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**Aquarius Aquanauts Continue High-tech Missions to Inner Space**

Key Largo, Florida - A team of scientists started a ten-day underwater mission today beneath the surface of the Atlantic Ocean in the Florida Keys and will not return for 10 days. They will be living in and working from the submerged underwater laboratory Aquarius, using it as a base camp from which they will conduct coral reef studies.

Owned by the National Oceanic and Atmospheric Administration (NOAA) and operated by the University of North Carolina at Wilmington (UNCW), Aquarius is a national asset and is the only undersea research platform of its kind in the world.

This will be the second trip to Aquarius in two years for Dr. Mark Patterson and his crew. Their continuing goal is to examine factors affecting coral bleaching, a problem that affects coral reefs worldwide. They'll add a new wrinkle this time down by exploring how bacteria might contribute to bleaching as well.

About as big as a school bus, and painted yellow, Aquarius is the world's only ocean research underwater laboratory. It rests 63 feet underwater and 3.5 miles offshore on Conch Reef in the Florida Keys National Marine Sanctuary. Aquarius "aquanauts" live and work on the seafloor for extended periods using a special diving technique called saturation diving.

Coral bleaching, which occurs when corals expel algae that normally inhabit and color their tissues, has been widely linked to global warming. Even a degree or two increase in summer water temperature can stress corals and cause them to bleach. Because the algae produce food for the coral, their expulsion reduces a coral's ability to grow and reproduce, and may eventually cause the coral to die. Bleaching has devastated coral reefs in Florida and other parts of the world.

But a general rise in water temperature does not completely explain observed bleaching patterns. Interestingly, the bleaching response does not affect all corals equally. A coral may bleach, but just a few feet away another can remain unaffected. This suggests that other factors such as currents (water motion), oxygen levels (surprisingly variable on the reef), and now possibly bacteria, may also play a role.

The primary goal of the Aquarius mission is to test how bleaching patterns on a reef might be related to the affects of localized currents. The idea is that a reef's irregular surface - marked by countless mounds, cracks, bumps and protrusions - can generate complex current patterns that might bathe and renew waters seen by one coral, while

another might become stressed in an area of limited flow, where the water becomes overly warm or oxygen-poor, causing it to bleach.

Diving from Aquarius gives Patterson and his crew the time needed to thoroughly investigate how the condition of individual corals relates to local water conditions. Unlike surface divers, Aquarius aquanauts can stay underwater indefinitely and have nearly unlimited bottom time during their dives. At the end of a mission, aquanauts undergo a 17-hour decompression.

Suspensions concerning the possible role of bacteria in bleaching are based on a 1997 study that demonstrated coral bleaching in a Mediterranean coral species that was caused by a bacterial infection. The study also suggested that a rise in seawater temperature can aggravate the bacterial infection by lowering coral resistance and/or increasing the bacteria's virulence. Patterson's team will sample bacteria from bleached corals for further laboratory study at VIMS.

Results from the Aquarius mission will be combined with data collected by a robotic submarine that will allow the team to compare local bleaching patterns to what's happening on the larger reef. The sub, nicknamed "Fetch," can dive far longer and deeper than even Aquarius aquanauts. Fetch "flights" can last hours and cover tens of kilometers. Unlike more conventional remotely operated vehicles (ROVs), which require cables or tethers to operate, Fetch is an autonomous underwater vehicle, or AUV, that flies freely through the water using on-board computer programs that tell it where to go and when to sample.

Fetch visited the Aquarius site on two occasions earlier this year, swimming more than 100 nautical miles over the reef where it discovered interesting patterns in the distribution of oxygen. Combining the Fetch oxygen measurements with the detailed data collected by the aquanauts will provide the first comprehensive look at how oxygen varies across a reef.

Graduate students Kristin Delano, Jo Gascoigne, and Janet Nestlerode will join Patterson on the July mission. VIMS graduate student Lawrence Carpenter will provide topside science support, along with William & Mary graduate Lauren Batte (now with NOAA's External Affairs Team) and Randy Cutter, a former VIMS master's student. Two UNCW staff will join the VIMS team to operate and maintain Aquarius life support systems during the mission, Craig Cooper and Roger Garcia.

Watch live web cameras, read expedition journals from the Aquanauts, view project summaries and pictures, and much more at the NURC/UNCW Aquarius website:

[www.uncw.edu/aquarius](http://www.uncw.edu/aquarius).