

# Getting ready for Mars on the Space Station

May 28 2019

---



This image of Earth taken by ESA astronaut Alexander Gerst from the International Space Station was shared on Alexander's social media channels in June 2018. Credit: ESA/NASA–A. Gerst

From disrupted biological clocks to radiation and contamination hazards, Europe is running experiments on the International Space Station to take human exploration one step closer to Mars.

As a new week starts on planet Earth, continuous research in orbit brings new knowledge about the challenges of making a trip to the Red Planet a reality.

## **Martian rhythm**

A crew on a journey to Mars would live outside of the 24-hour cycle of light and darkness we experience on Earth. So do astronauts on the Space Station who experience 16 sunrises and sunsets every day.

Scientists believe that such disruption has an impact on the astronauts' biological clock. To see how long-duration spaceflight affects people, NASA astronaut Anne McClain wore two sensors—one on the forehead and another one on the chest—for 36 hours as part of the Circadian Rhythms experiment.

For the fifth and last time during her mission, Anne's core body temperature and melatonin levels were monitored. Results will be compared to those taken on Earth before and after her mission to understand the effects and how to counteract them during deep [space](#) missions.

Strategies for adapting—or not—to new rhythms could shed light on sleep disorders and help people on Earth that live outside of the natural cycle, staying up late or working night shifts.



NASA astronaut Anne McClain donning the Circadian Rhythms hardware, a sensor that monitors how a crew member's biological clock changes during spaceflight. Credit: NASA

The pass of time could also be an issue for a trip to Mars that would last over 500 days. Recent research shows that astronauts underestimate time in orbit, just as they have an altered perception of distance in space.

Canadian Space Agency astronaut David Saint-Jacques and NASA astronauts Anne McClain and Nick Hague gauged how long a visual target appears on a laptop screen and their reaction times to these prompts recorded to process speed and attention.

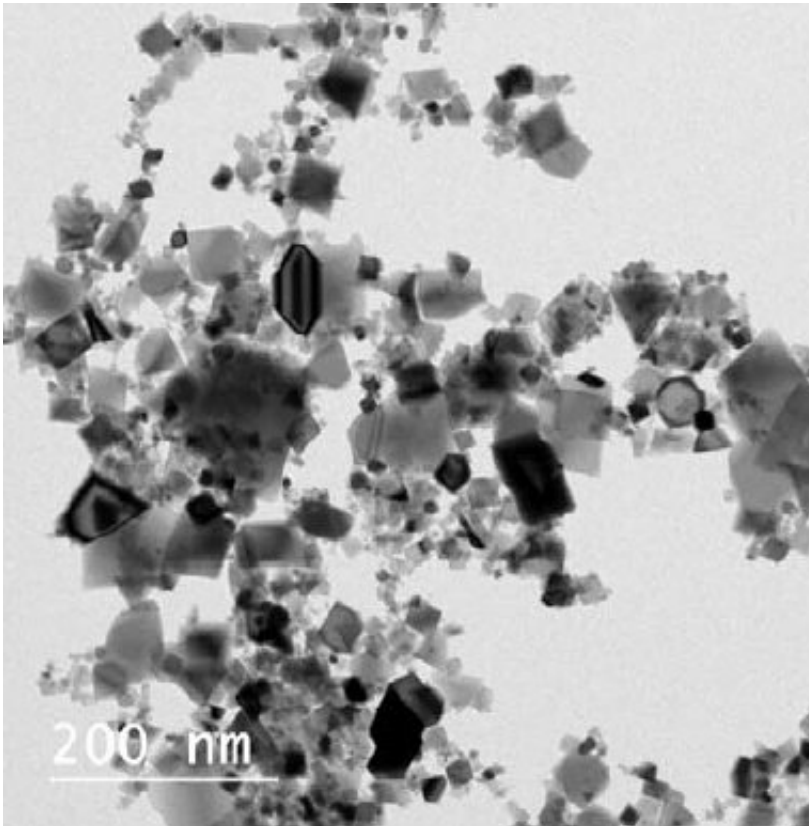
This was all part of the Time experiment, a relevant research because a

misperception of time may cause delayed reactions and create risks for crew safety.

## **Oxidative Mars**

Space takes its toll on the human body. An interplanetary mission to Mars will see astronauts aging faster. The International Space Station provides a unique opportunity to both reproduce the effects of aging and study the huge oxidative impact.

The European Nano Antioxidants experiment is seeking innovative antioxidants to stimulate cells in the battle against muscle loss. Living cells and ceramic particles were placed in the Kubik incubator for six days, housed in ESA's Columbus module. Half of the samples were kept at close to zero gravity, while the rest were exposed to the same gravity as Earth.



These ceramic particles, called nanoceria, mimic the biological behaviour of enzymes from living organisms. The particles can protect organisms from the damage caused by oxidative stress. Credit: Gianni Ciofani

The cells are now frozen at  $-80^{\circ}\text{C}$  and waiting for their ride home on 3 June aboard the SpaceX's Dragon spacecraft. Findings from this research could aid the development of new supplements to support astronauts on missions to Mars.

As soon as humans leave the protective shield that is Earth's atmosphere, space [radiation](#) becomes a serious concern, especially if headed to Mars. Radiation levels in space are up to 15 times higher than on Earth.

The Dosis-3-D experiment helps understand space radiation and how it

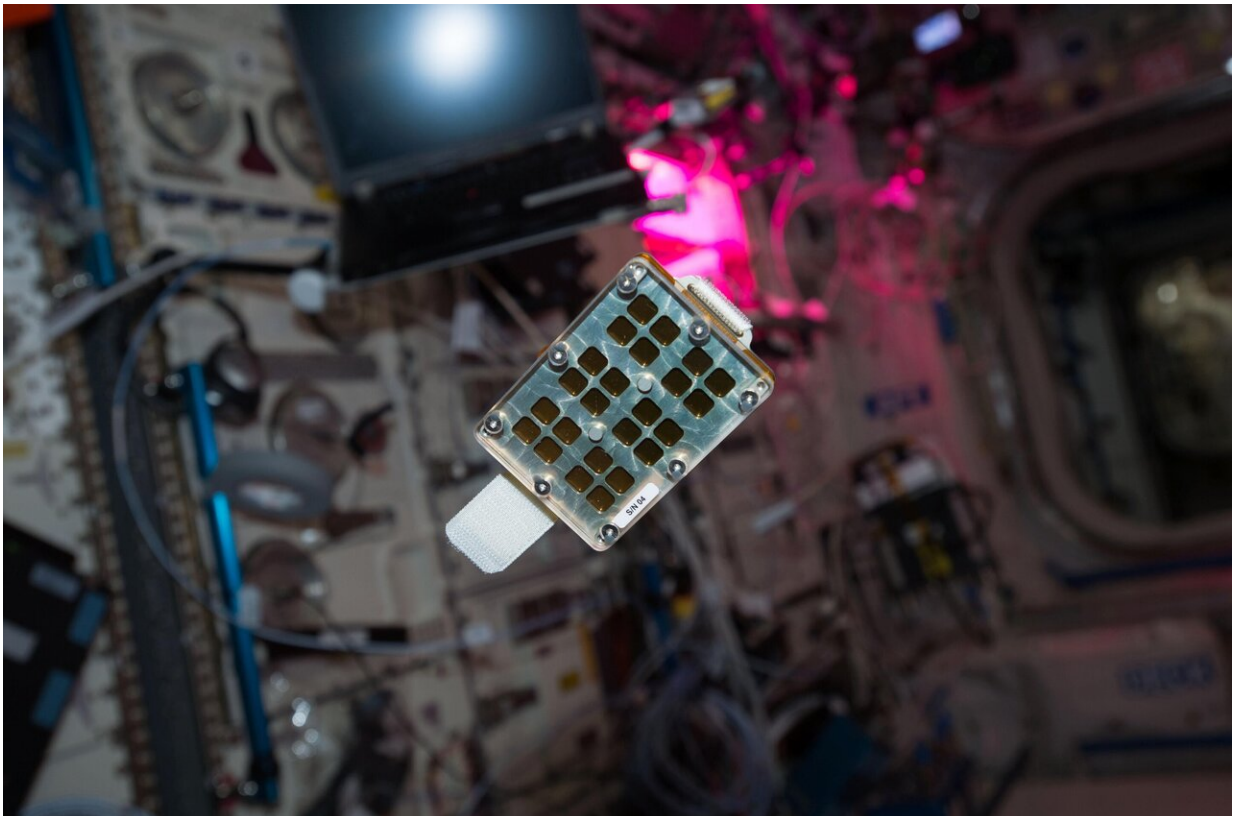


penetrates the Space Station walls. Eleven radiation detectors attached to the walls of Columbus record how much radiation gets through and help create a complete picture of space radiation inside the Station.

The latest data downlink on 21 May marked seven years of continuous measurements in space for Dosis-3-D.

## **Resistant materials for the interplanetary journey**

Radiation also has an impact on hardware. The ICE Cubes facility is ESA's faster, lower cost answer to making science happen in space. One of the "cubes—small modular containers slotted in the Columbus lab—is investigating commercial computer boards' resistance to space radiation.



Matiss-2 experiment on the space station. Credit: NASA

Bacteria and fungi can become a threat for both human health and equipment as they tend to build up in the constantly-recycled atmosphere of the International Space Station.

European researchers are addressing this contamination with the Matiss-2 experiment. This study aims to find better materials to build a [space station](#) or spacecraft, especially important on our way to Mars.

Scientists will analyze the materials to see how the bacteria formed biofilms that protect them from cleaning agents and also help them adhere to surfaces. This week David Saint-Jacques packed the seventh sample holder with anti-microbial surfaces to be shipped back to Earth for analysis.

Provided by European Space Agency

Citation: Getting ready for Mars on the Space Station (2019, May 28) retrieved 9 April 2024 from <https://phys.org/news/2019-05-ready-mars-space-station.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--