to 1 large piece per square mile (and countless micro-pellets) while sailing in the Pacific, curious about the Atlantic's condition.

[Cynqlen](#)

From my experience in the past, It depends on the site. Closer to shore, we see more plastic debris than further offshore. The dive today (June 14) is the furthest offshore I have been. Hope that we don't see any debris. In the mid-Atlantic canyons, we often saw fishing nets and gear such as longlines, plus cans and foul weather gear. For example, see

<https://oceanexplorer.noaa.gov/explorations/13midatlantic/logs/highlight-images/media/capstan.html>.

(Cheryl)

Unfortunately, we do often see trash on the seafloor, but as Cheryl mentioned, it depends on the the location of the dive and how close to land or shipping routes we are. When we were in the Marianas, we found a [Spam can](#) in the Mariana Trench; during the [Musicians Seamounts Expedition](#), we saw a refrigerator floating at the surface; while in the Gulf of Mexico recently, we found a [shipping container](#) that had fallen overboard with a load of washing machines; and we often see released balloons on the seafloor in a lot of places where you would think we would be beyond human impacts. The NOAA Marine Debris Program has a nice blog about the ins and outs of plastics in our ocean if you are interested: <https://blog.marinedebris.noaa.gov/ins-and-outs-plastic-pollution-our-ocean>. (Kasey)

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What's the weirdest or most unique creature you've found seen or otherwise interacted/observed down there? We know so little about it that it's fascinating to me.

[SoyMurcielago](#)

The red-eyed gaper! An angler fish that can inflate (with water) to scare off predators, then walk on the seafloor with its modified fins to "run" away! (Leslie)

There are so many amazing things that we see, it's hard to pick one! One of my favorites was a manta ray that swam right over the Johnson Sea Link submersible. Amazing! Another great experience was finding a large brine pool in the Gulf of Mexico. Amazing to see a lake at the bottom of the ocean! (Cheryl)

For unique and different, it's hard to find anything as weird as the fauna that live in the [water column](#)! These [animals](#) are so different than things we see on land or at the bottom of the ocean. We've often found organisms in the midwater that we aren't sure what they are or even what type of animal they are. They often look quite [alien](#)! (Kasey)

You mention that the data collected on this mission will be provided to decision makers. In what capacity will this data be provided and what kinds of decisions do you each hope will be made?

[iamMarkPrice](#)

One of the unique things about the way we conduct operations onboard NOAA Ship Okeanos Explorer is that [our data](#) are made publicly available ~60-90 days post cruise. This means that resource managers we engaged with during the planning process for each expedition are able to use these data soon after to inform their management decisions. In many cases, we visit some of the most remote and least-explored areas of our ocean, so the data we collect can provide some of the first-available information to managers; given that it is hard for managers to make decisions about things that they don't have any information about, our data can fill in key gaps. I wouldn't say that there is any one decision we are hoping for, but rather that managers will use the information we collect in a way that makes sense for them and their given resource to manage. All that said, as noted, the data we collect on these expeditions is made available to the public, not just resource managers. As neutral brokers of scientific data, anyone can access the data we collect. To access data from past expeditions supported by the NOAA Office of Ocean Exploration and Research, visit: https://www.ncddc.noaa.gov/website/google_maps/OE/mapsOE.htm. (Kasey)

In terms of public engagement & understanding, what do you see as your biggest hurdle?

[iamMarkPrice](#)

A hurdle for a lot of people is that the ocean, particularly the deep ocean, is far away and out of sight/out of mind. That's one of the reasons I love how we conduct operations via telepresence. For example, see <https://oceanexplorer.noaa.gov/okeanos/explorations/ex1404/logs/sept29/sept29.html> or <https://oceanexplorer.noaa.gov/okeanos/explorations/ex1304/logs/aug5/aug5.html> or <https://oceanexplorer.noaa.gov/okeanos/explorations/ex1708/logs/sept28/welcome.html>. Because of this telepresence technology, we are able to reach such a broad group of scientists that can be located anywhere in the world AND we are able to [share our expeditions in real time](#) with the public! (Kasey)

I find that if we can get the word out via social media that public engagement is much greater. The problem is that there are now so many different social media platforms that posting to each one is time consuming if updates or interactions are necessary. (Leslie)

**You can follow the NOAA Office of Ocean Exploration on social media (we post often!): Facebook: <https://www.facebook.com/OceanExplorationResearch/> Twitter: <https://twitter.com/oceanexplorer> Instagram: <https://www.instagram.com/noaoceanexploration/>

So as a fresh out of college marine biologist, I have so many questions.. First of all i love the streams, have been watching them for years now, it is amazing to be able to take a live look in the least known habitat in the world with a few simple clicks.

My most burning question is how to get into deep-water research. I know lot's of marine biologists, but deep-water researchers are much rarer so i don't know a lot of people to ask. Ever since i went into the deep sea in a submersible for a research project i have wanted to go back or study that fascinating environment. It's probably a hard question to answer but well it is such an important one for me i just had to ask. Any specific tips would be awesome.

Secondly: this kind of work is incredibly expensive ofcourse, how much time do you guys have to use the ROVs in interesting places, how is it decided which places you are going to explore and how much time are the ROVs used for other activities (i believe it is common to use them for maintenance and other commercial goals? Probably to reduce the cost of the expedition?)

Last question is probably a simple one: what is the distance between the lasers on the front of the ROVs? It is hard to get a sense of the scale of things under water.

[Confident_Frogfish](#)

Congratulations on your recent graduation! For your first question (how to get involved), I highly recommend getting some hands-on experience in the form of internships, volunteering in a lab, and even working as a marine science summer camp counselor – anything that you can do to learn more about what you like (and equally important, what you don't like doing) and what you are most interested in will be helpful. There are so many different [career paths](#) to doing "marine science" – some people get their starts in graduate school, others find that they love communicating about science versus conducting research, others like championing causes in the ocean and find a home in the federal government or with non-profits (depending on where their interests lie). On one of our expeditions, we asked participants for advice they'd give students interested in getting into ocean exploration as a career; here's what they said:

<https://oceanexplorer.noaa.gov/okeanos/explorations/ex1404/logs/sept21/sept21.html>. Also, for info on the wide variety of careers available, check out:

<https://oceanexplorer.noaa.gov/edu/oceanage/welcome.html>. If you're looking to make a foray into deep-sea exploration, we have an [Explorers-in-Training program](#) and you can also reach out to professors that have deep-sea labs, as they are often interested in talking to potential students! If you don't know many deep-sea explorers, you can learn about some of the work they do associated with missions sponsored by NOAA's Office of Ocean Exploration and Research, on the expedition web pages on our website here: <https://oceanexplorer.noaa.gov/explorations/explorations.html>.

For your second question, our vehicles are [custom built for our exploration missions](#), so they stay onboard pretty much all of the time, unless they are in the shop for maintenance when we are not in the field. We [typically have 4-5 ROV missions per year](#), so they are often busy collecting valuable data to help us learn more about the deep sea!

And finally, the lasers are 10 centimeters (a little less than four inches) apart.

Good luck! (Kasey)

A question about funding: in astronomy we have to write observation proposals to get time on one of the big telescopes.

How does that work in your field. Are you doing observations, measurements, experiments for other researchers who have successfully applied for that or do you only do your "own" research?

[_SZS](#)

We like to say that [our missions](#) are hypothesis generating versus hypothesis testing. We conduct operations in some of the most remote areas on Earth, so we often collect the [first-ever deepwater data](#) in those regions. Other scientists then take those data and start posing questions and conducting experiments based on our initial data.

In terms of how we determine what we are going to explore: We conduct community-driven exploration, which means that exploration sites are selected by scientists and ocean resource managers based on priorities in terms of where they are most in need of exploration data. For this expedition, we conducted a [call for input](#) where we used an online GIS tool to allow folks to submit targets to be considered for incorporation into our mission.

Our primary data types are [seafloor mapping](#), imagery and video, oceanographic sensors (like CTDs). We also collection data about the water column, subsurface features, and have a suite of oceanographic conditions sensors. All collected data are publicly available: https://www.ncddc.noaa.gov/website/google_maps/OE/mapsOE.htm. (Kasey)

What's your work like day-to-day, when you all aren't on expeditions?

[c0rpsey](#)

Mine is a lot of meetings and desk work in Washington, DC. Planning for expeditions starts several months in advance, so I'm either typically engaged in planning my next expedition or wrapping up the last one. (Kasey)

I spend a lot of time in my lab, working with technicians that generate genetics and genomics data. The majority of my time at the office is spent analyzing the data collected and writing journal articles, plus planning for expeditions. This is the best part of my job, and the time it takes to prepare is always worth it. (Cheryl)

I'm a geology professor at the College of Charleston, and I teach several marine geology and seafloor mapping courses to undergraduate students (mostly). I absolutely love working with the students and doing field work, which sometimes includes going out on a boat (nearshore) or a ship (offshore). I also teach coastal geology, so going to the beach is part of my job! (Leslie)

Ahoy Ocean Explorers!

Google Earth makes it look like the entire ocean is mapped, is that really the case? Can you speak to how much of the deep-ocean is currently unexplored?

[Murphando](#)

The base map for Google Earth was mostly generated using [satellite altimetry](#), which generates a very low-resolution surface. That means that only large-scale features have been mapped throughout the world's ocean basins. What we hope to do is contribute high-resolution, detailed maps to the global database. A new initiative called [Seabed 2030](#) has the goal to map in high-resolution the entire seafloor - very ambitious! Ships and autonomous (self-guided) mapping vehicles will be the workhorses for these efforts. Okeanos included! (Leslie)

To be honest, we have better maps of Mars than we do of the bottom of the ocean! We have seen less than five percent of the ocean, and lack high-resolution maps of approximately 90 percent of the ocean. As far as mapping goes, it all depends on what [scale and resolution](#) you are thinking about. Many of the major features of our seafloor have been revealed, but the smaller features (ones we need high-resolution data to see) remain a mystery until we can use a ship-based system or a AUV to collect higher-resolution data. While we were working in the Pacific, there were [several instances](#) of multibeam bathymetry being significantly different than what was predicted by satellite altimetry. (Kasey)

Hello!

What have been some of the more exciting/unexpected discoveries or observations made during dives you've worked on?

Thanks for doing this AMA and providing such wonderful streams for us landlocked people.

[Tartuffe](#)

We once observed a male spanish hogfish courting three females along the continental shelf edge. The male did a full-bodied quivering and shaking of all his fins...the females were not impressed! (Leslie)

For me it was every dive of the [Musicians Seamounts](#) expedition, as every dive was a different [high-density, deep-sea coral and sponge community](#). There had never been observations of corals from this region, [so every dive was a new surprise!](#) The Musicians Seamounts hosted the highest density of high-density, deep-sea coral and sponge communities of anywhere that we explored in the Pacific during [CAPSTONE](#). That being said, the region we are exploring during the [Windows to the Deep 2018](#) expedition is largely unexplored, too, so I can't wait to [see what we discover next!](#) (Kasey)

The cold seep finds on recent dives have been very interesting. As I understand, cold seeps aren't particularly large and are fairly spread out in the vastness of the ocean. That said, there's an abundant amount of life around them. I understand to an extent how creatures like tube worms get there, but what draws the larger predatory creatures like octopuses and fish? Are these animals capable of detecting a food source from large distances, or is chance involved to some degree?

Thanks so much for this AMA and your streams. They've been heavily inspirational and educational.

[Diphyidae](#)

Cheryl wrote a [great essay](#) about seeps as background for this [Windows to the Deep 2018](#) expedition and during our recent Gulf of Mexico expedition there was a [video about the seep habitats](#) that you might find interesting! (Kasey)

What is the biggest question you would like to see solved about the deep ocean?

[daniel_rdzbosque](#)

I mainly want the entire, global seafloor mapped at high resolution, so we can understand the history of the different basins (Atlantic, Pacific, etc.). Seeing the seafloor in glorious detail will generate many more questions! The [Seabed 2030](#) initiative is attempting this monumental task! (Leslie)

I'm most curious about habitat patchiness in the deep ocean. In a lot of regions of the ocean we will see similar overall conditions (depth, temperature, dissolved oxygen, geologic features, etc.) where animals would have similar access to food (or so we think), but yet the community structure differs at different places. At similar depths, we will see one seamount with dense coral communities and other seamounts without that much sessile fauna. Even within a dive, we will observe patchiness of the overall community that is somewhat baffling. A good example of this was at [Jarvis Island](#) in 2017, when we scaled a shallow flank of the island and encountered several distinct bands of animals. Each band was composed of hundreds, if not thousands, of different animals, but typically only one or two types of animals in each band. [It was an incredible place and left us with more questions than we had going into the dive!](#) During our [current expedition](#), we are exploring a diversity of habitats across the Blake Plateau, but at similar depths, so it will be interesting to see if we observe a difference in the communities that exist in these areas. Tune into the [live video feeds](#) and you can figure it out with us! (Kasey)

Hi guys! I really appreciate you taking the time to answer our questions today. I know how stressful conducting underwater research can be having just completed my AAUS certification and doing submerged prehistory stuff in Florida all summer...

Anyway, I was wondering about the role of benthic ecology going forward inasmuch as the wider implications of this research--are there potential indicators of anthropogenic climate change so far down on the seamounts and is there certain data you're expecting to gather to answer some of these concerns we have for, say the littoral zone?

[Sunken Past](#)

Congrats on your AAUS certification! I would say that the data we're collecting on this expedition is the ground-truthing that is needed to compare with data collected later to assess anthropogenic influences. Until we have characterized these habitats better, it will be difficult to ascertain changes and the causes of any changes we may see in the future. The corals that [live at these depths](#) do not have zooxanthelle symbionts, so bleaching, which occurs in shallow water corals when subjected to longer duration warming, is not an issue. Temperature may become an issue though, as the deep-sea corals are adapted to the cold temperatures of the deep sea. [Ocean acidification](#) could also become problematic for any organism that secretes a calcium carbonate skeleton, as they may not be able to do so if the deep sea becomes more acidic. (Cheryl)

Congrats on your AAUS Authorization – scientific diving was one of my favorite classes in undergrad! (Kasey)

Why are rocks being sampled during dives? Have there been any trends found in the kinds of rocks being found at different depths? Also, do you find there to be any correlations between certain kinds of substrates and the kinds of organisms found settling on or around those rocks (i.e. different minerals influencing settlement behavior)?

[Murphando](#)

We sample rocks to better understand the substrate (the seabed) on which these communities exist. The rocks also tell us a lot about the recent and geologic history of this unexplored region. These are sedimentary rocks and most contain microfossils that can tell us something about climate by what organisms' shells are found in them. Different areas have different rocks, most of which are buried by sediments. When they are exposed at the surface ("outcrop," "hardground"), they almost always have invertebrates attached to them. So far, I don't believe we know if specific rock types attract different organisms; it's more likely that the rock's depth and location with respect to food determines 'who' inhabits its surface. (Leslie)

Do you ever encounter whale bones?

[cetalingua](#)

I have not encountered whale bones, but it is always a possibility. There is an interesting succession of

fauna that inhabit whale bones, beginning with larger predators such as sharks and hagfishes, then smaller invertebrates including bone-eating worms and squat lobsters. (Cheryl)

In 2016, our partners from the Ocean Exploration Trust encountered a natural whale fall while exploring off the coast of California on Exploration Vessel Nautilus; check out the video here:
<https://www.nautiluslive.org/video/2016/08/03/observing-natural-whale-fall>.

Question from the younger audience: Do you ever see sharks? What kinds of sharks do you see, and do you have any favorites?

[Murphando](#)

We frequently see [six gill sharks](#) during our explorations, but we also saw a [greenland shark](#) in 2013 in the submarine canyons off New England which was really exciting! (Kasey)

How often do you encounter species that are new to science/new to that area? Which animal group has the most frequent new discovered species?

[Confident Frogfish](#)

The [deep sea](#) is largely unknown and so undersampled that we frequently see organisms that are unusual, rare, and potentially new to science! [Watch dives during our current expedition - Windows to the Deep 2018](#) - to see what we find along the [Southeast US Continental Margin!](#) (Kasey)

In the last 10 years, there have been many new species of corals that have been described from deep waters (greater than 200 meters), with the majority being octocorals. Most often, we are not sure whether a species is new to science until we can examine it and compare it to other species back in the lab. How often we find new species depends on the specific habitat visited and how often that type of habitat has been visited previously. (Cheryl)

How long is the average expedition/trip for the exploration ships? Does the crew on board have to stay away from home for extended periods of time?

[Sexy Slendy](#)

Over the last of couple years, our average mission is around 20 days; sometimes they are a little longer, and sometimes they are a little shorter. The mission team rotates on and off the boat, but the ship is home for our hard working crew and officers. We recently posted several mission logs that offer you a behind the scenes look into what life is like for the crew of the Okeanos Explorer:
<https://oceanexplorer.noaa.gov/okeanos/explorations/ex1708/logs/sept18/welcome.html> or
<https://oceanexplorer.noaa.gov/okeanos/explorations/ex1705/logs/may15/welcome.html> or
<https://oceanexplorer.noaa.gov/okeanos/explorations/ex1706/logs/july19/welcome.html>. (Kasey)

The duration of this expedition is roughly three weeks. The crew of NOAA Ship Okeanos Explorer stays on board for many cruises in a row, whereas the NOAA Office of Ocean Exploration and Research (OER) and science participants switch out with each cruise. The science leads generally are just on for one cruise (maybe/hopefully more in the future!), but the OER team will do several expeditions each year, just not back-to-back. (Leslie)

Have any of the crew/exploration scientists conducted exploration/research in a submersible versus an ROV, like D2?

[Murphando](#)

I've dived in the submersibles Johnson Sea Link II and Clelia about 10 times, near the dives for the [Windows to the Deep 2018](#) expedition, but at shallower depths than these dives. (Leslie)

Has an underwater drone ever had a major failure during a deep ocean exploration? Was it possible to recover the drone?

[Gohanto](#)

When we were in Puerto Rico in 2015, we launched an autonomous underwater vehicle (AUV) on behalf of one of our NOAA partners and the drama that followed was almost worthy of a soap opera. The short version of the story is that the AUV was declared lost at sea. Then, in a stroke of luck, two

months later when we happened to be transiting through the area again, and the AUV suddenly surfaced again only a few miles from our cruise track and we were able to recover it! If you want the full story, read [this weblog](#). (Kasey)

What is the most unusual or interesting sealife that you have run across in your expeditions?

[TheFrozenOne67](#)

The red-eyed gaper! An angler fish that can inflate (with water) to scare off predators, then walk on the seafloor with its modified fins to "run" away! (Leslie)

There are so many amazing things that we see, it's hard to pick one! One of my favorites was a manta ray that swam right over the Johnson Sea Link submersible. Amazing! Another great experience was finding a large brine pool in the Gulf of Mexico. Amazing to see a lake at the bottom of the ocean! (Cheryl)

For unique and different, it's hard to find anything as weird as the fauna that live in the [water column] (<https://oceanexplorer.noaa.gov/oceanos/explorations/ex1708/logs/sept23/welcome.html>)! These [animals] (<https://oceanexplorer.noaa.gov/oceanos/explorations/ex1705/logs/photolog/welcome.html#cbpi=oceanos/explorations/ex1705/dailyupdate/midwater/midwater.html>) are so different than things we see on land or at the bottom of the ocean. We've often found organisms in the midwater that we aren't sure what they are or even what type of animal they are. They often look quite [alien] (<https://oceanexplorer.noaa.gov/oceanos/explorations/ex1803/dailyupdates/media/apr28-3-800.jpg>)! (Kasey)

What would each of you say are the biggest technological challenges you face in terms of collecting data on a mission like this, and where would you like to see technological development to support these missions?

[iamMarkPrice](#)

I would love to get sediment samples, but unfortunately there is no suction device to collect them on the Deep Discoverer remotely operated vehicle (ROV). One has been designed, so hopefully in the future we'll have one. Scooping the sand makes the water all cloudy, so that's not optimal. (Leslie)

Working in the deep sea is always challenging! We have to make sure that any equipment we use is waterproof or water tight and that it can withstand cold and extreme pressure. Our partners at the [Global Foundation for Ocean Exploration and Research \(GFOE\)](#) conduct maintenance on the vehicles every day to make sure the ROVs do not have any issues that would compromise their ability to operate in these challenging environments. Check out [this video](#) for more info on how GFOE is "engineering for discovery." (Kasey)

It may seem simple, but a technical challenge for collecting genetics samples is the dedicated space on the ROV to stow samples individually, so that you can reference back to the correct metadata, such as images of the sample prior to collection, position on the seafloor at collection, temperature, depth, etc. For genetic connectivity studies, we need at least 10 samples per location, but 30 is more ideal. We often create unique sample storage gear for each ROV we use from items you can buy at building supply stores; for example, see: <https://oceanexplorer.noaa.gov/explorations/17gulfofmaine/logs/june10/june10.html>. (Cheryl)

How would you get into ocean mapping? I'm currently at the beginning of my GIS career and I'd eventually like to combine GIS with underwater mapping. Any tips would be appreciated!

[kosmicnomad](#)

There are a few options, certainly! For undergraduates, there are only a few institutions that have programs (including [College of Charleston](#) and the [University of Washington](#) BEAMS Programs). Graduate students can also take part in these programs, although there's no specific graduate degree for mapping. At the graduate level, the University of New Hampshire, Southern Mississippi, and Oregon State are the go-to institutions that I'm aware of. You can also find workshops at professional meetings that can give you an introductory look at the software. NOAA also hires survey technicians for the ships and onshore processing, so that's another avenue, although you might want to gain experience with one of the software packages first. (Leslie)

I would recommend taking an oceanography course to start. Understanding the physical and chemical dynamics of the ocean is important in order to be aware of how the properties of the water masses you

are mapping within affect the sound signal you are mapping with. Geomatics and geodesy coursework is very helpful as well. The University of New Hampshire (UNH) offers certificate programs and masters programs specifically in ocean mapping so the content is tailored to meet internationally recognized standards for ocean mapping (called "hydrography"). For students pursuing a rigorous education/career in hydrography or marine science, the NOAA Office of Ocean Exploration and Research, in partnership with the University Corporation for Atmospheric Research, offers an "Explorer-in-Training" experience that enables students or recent graduates to participate in ocean mapping working either onshore at UNH or on NOAA Ship Okeanos Explorer during a mapping expedition. More information here: <https://oceanexplorer.noaa.gov/okeanos/training.html> and here: <https://cpaess.ucar.edu/okeanos-explorer-in-training-program>. The next round of applications for the Explorer-in-Training program will be accepted in November/December 2018.

Getting involved with NOAA vessels as a Survey Technician is a great way to get hands-on experience with hydrography and travel while you are at it. (Derek)

How would you get into ocean mapping? I'm currently at the beginning of my GIS career and I'd eventually like to combine GIS with underwater mapping. Any tips would be appreciated!

[kosmicnomad](#)

We currently use a variety of software. We use Kongsberg Seafloor Information System (SIS) for acquiring multibeam sonar data, QPS Qimera (and previously Caris HIPS & SIPS) for multibeam data processing, and QPS Fledermaus for 3D/4D visualizations of mapping data. We also use Global Mapper and ArcGIS for converting data, spatial analysis, and making map products. We process water column acoustic data (for example multibeam water column data or EK60/EK80 water column data) using QPS Fledermaus Mid-Water. We process seafloor sonar backscatter reflectivity data using QPS Fledermaus Geocoder Toolbox to produce nice-looking images of the relative "hardness" of the seafloor. You can learn more about our different mapping sonars [here](#).

For preparing for a job involving seafloor mapping, training specifically in hydrography (seafloor mapping and surveying) is recommended. Also, try to get some time on a ship to see if you really love being at sea and want to do more! (Derek)

I'm taking kids (including an 8 year old future marine biologist) to The Shedd soon. What's your can't-miss thing there? Why? If I can get only one message through to the kids that day, what would you like it to be?

What fed your interest in science, say around ages 8, 9 and 14?

And do you eat fish?

[DrPepperFuelsMe](#)

I've never been to Shedd, but I'd love to go! I always love the coral reef tanks at aquariums. I was about that age when I decided I wanted to be a marine scientist, so it's a great age to get kids excited about the ocean. I loved going to the beach and aquariums and reading books about the ocean, and I was fortunate enough to go to marine science summer camps, which was a dream come true! My school also had a science program called Voyage of the Mimi, which was all about oceanography and was wonderful. These days, I'd point you (and any teachers) to the [education page on our website](#), which has lesson plans and activities for students of all ages.

Also, I love seafood! We just make sure to only eat sustainably caught fish! [Seafoodwatch.org](#) is a great place to learn about sustainable seafood. (Kasey)