

Army Space Command Astronaut Trains for Life in Space — Underwater

By Donald Montoya

LTC Jeff Williams, a U.S. Army Space Command astronaut, recently completed a nine-day space flight training mission. The catch is that he and two other astronaut mission specialists from the Johnson Space Center did it 60 feet underwater and 3.5 miles off shore in the Florida Keys National Marine Sanctuary.

The mission is the third of its kind between NASA and the National Oceanic and Atmospheric Administration and is being conducted under the project name NASA Extreme Environment Mission Operations. Basically, NASA astronauts live and work underwater using Aquarius — a laboratory and habitat. Aquarius is the only undersea research platform of its kind and is owned by NOAA and operated by the National Undersea Research Center at the University of North Carolina at Wilmington.

Measuring only 12 by 43 feet, this inner space station provides a similar environment to that found on the International Space Station.

“In planning for the mission, we have come to realize that the challenges associated with going to ‘inner space’ are very similar to the challenges of going to outer space,” Williams wrote in his online journal entries from July 9 through July 22. He made the comments during a week-long training session and time aboard the Aquarius.

“As a result, our experience and lessons learned will apply directly to future space flights on the Space Shuttle and the International Space Station.”

The similarities between working underwater and working in space largely center around the stresses of living in an extreme environment in an enclosed space. The lack of minimal comforts such as the ability to go home easily and the separation/isolation from family, friends and the outside world, coupled with challenging workloads, closely mirrors a space environment.

For nine days Williams, along with John Daniel Olivas, crew mission specialist, Gregory Errol Chamitoff, mission specialist candidate, and Jonathan Dory, a space habitability engineer from SPACEHAB, Inc’s, Habitability and Environmental Factors Office, lived and worked in “saturation” in and near Aquarius among the coral reefs off the Florida coast.

Typically used by marine scientists to study coral reefs and the coastal ocean, Aquarius allows “aquonauts” to live and work on the seafloor for extended periods using a special technique called saturation diving. The process dramatically increases the time divers can spend working in the ocean depths.

“During this time we were isolated and unable to come to the surface,” said Williams who holds the title of NEEMO 3 commander.

Williams, a veteran of Space Shuttle Mission 101, recounted the similarities of the Aquarius to the Space Station and Shuttle in his journal.

“It is amazing how similar the overhead of running Aquarius is like the operation of the Space Station or the Space Shuttle. Air quality is a high priority, of course, in both places.

“The power distribution systems are also an integral part of Aquarius and important to maintain just like space, along with the various means of communications.”

One thing Williams found immediately similar to being in space was working on the ocean floor. “Working with tools, line reels and the like in the ocean was like conducting a space walk. You had to work slowly and carefully in order to go fast.”

During a journal entry on Mission Day 3 Williams wrote, “Today we are planning on getting started on a construction project that will help develop methodologies for



Left: NEEMO Team on conference call with the International Space Station. Far Left, U.S. Army Space Command Astronaut, LTC Jeff Williams.

Below: NEEMO 3 Commander U.S. Army Space Command Astronaut, LTC Jeff Williams with his line reel.



conducting, controlling and coordinating similar projects on orbit, in the future on Mars or perhaps back on the Moon.”

This included long dives taken outside Aquarius, which resembled space walks outside the International Space Station.

During the nine-day mission, several different NASA departments monitored the progress of the astronaut crew from the Johnson Space Center in Houston, Texas, in real-time. Underwater communications equipment and cameras provided interactive capability between the aquanauts and NASA staff.

The crew did a live webcast for educational and outreach organizations, an interview with CNN and even had time for a 10-minute telephone call with their counterparts aboard the International Space Station 250 miles above sea level as the station made its way over the South Atlantic Ocean, or as Williams put it “an inner space to outer space phone call.”

This type of experience aboard Aquarius will be used to help build crew and mission control communication techniques and will provide leadership and interpersonal skills training to everyone involved.

On Day 8 of the mission Williams noted, “It’s hard to believe that the diving is over. Today will be dedicated to getting our data and personal equipment organized, preparing for and initiating the decompression routine and a little relaxation ... much like deorbit prep on the Space Shuttle.”

“Even though I had high expectations of the mission before, the experience has surpassed these and I couldn’t be more pleased with the way things went, both personally and for the crew.

“As in all things, what makes the difference is the peo-

ple. The crewmembers have been great to live and work with. Everybody has done all the right things in regard to what it takes for an expedition to work in an isolated and unforgiving environment, to operate safely and effectively, while maintaining high morale, esprit and camaraderie. Best of all, we have encountered no close calls or safety problems and everybody has had fun ... my two top priorities going in.

“The topside crew, both NASA and the National Undersea Research Center, also have been a pleasure to work with. They have gone above and beyond the call in anticipating the support we needed and responding to requests and contingencies, always in a can-do and enthusiastic way. In expeditions such as this, there is often great potential for a split to form between the deployed crew and the ‘base’ crew during the course of the mission but nothing of the sort occurred to us.”

Williams, a scuba diving enthusiast, is fascinated with exploring the unknown and the challenges of human exploration and considers the challenges of living and working on Aquarius to be analogous to that of space. “We have realized that the mission in Aquarius transcends the experiences we will have. Like space flight, the NEEMO mission is one small page in the history of human exploration.”

The public can see a recap of the crew’s mission and view images by logging on to www.uncwil.edu/nurc/aquarius/.

Donald Montoya is the deputy for Public Affairs at Army Space Command. Previously, he spent 25 years at White Sands Missile Range, N.M., serving as chief of Command Information. He served as an authority on missile range historical footage providing assistance to various independent production outfits such as PBS, BBC, The History Channel and The Discovery Channel.