

Science AMA Series: Hi Reddit! We're scientists on a NOAA mission to explore deep, unseen waters in the central Pacific. Ask Us Anything!

NOAAgov¹ and r/Science AMAs¹

¹Affiliation not available

April 17, 2023

Abstract

Hi Reddit! We are Scott France (deep-sea biologist, University of Louisiana at Lafayette), Del Bohnenstiehl (geophysicist, North Carolina State University), Michael White (NOAA seafloor mapping expert), and Kasey Cantwell (NOAA ocean explorer). We are joined by the Mission Team on board NOAA Ship Okeanos Explorer to answer your questions about our expedition to explore deep waters in the central Pacific- an area of the world where the vast majority of deeper waters remain unseen by human eyes. We are currently on the “Mountains in the Deep: Exploring the Central Pacific Basin” expedition to explore deep waters within Pacific Remote Islands Marine National Monument; around the Cook Islands Marine Park; and the high seas. 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 ancient seamounts; map the seafloor; and learn more about the geologic history of the area. Information collected during the expedition will support management decisions, to appropriately use and protect what we know as well as what we have yet to discover. We have all participated in numerous deep-ocean exploration missions. We're here from 2:00 pm ET to 4:00 pm ET to answer your questions about the current expedition or ocean exploration in general... AUA! You can follow us on Facebook at <https://www.facebook.com/OceanExplorationResearch/>, Instagram @noaaocexploration, or Twitter @oceanexplorer, or visit our website <http://oceanexplorer.noaa.gov> to stay up to date with all of our deep-ocean exploration activities! Thanks for joining us today to talk about ocean exploration! Unfortunately, we are out of time. Good news is that you can continue to follow the Mountains in the Deep: Exploring the Central Pacific Basin between now and May 19, 2017. While we aren't diving today (May 1), all things permitting, ROV dives are planned most days until May 15, 2017, typically from about 8 am to 5 pm SST (3 pm to 12 am EDT). Expedition home page: <http://oceanexplorer.noaa.gov/okeanos/explorations/ex1705/welcome.html> LIVE video of our dives: <http://oceanexplorer.noaa.gov/okeanos/media/exstream/exstream.html>

the WINNOWER

[REDDIT](#)

Science AMA Series: Hi Reddit! We're scientists on a NOAA mission to explore deep, unseen waters in the central Pacific. Ask Us Anything!

NOAAGOV [R/SCIENCE](#)

Hi Reddit! We are Scott France (deep-sea biologist, University of Louisiana at Lafayette), Del Bohnenstiehl (geophysicist, North Carolina State University), Michael White (NOAA seafloor mapping expert), and Kasey Cantwell (NOAA ocean explorer). We are joined by the Mission Team on board NOAA Ship Okeanos Explorer to answer your questions about our expedition to explore deep waters in the central Pacific- an area of the world where the vast majority of deeper waters remain unseen by human eyes.

We are currently on the "Mountains in the Deep: Exploring the Central Pacific Basin" expedition to explore deep waters within Pacific Remote Islands Marine National Monument; around the Cook Islands Marine Park; and the high seas.

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 ancient seamounts; map the seafloor; and learn more about the geologic history of the area. Information collected during the expedition will support management decisions, to appropriately use and protect what we know as well as what we have yet to discover.

We have all participated in numerous deep-ocean exploration missions. **We're here from 2:00 pm ET to 4:00 pm ET to answer your questions about the current expedition or ocean exploration in general...AUA!**

You can follow us on Facebook at <https://www.facebook.com/OceanExplorationResearch/>, Instagram @noaoceanexploration, or Twitter @oceanexplorer, or visit our website <http://oceanexplorer.noaa.gov> to stay up to date with all of our deep-ocean exploration activities!

Thanks for joining us today to talk about ocean exploration! Unfortunately, we are out of time. Good news is that you can continue to follow the Mountains in the Deep: Exploring the Central Pacific Basin between now and May 19, 2017.

While we aren't diving today (May 1), all things permitting, ROV dives are planned most days until May 15, 2017, typically from about 8 am to 5 pm SST (3 pm to 12 am EDT).

Expedition home page: <http://oceanexplorer.noaa.gov/okeanos/explorations/ex1705/welcome.html> LIVE video of our dives: <http://oceanexplorer.noaa.gov/okeanos/media/exstream/exstream.html>

[READ REVIEWS](#)

[WRITE A REVIEW](#)

CORRESPONDENCE:

DATE RECEIVED:

May 02, 2017

DOI:

10.15200/winn.149364.43063

ARCHIVED:

May 01, 2017

CITATION:

NOAAgov, r/Science, Science
AMA Series: Hi Reddit! We're
scientists on a NOAA mission
to explore deep, unseen waters
in the central Pacific. Ask Us
Anything!, *The Winnower*
4:e149364.43063, 2017, DOI:
[10.15200/winn.149364.43063](https://doi.org/10.15200/winn.149364.43063)

© et al. This article is
distributed under the terms of
the [Creative Commons
Attribution 4.0 International
License](#), which permits

What is the strangest thing you have ever seen or heard underwater?

[throwawaybillij](#)

For "heard," that's got to be the various sounds generated by ice sheets breaking up in Antarctica:
<https://www.pmel.noaa.gov/acoustics/sounds/bloop.html> (Del)

If you want to check out a NOAA Office of Ocean Exploration and Research-funded project to better understand sound in the deep sea, visit:

<http://oceanexplorer.noaa.gov/explorations/16challenger/welcome.html>

The video you folks posted a few weeks ago where a shrimp attacked a fish, tore it open, and then ripped a smaller fish out of the first fish's belly and ate it and the first fish while it was alive is the single most *metal* thing I've ever seen.

<https://youtu.be/bnCQSoQSV3g>

Have you amazing folks seen anything else so unsettling during your exploration?

Also, on a more serious note, how bad is the pollution down there? I have read elsewhere that the ocean floor is tragically covered with human garbage. Is this as big of a problem as I've read?

unrestricted use, distribution,
and redistribution in any
medium, provided that the
original author and source are
credited.



[Cephalopodia](#)

That shrimp-fish battle ranks pretty high on the unsettling meter for a lot folks. The trash is unsettling, too -- and unfortunately, we do encounter trash often during remotely operated vehicle dives. Last year, during our Deepwater Exploration of the Marianas expedition, we saw trash, on Earth Day, while exploring in the Mariana Trench; our lead scientists wrote a log about it:

<http://oceanexplorer.noaa.gov/oceanos/explorations/ex1605/logs/apr22/welcome.html>. It's a stark reminder that you don't need to be on the water or even the coast to have an impact on the ocean. Thankfully, there are things that you can do to reduce marine debris impacts, no matter where you are: <https://marinedebris.noaa.gov/>.

Have you ever seen/heard something that you couldn't explain or still gives you chills? If so can you tell us what happened?

[xVronic](#)

Unexplained noise in our sonars always gives me chills!! We are constantly asking ourselves about the area we are working in and what could be generating ambient sound in our sonars... (Mike)

What do you expect to find vs. what do you sort of hope you find.

[deadlypinfish](#)

We try to avoid expecting to find things. We know so little about the deep ocean, we are truly exploring and we don't know what we will find. However, we have been diving and mapping areas that have a higher likelihood of hosting high-density coral communities. These are incredibly important for deep-sea ecosystems and we understand very little about them and why they are found where they are. We have also been choosing dive sites that will allow us to collect rock samples that will give us a better understanding of the age of the seamounts we are exploring. Knowing their age will help us better understanding how plate tectonics work.

1) Does anyone do metagenomics(bacterial/archaeal/viral sp etc) of deep sea ocean? Do you collect samples for that?

2) Have you guys seen/documentated effects of ocean acidification on deep sea species? Or is the influence less ?

Also... asking for everyone here, how do we support NOAA given the impending budget crises?

[tellkrish](#)

Regarding your first question: Absolutely! There is a huge amount of interest in the microbial communities in the deep sea, both the "free-living" stuff in the water column and the communities associated with the surfaces of corals and sponges. We haven't yet been collecting water samples, but there are plans to do so on future expeditions.

For most biological samples we collect, if there is enough tissue, we will preserve some for metagenomics; these are sent to the Ocean Genome Legacy (<https://www.northeastern.edu/ogl/>) for long-term storage. Metagenomics allows for a full picture of the genome. This allows us to discover what food and energy sources the deep-sea microbes might be using - or what novel genes they carry. Advancing technologies now allow for relatively inexpensive sequencing of a genome, so the methodological tools are being applied to all sorts of deep-sea organisms. It is simply a matter of having access to the specimens, enough money to run the analyses, and (very important!) the bioinformatics tools to analyze the massive amounts of DNA sequence data that come from metagenomics.

If you are looking for a career in biosciences, bioinformatics is the wave of the future (well, now actually!). We need you! [Scott F.]

Hello! With the recent excitements on space exploration to Mars and beyond, how do you think fields like marine-biology and ocean related sciences can attract more attention?

What are some of your favorites about the prospect of ocean exploration?

Thanks!

[opiummaster](#)

There's a lot to be learned about the seafloor by studying other planets and a lot we can learn about other planets by studying the seafloor. A great example is the pancake-shape volcanoes (round, not too tall, and flat on top) that we've mapped on this cruise. Similar features have been described on Venus using Magellan radar data! By comparing the two environments, we can better understand how these volcanoes are formed and what that tells us about the geologic environment. We'll try to get an image and mission log entry up on this shortly; stay tuned to our website:

<http://oceanexplorer.noaa.gov/oceanos/explorations/ex1705/logs/welcome.html> (Del)

Hello! With the recent excitements on space exploration to Mars and beyond, how do you think fields like marine-biology and ocean related sciences can attract more attention?

What are some of your favorites about the prospect of ocean exploration?

Thanks!

[opiummaster](#)

Working with such a talented and supportive team consisting of our science and engineering folks and the Okeanos Explorer's officers and crew. Everyone believes in our mission to explore the unknowns of our oceans. (Mike)

My partner is interested in Marine Biology, but not interested in going into immense debt for the degree. She is in her late 20s. Do you have any recommendations of how she could work in/related to the field?

[squeevey](#)

In the field of marine science, it is not uncommon for a professor to have funding to pay for your graduate degree or for a school to have a fellowship program that covers a chunk, if not all, of a PhD or Masters student's tuition and salary. A good way to start is to identify a couple topics or a field of study that you are interested in. Then look into professors and programs that do the type of work you are interested in. Reach out to the professor (or a number of professors) and discuss your interests. Every professor I reached out to during my grad school hunt was helpful, friendly, and willing to talk to me about what potential opportunities they had in their lab. The first step though is looking more into what you want to study. (Kasey)

First off, this sounds awesome. Also studied at ULL. When you do deep-ocean exploration missions, how often do you discover new species? What is the procedure when you do?

[croatianscentsation](#)

Great question! However, it is a bit hard to answer quantitatively (Hey! I'm a scientist, what did you expect!?). Finding new species is a possibility on every ROV dive we conduct, not just every mission. But sometimes it is more likely than other times. Partly it depends on whether we are exploring an entirely new area (meaning unexplored previously) - as we are on the current mission. I will be very surprised if we don't find new species during the dives in the next few weeks. If we are exploring new sites within fairly well characterized regions (e.g., exploration around the Hawaiian Islands where there has been a longer history of work), then the probability of finding new species on every mission goes down some.

The process of discovering and naming new species is involved. It starts with "Do I recognize the animal I am looking at?" This works best when you are an expert in the group. It works even better on a telepresence mission when you have a whole group of experts in the field participating. If no one in the group recognizes it, we request a collection. Once it is recovered to the ship, the specimen is deposited at the National Museum of Natural History (part of the Smithsonian Institution) and from there the appropriate expert can examine its morphological and genetic characteristics, compare these

to known species, and write a formal description of a new species as appropriate. This manuscript is then reviewed by other scientists familiar with the group. If it is deemed acceptable, the paper is published and, voila, a new species name is created. If it wasn't clear from my answer, this whole process can take a very long time, months to years. [Scott F.]

Do you find shipwrecks or downed aircraft often.

[Phelxlex](#)

I wouldn't say often, but marine archaeology can be a regular part of our operations. For example, last year during the Deepwater Exploration of the Marianas expedition, we found a B29 aircraft that had been lost during World War II. While we have found a number of shipwrecks, this was our first aircraft: <http://oceanexplorer.noaa.gov/oceanos/explorations/ex1605/logs/jul9/welcome.html> (Kasey)

Examples of shipwrecks we've found and explored include the Amakasu Maru No.1, a Japanese cargo ship which was sunk by the American submarine USS Triton on December, 24 1942, off Wake Atoll (<http://oceanexplorer.noaa.gov/oceanos/explorations/ex1606/logs/aug14/welcome.html>) and an estimated 1800s cargo vessel in the Gulf of Mexico (<http://oceanexplorer.noaa.gov/oceanos/explorations/ex1402/logs/apr20/apr20.html>).

In light of the recent findings regarding the coral bleaching off the coast of QLD in Australia, is there a possibility that the same conditions could cause damage in the deep sea? And leading on from this, do you expect climate change/global warming to have much of an effect on the areas that you will be visiting?

[geneticsrus](#)

We know so little about the deep sea that is is hard to say how these corals will respond to stresses like climate change. There is virtually no time series data in these areas, so we are trying to collect baseline information that can be used in future studies to see how things have changed. Deep-sea coral does not have the same symbiotic partners that shallow water corals do, so deep corals do not bleach like their shallow water cousins. We are still trying to find good ways to monitor the health of deep-sea ecosystems.

Love your live streams!! Since there is a lot of coverage on the dying reefs, do you expect the deep sea reefs to be similarly impacted as well?

[dkdang](#)

We know so little about the deep sea that is is hard to say how these corals will respond to stresses like climate change. There is virtually no time series data in these areas, so we are trying to collect baseline information that can be used in future studies to see how things have changed.

Do you think there's a deeper place than the mariana trench?

[cheeky_m8](#)

Most likely not. While the deep ocean is not very well mapped, we can infer relative ocean depth from satellite altimeter data (for which seafloor coverage is 100 percent). Changes in seafloor bathymetry actually change the shape of the sea surface due to small variations in gravity caused by seamounts and trenches. So, we have a very rough idea of the shape of the ocean floor, but there is a margin of error, so it is possible that direct sonar measurements will surprise us. To get an idea of the margin error in the satellite data, check out this image of a seamount that was mapped by the Okeanos in February and Okeanos multibeam data revealed an approximate 1,700 meter seamount height difference when compared to previous satellite altimetry:

<http://oceanexplorer.noaa.gov/oceanos/explorations/ex1705/background/plan/welcome.html#seamount>

Can you tell us about what, if any, software you use to track, interpret or visualize the data you collect?

Are there any homegrown or open source applications that you use, how about commercial solutions?

Do you use such analyses of data in the field to make day to day decisions about where to explore or is your route fixed?

[retardrabbt](#)

Great question. There is a lot of different software onboard that we use to process the many data types that we collect on NOAA Ship Okeanos Explorer. We use both commercial and open-source software for our multibeam mapping and video data. Both ship and shore-based experts have access to these programs. For the annotations, our scientists can insert their identifications and descriptions as we see them on the live stream! A play-back program allows us to search for certain annotations (for example, a specific species of animal or geological feature) and then pull up the video. And yes, data collected in the midst of an expedition is regularly used to plan activities for the next day. (Amanda)

What's your favourite thing that you have ever seen in the deep sea??

[NicoRosberg1](#)

Mountains - over miles tall off the seafloor, emerging out of the deep - revealed by our sonars. (Mike)

Just how deep down are you guys going to go? Also, How many new species do you expect to discover? Deep ocean exploring has always interested me, and I wish you guys the best of luck and hope that you make many fascinating discoveries.

[DanQuaylePotatote](#)

Thanks for your questions! Our two-bodied remotely operated vehicle (Deep Discoverer and Seirios) is capable of diving up to 6,000 meters deep (or 3.7 miles)! The deepest dive we have planned for this expedition will be approximately 4,500 meters, at a fracture zone within the Jarvis Island Unit of the Pacific Remote Island Marine National Monument. We are truly exploring, so we are not how many potentially undescribed species we'll come across! [Kasey]

Hi all, I was glued to my screen during the Okeanos dives around this time last year and am looking forward to the next dives!

Over past expeditions, have you found any evidence to suspect that human's have significantly impacted any of these previously unexplored deep sea ecosystems? I vaguely remember you all mentioning that fishing nets dragging on the sea floor have impacted certain areas, are there any other human activities that have had an impact that we might not have known about before?

[mrbak3r](#)

You may think that working in the deep sea means that we only see pristine environments, but unfortunately that isn't true. During our 5,000-meter dive in Sirena Canyon, along the Mariana Trench wall, we saw multiple pieces of marine debris. A soda can, a food tin, and a piece of rope all accompanied the fish, corals, and rocks that we imaged as we moved up the slope. We encountered even more trash (nine pieces!) on our dive the following day at Enigma Seamount, including several plastic bags and a piece of clothing. Even here, in one of the deepest places on Earth, humans have left their mark. Check out this video from last year:

<http://oceanexplorer.noaa.gov/okeanos/explorations/ex1605/logs/apr22/welcome.html>

Hello! So there is a ton of fiction about what kind of monsters and such live in the ocean, so I'm curious 1) What's the craziest thing you HAVE seen, and 2) What realistically could live in the ocean depths that we just have no idea about?

[kcroyalblue](#)

The ocean remains so underexplored, we really see new and exciting things just about every time we go down and take a look. I study the animals that live in the water column (the space between the surface and seafloor), and that area is even less explored than the seafloor. One of the craziest things

about the water column is that most of the animals are gelatinous, meaning they are see-through and made of mostly water. There are gelatinous jellyfish, of course, but there are also gelatinous worms, gelatinous fish, and some animals you may never heard of, like larvaceans, which look like little tadpoles that build huge webs around themselves to filter water for food. See:

<http://oceanexplorer.noaa.gov/oceanos/explorations/ex1702/logs/feb27/welcome.html>

One of my favorite crazy gelatinous animals is called a siphonophore- siphonophores are large colonial jellyfish - they are made of many individuals that each have different jobs- swimming, eating, reproduction, buoyancy. Siphonophores can form chains that are dozens of feet long, and are absolutely beautiful. Check out this one from our last expedition:

http://oceanexplorer.noaa.gov/oceanos/explorations/ex1703/dailyupdates/media/video/dive06_siphonophore/siphonophore.html

Realistically, I think we some things that could live in the deep water column that we have no good way of observing are undiscovered species of large fish. A large fish could swim away from the nets we use to catch animals at those depths, and also may avoid the lights and sounds of the ROV we use to image animals, so it could be really hard to ever find some of these. (Amanda Netburn)

Firstly thanks for doing the AMA. I think the deep-sea is incredibly fascinating.

I'm guessing you'll have been asked this before, but do you believe you'll ever find a living creature that is what someone might class as prehistoric or jurassic in nature? I.e. a deep-sea Loch Ness monster, or kraken-like creature (and no, squids and octopuses don't count for the latter).

[Afrikiwi](#)

While this may not be exactly what you are thinking of, a couple of years ago in the Gulf of Mexico, we found burrows of what is known as a Paleodictyon. They are a huge mystery. Their burrows can be found in the fossil record going back nearly 600 millions years, but no one has ever figured out what creature makes these burrows and they are certainly prehistoric. Here is a picture of what we saw:

http://oceanexplorer.noaa.gov/oceanos/explorations/ex1402/logs/highlight_imgs/media/paleo.html.

I know communities of organisms can sprout up around ocean vents but, are there any other non-light areas in the deep ocean that sustain vast amounts of life?

[age_of_rationalism](#)

Yes, there are a few other areas that support life without the input of light. One example of this is around a whale fall. When small animals die, they are typically decomposed by bacteria before they sink to the seafloor, but when a whale or other large animal dies, most of its body will eventually sink to the bottom. This is a huge input of energy compared to the background environment, and can support a chemosynthetic ecosystem. One of the common animals at whale falls is called Osedax, or bone worms. (Amanda)

Is there danger of the light used by cameras to see down there damaging life unused to light, visible or otherwise?

[the_dinks](#)

There is likely a short-term blindness effect which is called retinal bleaching. If the lights aren't too intense and too long, then animals will recover their normal vision within a few minutes or so. However, if the lights are too intense and are too long, then there could be permanent damage. This is one reason we avoid taking close-up shots of an animal's head for too long.

Hello! I would like to know what has been the most surprising thing that you have ever come across down there in the deeps?

[Lg02ithM](#)

Every day of our expeditions we find new surprising things: potential new species, new geologic phenomenon, weird interactions - the list goes on and on! One of the best parts about ocean exploration is that we never know what we will see. This means that every day is a bit of a surprise!

Here are a few of my favorites:

Massive deep sea coral communities:

<http://oceanexplorer.noaa.gov/oceanos/explorations/ex1504/logs/leg3-dive6/leg3-dive6.html>

B29 bomber discovery:

<http://oceanexplorer.noaa.gov/oceanos/explorations/ex1605/dailyupdates/media/video/0709-b29/0709-b29.html>

Hydrothermal vent discovery:

<http://oceanexplorer.noaa.gov/oceanos/explorations/ex1605/dailyupdates/media/video/0501-hydrothermal-vents/0501-hydrothermal-vents.html>

An unusually deep octopus:

http://oceanexplorer.noaa.gov/oceanos/explorations/ex1603/dailyupdates/media/video/dive_1/ex1603_dive1_022716.html

And without fail, we always have at least a few "What is that??" moments every day :

<http://oceanexplorer.noaa.gov/oceanos/explorations/ex1605/dailyupdates/media/video/0622-whatisthat/0622-whatisthat.html>

I LOVE MY JOB! (Kasey)

Do you use sonar? And if so, how do you protect the marine life from the disorienting effects of the technology? Do you think we should continue using sonar?

[borinbilly](#)

It is important to realize there are many different types of sonar, and thus the sound field created by any given sonar is different from another. The sonars we use are not military sonars, and they are not seismic sonars used for oil and gas exploration that have louder sound intensities and can travel much longer distances. The sonars we use are scientific sonars that have a narrow localized sound field and are generally higher frequencies than what whales use to communicate. For more info on the Okeanos Explorer's sonars, see:

<http://oceanexplorer.noaa.gov/oceanos/explorations/ex1703/logs/mar11/welcome.html>

In the several years of operating NOAA Ship Okeanos Explorer and its remotely operated vehicles and sonar systems, there has been no indication of harm to marine animals. Knowledgeable experts who are aware of the sensitivities of the marine environment conduct the at-sea portions of our operations. We fully expect that our operations will only result in short-term changes to the ocean environment in a very limited area, largely because our missions are projects of limited size and magnitude for which any cumulative effects will be negligible. That said, if and when marine mammals are visually observed or identified in our area of operations, we take actions to mitigate or remove any potential for harm to those animals; we operate in full compliance with environmental laws and endangered species protections. Additionally, we use a soft startup when we begin mapping operations.

I am so excited for this to be happening again! I watched almost every day when you all did this last summer and absolutely loved it.

I know the "camera 3" channel replays the previous day's stream, but is there anywhere I can find all of the previous streams unedited?

Keep up all your great work!

[kirbyfood](#)

Thanks for tuning in! All data and information collected during Okeanos Explorer cruises are made publicly available within 30-90 days of cruise completion, including video footage from the remotely operated vehicle. Different datasets are made available from different archives. Video footage primarily goes to the NOAA Central Library. You can search for past Okeanos Explorer expeditions by visiting the OER Digital Atlas (https://www.ncddc.noaa.gov/website/google_maps/OE/mapsOE.htm), then doing a "search by text" for Okeanos Explorer. Alternately you can fill out a data request form:

<https://docs.google.com/a/noaa.gov/forms/d/1pU3jbcV5ffunMKUbygnA2OK-ZT9qj2Dh6JgZ79TTORM/viewform?formkey=dHAYcC1MYndJb0hTdGRaYXAzVTVBdWc6MA&fromEmail=true>

What do you think about when you see such large amounts of money go towards space exploration, when we know almost nothing about our oceans?

[ltpump](#)

Learning about other planets is fundamental to understanding how Earth works and in what ways our planet may be unique. In general, there's been a fair amount of synergy between space and ocean exploration efforts. Ideally, we'd like to continue strong programs in both (Del).

Could you detail the role of a mapping expert in this situation? Forcing a mapping expert to spend days in one spot with a ROV sounds like torture more than research. Or do you cover much more area than I'm picturing, or is this a years long expedition?

[TweakedNipple](#)

Excellent question, so many answers. Our current "Mountains in the Deep Expedition" (<http://oceanexplorer.noaa.gov/oceanos/explorations/ex1705/welcome.html>) is part of a larger three-year project known as the Campaign to Address the Pacific monument Science, Technology, and Ocean NEeds (CAPSTONE; <http://oceanexplorer.noaa.gov/oceanos/explorations/capstone/welcome.html>) addressing science and technology needs in the Pacific. Some of our cruises during this expedition have been dedicated to mapping. So you are correct -- this is a years-long effort.

Concerning our daily operations, our model for ocean exploration is "Always Exploring." On the ground (really on the seas) this means that when the ROVs are not in the water, we are mapping 24 hours/per day. Our overnight mapping plans include areas in the vicinity that have no mapping data at all. We may even map potential ROV dives sites overnight before choosing the exact dive location in the morning. This, of course, means the Mapping Team staffs the Okeanos Explorer's control room at all hours, doing mapping 24 hours a day on transits to our next dive site.

One of our newer areas of interest is mapping the water column itself, which is everything between the sea surface and the seafloor. The Okeanos Explorer is equipped with a suite of single beam sonars, sometimes also referred to as split-beam, that we use to map the intensity of sound returns in the water column. This allows us to detect things like concentrations of biomass, gas seeps, and even individual organisms in the water column. Based on suggestions from our partners, we are now keeping the single-beam sonars on during during ROV dives - so even when diving, we are mapping the water column. We even can observe the ROVs transiting through the water column!

And finally, when the ROVs are diving, they typically dive on data generated by the mapping team. Personally, as the Mapping Lead, I am always excited and proud at an interesting find, because it was our mapping data that helped guide us to such an interesting discovery. (Mike)

I did an internship at an ocean acoustics lab, around a year ago. I was really interested in acoustical modelling of underwater species, like whales. I had heard that such methods have gone obsolete, is it true?? If not, what are frontiers in this branch of ocean acoustics?

[animengus](#)

Bioacoustics, using sound to study animals, remains a very active field of research, and whales remain one of the most common animals to study using passive acoustics (i.e., studying them by listening to the sounds they make). I can think of two major frontiers in this line of research. First, with the ever-increasing computing power, people are developing algorithms to sort through months or years of acoustic data to make automated detections of the animals and identify their behaviors. Second, researchers are learning that many animals in the ocean besides for marine mammals produce sound, and there is an emerging field to use passive acoustics to study shrimp, fish, and other animals that were only recently discovered to make noise.

Hello! What are some challenges you face right now in terms of deep sea exploration and what innovations are you looking forward to for the future?

[Kowalski12](#)

One of the biggest technology challenges that we have in ocean exploration is most electromagnetic waves don't propagate very far in water. So we can't use, radar, WiFi, or lasers very well. Instead, we have to rely on cables and sound to carry information and, as you might imagine, running miles of cable is expensive and sound carries a lot less information a lot more slowly than light or radio waves. When NASA wants to map the surface of another planet, they can launch a satellite that can map the entire planet from orbit while moving thousands of miles an hour. In ocean exploration, we have to use sonar instead, which means we need a ship that moves at 10 knots to carry a really big set of sonar transducers. We calculated that it would take the Okeanos Explorer over a thousand years to map Earth's seafloor with her current equipment (<http://oceanexplorer.noaa.gov/okeanos/explorations/ex1503/logs/jun2/jun2.html>). These same limitation makes it very hard to communicate with autonomous underwater vehicles, which is a real problem. So, improved ways to move data through the water would greatly accelerated ocean exploration.

I have terrible thalassaphobia, can a person like me work in that field? I've always had dreams of working in that area regardless of my fear.

[AddiCrack](#)

We have such a diverse team of scientists, expedition coordinators, engineers, educators, communications specialists, and administrative professionals that make what we do possible -- and not all of us have to go to sea -- so it's doable! What you really need is passion for what you do; dedication to pursue this career path -- it isn't always easy and there will be some hard classes ahead; and persistence to give up some of your summers and free time to get experience in the field you are interested in. Read a bit more about some advice our team had for the next generation of explorers here: <http://oceanexplorer.noaa.gov/okeanos/explorations/ex1404/logs/sept21/sept21.html>. Or check out some of the different careers in the field: <http://oceanexplorer.noaa.gov/edu/oceanage/welcome.html>