

FINDING “NEEMO”

By DJ Montoya

The concept of two Soldiers training on the ocean floor seems to be all wet — or does it? Not for two Army Astronauts though as COL Timothy J. (TJ) Creamer and LTC Timothy L. Kopra joined other fellow NASA team members on a week-long exercise back at the end of September at an undersea laboratory known as the National Oceanic and Atmospheric Administration’s (NOAA) Aquarius.

The event was the NASA Extreme Environment Mission Operations (NEEMO) 11 and was the third and final one conducted for this year. The crew for this last NEEMO mission consisted of four Astronauts with Sandra H. Magnus and Air Force Maj. Robert L. Behnken joining Creamer and Kopra.

During the seven-day from Sept. 16 – 22 stay on the 45-foot-long, 13-foot-diameter Aquarius complex located three miles off Key Largo in the Florida Keys National Marine Sanctuary the crew simulated moon walks, techniques for communication, navigation, geological sample retrieval, construction and the use of a remote-controlled robot. All of this was conducted 62 feet beneath the surface.

Valuable lessons were learned as the crew conducted their daily routines outside the Aquarius with a watchful eye at NASA’s Johnson Space Center’s Exploration Planning Operations Center, Houston.

“Making remote operations work well takes a lot of practice and choreography,” said Creamer.

“We just can’t start tomorrow operating on the lunar surface, or on Mars. There is so much preparation, rehearsal, protocol development, difficulties in coordination to overcome.

“This NEEMO environment exercises all of that, and is part of the very necessary baby-stepping required to get us back to the Moon, and farther.”

Kopra echoed these same thoughts by saying, “This sort of mission, just like complex military operations or Space flight which requires a tremendous amount of planning, coordination, training, rehearsal, and review.”

“These are skills we can all use during our preparation and execution of missions on board the International Space Station, but NEEMO 11 was also an opportunity to identify and hone ‘best practices’ that can be used on future lunar missions. This type of mission is the leading edge



NEEMO 11 crew members take a moment to pose for a crew photo during preparations for their stay inside the Aquarius Underwater Laboratory off the coast of Key Largo, Florida. Astronaut/aquanaut Sandra H. Magnus (second right) led the crew for the eleventh NASA Extreme Environment Mission Operations (NEEMO) project. Astronaut Timothy J. Creamer (left), Robert L. Behnken, and Timothy L. Kopra round out the crew. The crew is spent seven days, Sept. 16-22, on an undersea mission aboard the National Oceanic and Atmospheric Administration's (NOAA) Aquarius Underwater Laboratory, which is operated by the University of North Carolina at Wilmington and located off the coast of Key Largo, Florida.

development for how we'll conduct operations once we return to the moon."

The crew, split into two teams, took turns daily performing Extra Vehicular Activity as in a simulated extraterrestrial environment. Since both Creamer and Kopra have the same first names they were paired up with different partners — Creamer/Magnus and Kopra/Behnken.

Also, to avoid confusion during their voice transmissions outside the Aquarius — which at times sounded like Darth Vader — Creamer was referred to as "TJ" saying, "I am TJ Creamer — full name: Timothy John Creamer, but I only ever heard that when my Mother was upset with me."

Although one would think operating in an underwater environment would be a cake-walk as seen in all those Discovery Channel documentaries Creamer and Kopra found both ups and downs.

"The fun aspects were simply being able to observe nature so closely — we were truly on "another planet" while we were EVA-ing, and seeing all of the wildlife, the activity, the interactions, the beauty was the most fun aspect; and in my mind's eye, extending that to when we really do walk on the Moon again," said Creamer.

On the flip side Creamer pointed the more difficult

aspect of the EVAs tended to be the developmental projects dealing with the design of the next generation of Spacesuits for planetary exploration.

"The worst case was a 90-pound suit with a very forward center of gravity, and trying to pick up a dozen rocks as samples. This configuration made it extremely difficult to recover from either a prone position or from one knee, and of course ... the event was timed, so we were at max effort.

"My thoughts during this portion of the testing were that I'd not like this configuration if I was remotely operating on the Moon — I'd get dangerously fatigued pretty quickly."

Kopra, who has scuba diving experience, found the adjustment from swimming to walking in this simulated lunar environment more natural.

"Depending on the particular dive, we had weights distributed on a Spacesuit mockup, around our torso, or on our legs," said Kopra.

"With this sort of configuration, it was quite natural to walk or run, but we were more buoyant to simulate the reduced gravity of the moon. It wasn't difficult at all to move around during the EVAs. In fact, after a few days, it felt quite natural.

"Sometimes, you could feel the pull of the umbilical

Tip of the Sphere



NEEMO 11 astronaut/aquanauts COL Timothy J. Creamer (left) and LTC Timothy L. Kopra (right) photographed in their undersea habitat for the NASA Extreme Environment Mission Operations (NEEMO) project.

that supplied our air and communications or had to walk against a slight current, but I think it would be very difficult to find a better analog for an extraterrestrial environment.”

Both Creamer and Kopra felt that their experience during this mission and the role the Army has to play in future Space missions is a valuable one.

For Creamer his robotics training at NASA helped when he was flying the Remotely Operated Vehicle around Aquarius. According to Creamer the ability to do mental gymnastics and change coordinate frames were the key.

“I have to confess, to a greater extent, my Army helicopter background helped even more with the control touch and vehicle awareness,” he said.

Kopra said, “The Army clearly has a role in future Space exploration missions.

“The Army provides critical skills that contribute to these ambitious goals — operational experience, discipline, and mission focus — and these will be vital for NASA’s planning and execution of missions to the Moon and Mars.”

After a successful seven-day mission, which included swapping notes with fellow Army Astronaut COL Jeffrey Williams aboard the International Space Station on day six via a video teleconference, both Creamer and Kopra continue working toward future missions on board the ISS.

Donald Montoya is public affairs specialist with 32 years of federal service. He has almost seven years experience with U.S. Army Space and Missile Defense Command/U.S. Army Forces Strategic Command. Before that he spent 25 years at White Sands Missile Range, N.M., in the Public Affairs shop as the chief of Command Information. He currently serves as the public affairs representative for the 1st Space Brigade and is a regular contributor to **the Army Space Journal**.



Clockwise from top: NEEMO 11 astronaut/aquanauts Timothy L. Kopra and Timothy J. Creamer (inside habitat) take a moment to pose for a photo during a dive session for the NASA Extreme Environment Mission Operations (NEEMO) project; After splashdown, NEEMO 11 crew members make their way to their undersea habitat to begin the eleventh NASA Extreme Environment Mission Operations (NEEMO) project. From left to right are astronaut/aquanauts Robert L. Behnken, Timothy L. Kopra, Timothy J. Creamer and Sandra H. Magnus; The NEEMO 11 crew members and support team return to the surface as the eleventh NASA Extreme Environment Mission Operations (NEEMO) project draws to a close.