

The Universe in my pocket



Life on the Space Station

Julieta Fierro

Institute of Astronomy
UNAM, Mexico

Grażyna Stasińska
Paris Observatory





Weightlessness permits the fabrication of novel materials that can later be used on the Earth.



Astronauts must keep their muscles strong while they are in space. The treadmill has elastic straps that keep the astronaut from floating away.



The challenge of eating



Christmas on the Space Station

2

Daily life in space

Space expeditions are not just trips to the Moon. Thanks to numerous trips to the International Space Station, new medical tests, more comfortable clothing, new types of food, better computers and communication techniques have been developed.

To stay on the Space Station for long periods of time, people must learn to live in space, which is not easy. Not only do they have to work hard, but they feel strange because of the weightlessness, living in cramped quarters and having to exercise a lot. To achieve all this, it is important that their physical and mental condition be in top shape. So it's also important for them to have some fun!

To be an astronaut requires arduous physical, technical and mental preparation.

3

Work

Astronauts need to master many different skills before going into space. They must be able to concentrate on the job, solve unexpected problems, and live only with what they have on the station for months at a time.

They are trained to be pilots, to operate dozens of space science experiments, and to maintain equipment both inside and outside the station. Although most of the repairs on the outside are done with robotic arms, the fine movements of human hands are sometimes needed. The spacesuits are like small ships, they must offer protection from small meteors, cold and heat, and of course provide oxygen. In case of emergency the astronaut must be able to propel himself back to the station.

An astronaut works on an experiment to test how shape perception is altered by weightlessness.



Astronauts grow plants such as lettuce and peppers to have fresh vegetables for their meals.



Astronaut on a "spacewalk" mission outside the shuttle.

Astronaut placing samples in the cryogenic freezer.



Washing one's hair requires combing it "up" and using a no-rinse shampoo without water.

To sleep, astronauts must be strapped down, otherwise they would float about.



Some astronauts have trouble sleeping if they are bothered by odors, light, or noise.



Astronauts brush their teeth with edible toothpaste to avoid rinsing with water.

Sleeping and washing

To sleep in space the astronauts must be strapped down, otherwise their bodies would float freely around the station and might collide with the delicate instruments. Some astronauts find it hard to adapt to sleeping with light or people snoring next to them.

There are no space showers, since the water does not fall, nor tubs, since the water would float everywhere. Instead, astronauts use a thick shampoo that does not produce foam. It is rubbed all over the body and hair and it is not necessary to rinse it, just wipe off the residue with a towel.

This is similar to the disinfecting gel we used on our hands during the COVID pandemic, that did not need to be rinsed. The space station's air filtration system removes the residues that evaporate from the shampoo.

Food and eating

On the International Space Station there is different food for the tastes of astronauts from different nations. The first space travelers drank only water, tubed porridge and sugar pills. Later, dehydrated food was invented. Still later, food similar to that of military rations was invented.

Nowadays, it is possible to grow fresh produce in space, such as lettuce or chili peppers. This gives a special touch of freshness to the astronaut's meals.

When Thomas Pesquet went to the Space Station, he brought dishes prepared by the chef of the Élysée, the palace where the president of France lives, as a gift to his companions. This was the best space banquet in history.

9

Individually packaged foods.



Eating bread on the Space Station would be dangerous because the crumbs could fly off and damage the instruments. That's why astronauts eat tortillas.



Every few months, a spacecraft travels to the Space Station to bring supplies from Earth that the astronauts need, new experiments to work on, and also fresh fruit.



When astronaut Thomas Pesquet arrived at the Space Station he brought a menu that included beef with mushrooms and pear tart.

8



Water and waste

Transporting water, or any other material, to the Space Station, requires an enormous amount of fuel. To avoid as much as possible this huge expenditure of energy, the Space Station recycles all the material it can. For example, astronauts' urine is collected, purified into water, and drunk again. The astronauts soon get used to this process.

The debris that accumulates on the Space Station is ejected towards Earth, and when it falls, it gets so hot due to atmospheric friction that it catches fire and disintegrates. If some small fragments survive, they usually land in the Pacific Ocean where there is no danger of hurting anyone.

If you have ever seen a shooting star, it could have been space junk, either from the Space Station or from defunct satellites.

Water for the inhabitants of the Space Station is recycled, which helps minimize the supply of products brought from Earth.



The astronauts urinate into a funnel that carries the liquid to where it is recycled into drinking water.



Astronauts accumulate significant amounts of garbage, including clothing, which cannot be washed on board, due to lack of water. 10



Several astronauts are musicians and take their instruments to the Space Station.

Others are photographers and take pictures of the Earth.



Some astronauts like to read quietly.



Others spend their free time following the games of their favorite sports teams from a distance.



Some astronauts play chess. In order for the chess pieces to stay on the board, they are attached with magnets.



12

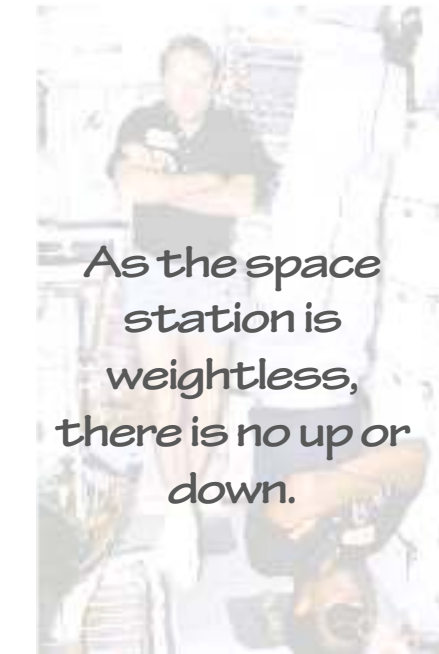
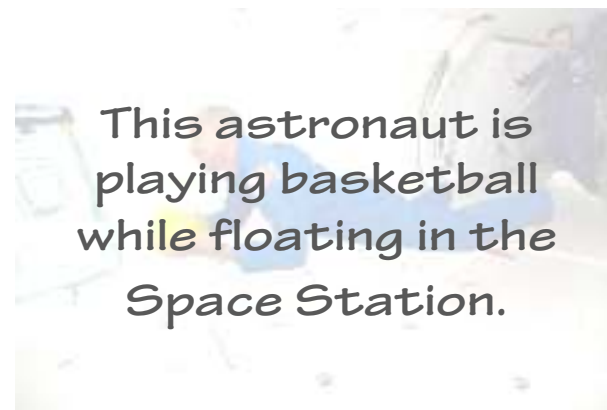
Having fun

A fundamental part of spending long months on a space station and maintaining mental health is having fun.

Some astronauts like to spend their free time looking out the windows of the Space Station, contemplating the beauty of the Earth; they observe the continents, the movement of the clouds, the expanse of the seas. Others make music, watch television, play chess or read.

Still others take pictures of our planet or of activities on the Space Station. Such images are a way that they can share their experiences with us on Earth. The benefits of space missions are for all mankind. Space exploration has brought new knowledge in navigation, health, materials, agronomy, electronics, communications, gastronomy and robotics ... In short, in almost all disciplines.

13



QUIZ

This astronaut is playing basketball while floating in the Space Station.

This photo was taken on the Earth. The loose hairs of the astronaut aren't floating!

This astronaut is floating inside the Space Station

Answers

The loose hairs of this astronaut are floating because she is weightless on the Space Station.

As the space station is weightless, there is no up or down.

Which of these photos **wasn't** taken on the Space Station and how do you know?



Answers on the back

The Universe in my pocket No. 35

Julieta Fierro, of the National University of Mexico, and Grażyna Stasińska, of the Paris Observatory, wrote this booklet in 2022. They dedicate it to their grandchildren Uli, Chaak, Arsen, Côme and Sacha.

Something to think about

If you were chosen to spend several months on a space station, think about how you would like to sleep, and what you would like to eat.

Imagine what you would do during your free time and check it would be possible to do it in a weightless environment.



To learn more about the TUIMP series and the topics presented in this booklet, please visit

<http://www.tuimp.org>

Translation: Stan Kurtz
TUIMP Creative Commons

