NEEMO 16

Mission Day 1 - Status Report

Aquarius Reef Base, Key Largo, FL

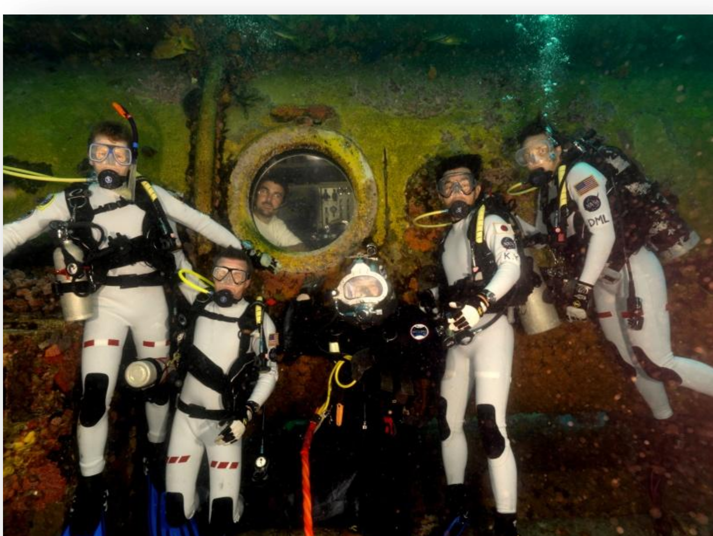
Monday, June 11, 2012

Splashdown!

The NEEMO 16 crew successfully “splashed down” at 11:05 a.m. EST Monday to start their 12-day mission aboard *Aquarius*.

The NEEMO 16 Crew ready for Splashdown.

The day was very busy as the crew tackled two orientation dives, completed safety briefings on their new home, and got all of their gear unpacked, set up, and stowed. Previous crews have compared the pace of the day to their first hours on space missions. These activities went smoothly – even getting ahead on the timeline – which was a testimony to the significant amount of preparation the crew and topside team accomplished prior to the start of the mission.



The crew prepares to enter their new home for the next 12 days.

Habtech Justin Brown verifies correct placement of equipment.

Loading the submersible onto the shipping vessel for transport to the habitat.

Subs and Science

Two DeepWorker submersibles as well as a shipping vessel are a part of the NEEMO 16 mission. Today the submersibles arrived at the docks, they were loaded onto the shipping vessel, and they began their sea journey to the Aquarius Base. The submersibles are key for two different areas of the NEEMO mission: simulating a space exploration vehicle and enabling science activities.

Underwater based science activities present exciting opportunities to integrate real science and real exploration field activities in a hostile environment. The challenges associated with the human scientific exploration of underwater environments are analogous to those we will encounter on NEAs, the Moon, and Mars. The physical, mental and operational rigors associated with the SCUBA diving and DeepWorker submersible operations at NEEMO are directly relatable to astronaut EVA scenarios using spacesuits and pressurized rovers, respectively. Underwater, humans must, as they do in space, contend with limited connection to colleagues, protection/isolation from the environment, and life support systems (LSS), all while exploring and conducting science in variable and unfamiliar terrains.

The crew in Aquarius.

Communication Delay Challenges

Given the background objective of exploring a Near Earth Asteroid, an important consideration to take into effect is the communications delay present between the explorers with their vehicles, and the earth. As fast as light is able to travel through space, the huge distances involved still mean that the communication each way takes enough time that normal communication methods don't work well. Though distances vary based on the relative positions of the Earth and the NEA in their orbits, a representative one-way time of 50 seconds was chosen for this study.

While unmanned spacecraft have been operated successfully with much greater time delays than this, the largest time delay previously experienced during a human mission was on the Apollo missions to the moon – a one-way delay of fewer than two seconds.

Communication delays for human missions have multiple components: voice, text, streaming video, video conferencing, data, command, file transfer, and internet use. Using a communication delay emulator and rules of engagement, we will be operating the NEEMO 16 mission with a baseline communication delay affecting each of these types of communication. It will impact how the crew and Mission Control Center interact for normal operations, how the crew stays in touch with their families and friends, how the medical professionals are able to watch over the health and well-being of crew members, and how the crew participates in educational and public outreach. It is expected that as these communication delays grow into minutes the model of how Mission Control and the crew interact will have to fundamentally change, with the crew becoming much more autonomous.

Dottie Metcalf-Lindenburger (NASA) talking with Topside support members prior to departure.

Tim Peake (ESA) riding to Aquarius.

Throughout this mission we will highlight how specific tasks and operations are impacted by this 50-sec NEA comm delay, and how we are planning to overcome it. The data we collect will be compared with known operations on human spaceflight missions lacking a significant comm delay (i.e., all of NASA's human spaceflight experience to date), and will ultimately be used to help us design the operations and vehicles that we will depend on for NEA exploration and beyond.

The crew poses for a group photo outside Aquarius.

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The NEEMO Mission Management and Topside Support Team