
ARIS Aboard Aquarius

Fabien Cousteau's Mission 31 Requests ARIS for Cutting Edge Ocean Research



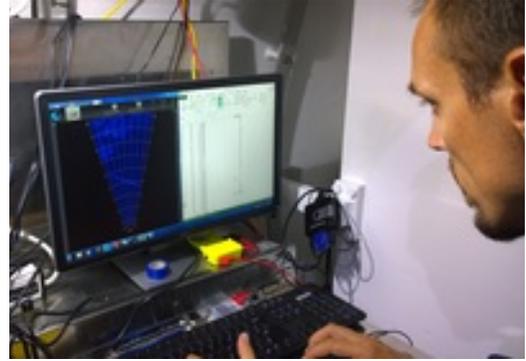
This summer, Sound Metrics received the exciting invitation to join Fabien Cousteau's Mission 31 by providing ARIS and DIDSON sonars for a pioneering ocean research expedition aboard Aquarius, the underwater research lab operated by Florida International University.

Mission 31 was a groundbreaking underwater study led by Fabien Cousteau, grandson of Jacques Yves Cousteau, the famous French explorer who created the first marine living environments for humans and led the first successful extended study on the ocean floor. Mission 31 celebrated the 50th anniversary of Jacques Yves Cousteau's study while taking underwater research to the next level. For 31 days, Fabien and his team of students successfully undertook the longest underwater study ever recorded at 60 feet below the surface, one day longer and at twice the depth of Jacques Yves Cousteau's original mission, all the while broadcasting the mission's daily activities 24/7 over multiple new media platforms to make their studies readily accessible to the public.

The mission began on June 1, 2014, as Fabien Cousteau and his team



Pictured above: An outside view of Aquarius, and the ARIS Explorer 3000 employed on the ocean floor



submerged for their month-long period of ocean research aboard Aquarius, the world's only currently existing underwater laboratory. Located near the coral reefs in the Florida Keys National Marine Sanctuary and operated by Florida International University, Aquarius allows for unparalleled up-close marine observation.

Earlier in May, Dr. Kevin Boswell, Science Advisor at Florida International University (FIU), contacted Sound Metrics Corp on behalf of the Mission 31 team with the invitation to join the mission by providing sonars to aid their research. Sound Metrics provided both a DIDSON DH (Diver-held Sonar) as well as an ARIS Explorer 3000 to be employed on site to collect data on

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- Dr. Kevin Boswell

habitat dynamics, specifically that of preyed-upon fish species whose survival is critical to the health of coral reefs.

Adam Zenone, a graduate student at FIU performing his thesis on marine acoustics and an aquanaut who worked closely with ARIS during the mission, provides an excellent description of the research ARIS was used for below:

“Overfishing is frequently regarded as one of the greatest threats to the health of coral reefs. Healthy stocks of algae-eating fishes crop algae on reefs and recycle nutrients to keep reefs in coral dominated states. While it is becoming increasingly

**Pictured above:
Student aquanauts,
Adam Zenone and
colleague, using the
DIDSON Diver Held
during Mission 31**

well known that overfishing of herbivorous fishes can instigate shifts from coral to algae dominated reefs, we currently still do not understand the role large predatory fishes play in maintaining healthy coral reefs.

Worldwide, large predators such as grouper are often heavily targeted by fisherman for both food and sport. In many environments, the loss of such large predators can trigger drastic changes in the environment. Predators not only impact the environment through the consumption of prey species, but can have indirect effects that far exceed the body count of the prey consumed. For example, the reintroduction of wolves into Yellowstone National Park has initiated an environmental recovery that goes far beyond the wolves and elk that they eat. Rather than direct mortality, the fear of being eaten has driven elk to change the areas where they forage, allowing for the recovery of the parks previously declining aspen trees. From grazing herds and lions in the savannahs of Africa to snails and crabs along the shores of the Northern Atlantic, these “landscapes of fear” that predators can create have been shown to regulate the feeding grounds of a myriad of animals across the planet. However, the effects of large predators on coral reefs are as of yet unknown.

To investigate how predators shape the behavior of reef fishes, the first portion of our research utilized model predators and cutting edge hydro-acoustic technology including the Kongsberg M3, and Sound Metrics ARIS. Deployed from Florida International University’s Medina Aquarius underwater research habitat, we placed highly desirable food sources across the reef in the presence and absence of model Black Grouper, an important but depleted game fish. To monitor changes in the behavior and feeding patterns of resident herbivores, the ARIS imaging sonar continuously record fish behavior in the area. With the imaging sonars, data could be collected under all conditions, and also allow for an unprecedented window into the behavior of fish at night. This data, coupled with detailed observations about food consumption, will allow us to understand how herbivorous fishes balance foraging decisions with the risk of predation and better understand the role of predators on reefs.”

Boswell, who is also an experienced DIDSON and ARIS user currently working with FIU’s underwater acoustic program, remarked on the significance of having Sound Metrics acoustic technology alongside the team’s optic cameras. In addition to collecting continuous data through varying conditions, employing acoustic sonar cameras provided better depth perception. “While you may be able to see things visually underwater, you can’t necessarily quantify them. You can tell that there’s a fish in front of you, for example, but how many fish are behind that fish? The acoustic sonars were able to measure this.” he explained.

“We were very fortunate to have the ARIS and the DIDSON on this mission in order to do things with acoustic technology that most of our peers probably don’t.” Boswell added. “The latest variation of the ARIS, especially the resolution, and phenomenal distance when compared with the older DIDSON, is amazing.”

While performing their research, the Mission 31 team enabled ocean enthusiasts of all ages to enjoy and learn about Sound Metrics sonars and their work aboard Aquarius. For example, Aquarius residents regularly scheduled interactive sessions with school classrooms via Skype, during which they could show students their underwater surroundings and the equipment they were using. Boswell described the exciting 'aha moment' seen on young students faces as they made the mental connection between what they understood about sound waves and the application of ARIS technology.

Overall, everyone involved in Mission 31 agreed that the expedition was a huge success in both ocean habitat research as well as exposing the public to the human-ocean connection within the lens of marine exploration. We were honored to provide acoustic sonar imaging to Aquarius with DIDSON and ARIS, and look forward to bringing similar assistance to other ocean explorers looking for the best technology available to keep marine habitats healthy and sustainable.