

Underwater jetpacks with Neemo

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A Neemo aquanaut with jetpack used to move underwater. Neemo missions train astronauts for life in space. Living and working in an underwater base is similar to life on a space station. During a 12-day mission, ESA astronaut Tim Peake and six crewmates lived in cramped conditions, performed ‘waterwalks’ and had to solve problems as a team to test equipment and techniques for future space exploration. The underwater base is almost 20 m under the sea off the coast of Florida. Credits: NASA

(Phys.org) -- ESA astronaut Tim Peake and his Neemo crewmates resurfaced last week after spending 12 days underwater off Florida’s Atlantic coast. The aquanauts tested equipment and techniques for future space exploration as well as finding time for educational experiments.

Although only 20 m under the Atlantic Ocean, the voyage home took 17 hours. Living underwater requires a long decompression to allow the aquanauts’ bodies to adapt to normal surface pressure.

Being physically cut off from the world above is one of the ways Neemo missions simulate space operations.

All messages between ground control and the aquanauts were delayed by 50 seconds, just as if the aquanauts were far from Earth.

This was one of the first times such a complex mission had to cope with a communication delay. Tim explains why the mission was a success: “At times, up to 100 people were working at the same time, including 20 divers and submersible pilots.

“It ran beautifully, and was all timed to perfection. In a word: teamwork.”

Diving underwater is one of the best ways of simulating weightlessness on Earth. The aquanauts spent hours on ‘spacewalks’ investigating how humans could explore and retrieve samples from an asteroid as well as testing tools and techniques.

In space, even the simplest tasks need to be thought out in detail. For example, chipping off a piece of asteroid requires that an astronaut hold on to something, otherwise he would float away into space.



The Neemo base where ESA astronaut Tim Peake spent 10 days testing equipment and techniques for future space exploration as well as finding time for educational experiments. The underwater base is almost 20 m under the sea off the coast of Florida. Credits: ESA-H. Stevenin

These problems and more were investigated during Neemo. Several methods of exploring and operating on an underwater ‘asteroid’ were tested.

Ropes were fastened to the surface of the simulated asteroid and the aquanauts used them to move about.



A submersible transporting a Neemo aquanaut to a simulated asteroid. In space, chipping off a piece of asteroid would require that an astronaut hold on to something, otherwise he would float away. The submersible was tested underwater as a means of getting to asteroids as well offering a stable platform for astronauts to work on. Footstraps allow aquanauts to fasten themselves to the submersible, keeping their arms free for working on the asteroid. Neemo missions train astronauts for life in space. Living and working in an underwater base is similar to life on a space station. During a 12-day mission, ESA astronaut Tim Peake and six crewmates lived in cramped conditions, performed ‘waterwalks’ and had to solve problems as a team to test equipment and techniques for future space exploration. Credits: ESA-H. Stevenin

Jetpacks were also tried. “Manoeuvring in jetpacks proved to be very efficient – and was also extreme fun,” says Tim. But the jetpacks were not ideal – they did not provide a stable platform for work.

Underwater vehicles proved to be a better way of working on an asteroid. Submersibles could be driven to areas of interest.

Once in place, aquanauts strapped their feet to the submersible, freeing their arms for scientific work.

Science under pressure

Between the lengthy dives and hard work the aquanauts had time to record a series of “science under pressure” videos.

Experiments were performed at sea level before the mission began and viewers were challenged to comment on what would happen when they were repeated in the underwater habitat.

The first correct entries received certificates of recognition from ESA, NASA and Japan’s space agencies.

Two more challenges will be revealed over the next few days. Follow Neemo on social media and submit answers via Twitter or Facebook.

The adventure is over for the aquanauts now, but the Neemo team has much information to analyse.

It might be a while before humans explore asteroids in space but Neemo is providing engineers with vital information for designing future missions.

Provided by European Space Agency

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