

Fabien Cousteau Leads "Aquanauts" in Record-Breaking Undersea Expedition

Timed for 50 years after a historic Jacques Cousteau effort, Mission 31 advances ocean science and exploration.

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A diver and a school of fish can be seen outside the Aquarius underwater research habitat in the Florida Keys, where Fabien Cousteau is leading a historic expedition.

Fabien Cousteau is leading a team of scientists, educators, and filmmakers this month on the longest-ever expedition in a stationary habitat beneath the sea. The project, called [Mission 31](#), aims to build awareness about the need to protect the ocean and honors a historic expedition 50 years ago by Cousteau's famous grandfather, explorer [Jacques Cousteau](#).

Launched on June 1, Mission 31 is a 31-day, privately funded expedition at Florida International University's Medina [Aquarius](#) Reef Base.

The habitat lies 63 feet (19 meters) below the surface in the [Florida Keys National Marine Sanctuary](#). Windows look out on swimming fish and deep coral reefs. (See "[Stunning Underwater Photos for World Ocean Day](#).")

The team is studying climate change, ocean acidification, plastics pollution, decline of biodiversity, and predator-prey relationships. Cousteau and his colleagues are also making a documentary film and have participated in more than 50 educational Skype sessions with schools, aquariums, and museums in the United States, Canada, Australia, Kenya, and the Czech Republic.

Guests who have dived to [Aquarius](#) for short visits with the Mission 31 team include National Geographic Explorer-in-Residence [Sylvia Earle](#), Greg Stone of Conservation International, marine artist [Wyland](#), actors Adrian Grenier and Ian Somerhalder, and retired NASA astronaut Clay Anderson.

"Jacques Cousteau was my hero, and I believe Fabien is following closely in his flippers," Wyland said in a statement. "Fabien is sharing the beauty of our undersea world with everyone and inviting artists, scientists, and all of us on this epic mission that will help us all have a better connection with our water world."

On June 11, Jacques Cousteau's birthday, Florida Governor Rick Scott called to wish the team well. The members also celebrated by wearing red caps, as Cousteau often did, and eating French pastries and "red cap" cookies.

Aquarius is the world's only underwater marine laboratory. It measures 43 by 20 by 16.5 feet (13 by 6 by 5 meters) and weighs approximately 81 tons. It has six bunk beds, hot water, a mini-kitchen, climate control, computers, and wireless Internet.

Fifty years ago, Jacques Cousteau led a 30-day expedition underwater aboard a habitat called [Conshelf II](#) in the Red Sea off Sudan. He and his team proved that "saturation diving," which means living and working at a pressure higher than on the surface, was possible for long periods. Mission 31 is 30 feet (9 meters) deeper than Conshelf II.

National Geographic spoke with Fabien Cousteau, as well as scientists Liz Magee and Grace Young, inside Aquarius via Skype. Magee is a research diver with Northeastern University; Young graduated in May from MIT with a degree in mechanical and ocean engineering, with a specialty in marine robotics.



Fabien Cousteau, the leader of Mission 31 in Aquarius, is shown here in the Bahamas.

What was the impact of Jacques Cousteau's Conshelf II expedition 50 years ago, and how did it inspire your current mission?

Cousteau: My grandfather was a pioneer in building underwater habitat. He and his team spent 30 days gathering scientific data, on both the ecosystems around their habitat and the physiological effects of working underwater. We are going one day longer than that expedition in a symbolic nod to honor them and to point the way toward future ocean exploration.

I grew up with a grandfather who was a visionary, a philosopher, and a wonderful storyteller. He was also very connected with young people. Being the oldest grandchild I got to live 30 years of my life with him. I've been on expeditions since a young age and have been immersed in that world.

Conshelf II has always been one of those legendary stories I kept in the back of my mind. When Sylvia Earle did her [Mission Aquarius](#) [in July 2012] to highlight the importance of ocean habitats, I realized I wanted to live the dream of becoming an aquanaut. And I realized what an amazing platform it is for education.

You are underwater in the Florida Keys National Marine Sanctuary, and President Obama just announced plans for a [huge new marine sanctuary](#) around remote islands in the Pacific. How important are these protected areas?

Cousteau: Being a third-generation explorer, it brings me a lot of hope to see that the U.S. is leading by example. The Obama administration is protecting swaths of ocean that really need protecting. I look forward to seeing it come about and being enforced.

We desperately need protected areas around the world so we can rebuild the natural bank account that we all need.

Magee: If more people were exposed to the wonders of the sea, then everyone would be all for protecting it. That's why part of our mission is exposing people who don't normally think about the ocean to how vital it is to our livelihoods and our lives.

Young: I find it incredibly frightening that we have the technology to completely destroy the ocean in my lifetime, but marine protected areas are hope spots, as Sylvia Earle calls them.

Now that the mission is more than half over, what has it been like to live and work underwater for days at a time?

Cousteau: Today [June 19] is day 19 of the mission, which makes it officially the longest mission that has happened in the Aquarius habitat. We have another 13 days to go.

It's now been a few days since Liz and Grace joined us. They switched out with Andy [Shantz] and Adam [Zenone], two students from Florida International University. They've become surface dwellers again. We also have a team of 36 people at the surface, both scientists and support staff.

What have you learned about the physiological and psychological effects of living long-term underwater, at high pressure and without the sun?

Cousteau: We wear bands that monitor light and our activity, and we are doing a survey of how we sleep. We're working long days down here. At first we got up at 4:30 every morning and went to bed at 11. Now things have slowed down a little bit, and we're getting up at 6 but still going to bed around 11. We're studying the effects of being down here.

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ate ocean explorer Jacques Cousteau, Fabien Cousteau's grandfather, pioneered the use of submersibles and underwater habitats.

How did the decompression go for the first team—Adam and Andy—that left after the first part of the mission?

Cousteau: The decompression process takes about 18 and a half hours; it's lengthy. But living at saturation allows us to go diving as long as we want.

Magee: When we were getting ready to go down, we saw Adam and Andy come up. They said they were sad that it was over, but they were really excited to see the sun.

How does the saturation diving work?

Magee: After 24 hours of being down here, we are considered fully saturated, or fully nitrogen loaded. So we have more nitrogen dissolved in our blood [because of the pressure from the surrounding water].

That means we can stay out in the water diving for up to nine hours. It's such a unique opportunity, and one of the things I was most excited about, to be able to dive for so long.

Cousteau: When astronaut Clay Anderson came down here, he could only stay for 45 minutes. In that case it is just like a normal 60-foot (18-meter) dive. If he had stayed longer, he would have had to go through decompression.

Do you think we are any closer to realizing Jacques Cousteau's vision of underwater colonies?

Cousteau: Technologically speaking, we're absolutely capable of doing it at this point; it's a matter of funding and willpower. On the flip side of that coin, there is a lot of technology now that my grandfather had only dreamed of: for example, the ability to talk to you on the surface [through WiFi]. Underwater habitats are a fantastic tool for science and education, and they provide a unique perspective.

Young: I could see myself having an underwater vacation house, but I'd miss my friends and family too much to live underwater permanently.



Jacques Cousteau led a group of "aquanauts" in an underwater habitat in the Red Sea in 1963, proving that such expeditions were possible.

You have pointed out that we have explored only about 5 percent of the ocean. Why is it important to keep exploring?

Cousteau: I think it's paramount to learn more about the ocean, not just for science, which is incredibly important, but also for ourselves. We need to learn more about the interconnectivity of the ocean. This is our life support system. Otherwise, we are just a little brown rock in space like all the others. There's no such thing as healthy people without a healthy ocean.

We're polluting what's left in ways that are starting to affect us. It's leading to increased rates of cancer and all sorts of other diseases. We're basically using the ocean as a garbage can.

Young: I'm concerned we might destroy ecosystems in the deep sea before we even know they existed. Now we have the technology to mine the seafloor, overfish, and destroy coral reefs by changing acidity.

Your team has been studying ocean acidification. How have you been doing that, and what have you learned?

Magee: There are beautiful giant sponges right outside the habitat. Some could be thousands of years old. Some call them redwoods of the reef. And we're setting up sensors inside them to measure such variables as oxygen and temperature, so we'll be able to understand what happens with rising acidity of the water and its impacts on the sponges. It will also help us better understand the activity of these sponges.

What else are you studying?

Magee: We are using sonar to study predators and prey. The sonar mounts to the top of your helmet so you can visualize it. And Grace brought a high-speed camera.

Young: The camera came out just five weeks ago, and we got one of the first models. We had a housing built for it, and we are using it for the first time underwater. Last night we looked at Christmas tree worms. We hope to better understand how the creature moves.

Magee: A grouper fish releases a pulse of sound to stun prey fish. We hope to capture that with the high-speed camera. It's so fast that you wouldn't hear it if you were diving right next to it. The only way we can hope to capture it is by spending hours in the water, and the only way we can do that is by saturation diving. The only way to do that is by a habitat, so Aquarius gives us the gift of time.



Mission 31 scientists are studying how groupers, like this one off Florida, stun their prey with sonic pulses.

When retired astronaut Clay Anderson visited you at Aquarius earlier today, did he find the habitat similar to being in space?

Cousteau: NASA uses Aquarius as a training ground for space because the parameters are very similar to living in space. In 2003 Clay Anderson came down here to train. It's also thrilling to have an astronaut here to explain why it is so important for exploration in general.

Young: In my background in robotics, I think of the ocean and space as similar environments.

What do you do for fun underwater?

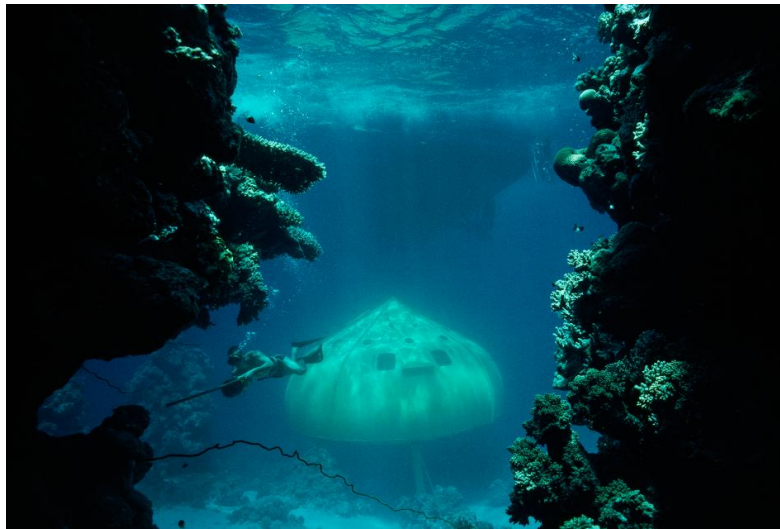
Magee: Yesterday was really fun for me. I made a dive over five hours, my longest ever. It's really fun just being in the water.

Young: We can watch movies, but we haven't much—we have too much fun looking out the window.

Cousteau: We have playing cards, but they haven't been opened. Most of the time we're just looking out the window. It's so fascinating. It's a unique experience.

Magee: The fish are just as intrigued with us as we are with them. Last night we had a grouper that was staring in at our window. She was checking us out.

Cousteau: It's also neat how many people are watching us online. We have a constant video stream. My mom saw me blow my nose, and she emailed to ask if I had a cold.



Jacques Cousteau's underwater habitat in the Red Sea in 1964. This inspired Mission 31 a half century later.

What have been the coolest things you've seen on the mission?

Cousteau: One evening [while diving] I was waiting for the cameraman, and I looked over at a post [outside the habitat]. All of a sudden, it started smoking. I thought it might be an electrical fire or something. But when I got closer, I realized there were about 30 Christmas tree worms on the post, and they had started spawning all at once, so it looked like smoke. I also saw a giant tarpon swimming around close enough to touch. A few days ago we saw a grouper strike a barracuda. I've never heard of that behavior before.

Young: What amazes me is I'll look at a patch that looks like empty sand, but the more you look the more you discover. I saw a piece of sea grass and then saw it walking. I thought I was hallucinating, and then I saw it was a tiny crab.

Any final thoughts?

Cousteau: For Mission 31 we have the goal of reaching 331 million people around the world, and hopefully we'll double that. We'll have a feature documentary, and we have many blog posts and information on our website. We've done many sessions with classrooms around the world.

We hope to continue the synergy that we're starting to see around ocean protection. It's critical so our children will be able to enjoy the ocean. When I first had the idea for the mission, I didn't know if we would pull it off, but my grandfather used to say only the crazy ideas succeed.

Young: It's been a splash.

Adapted from <http://news.nationalgeographic.com/news/2014/06/140624-fabien-cousteau-aquanauts-aquarius-mission-31-ocean/>