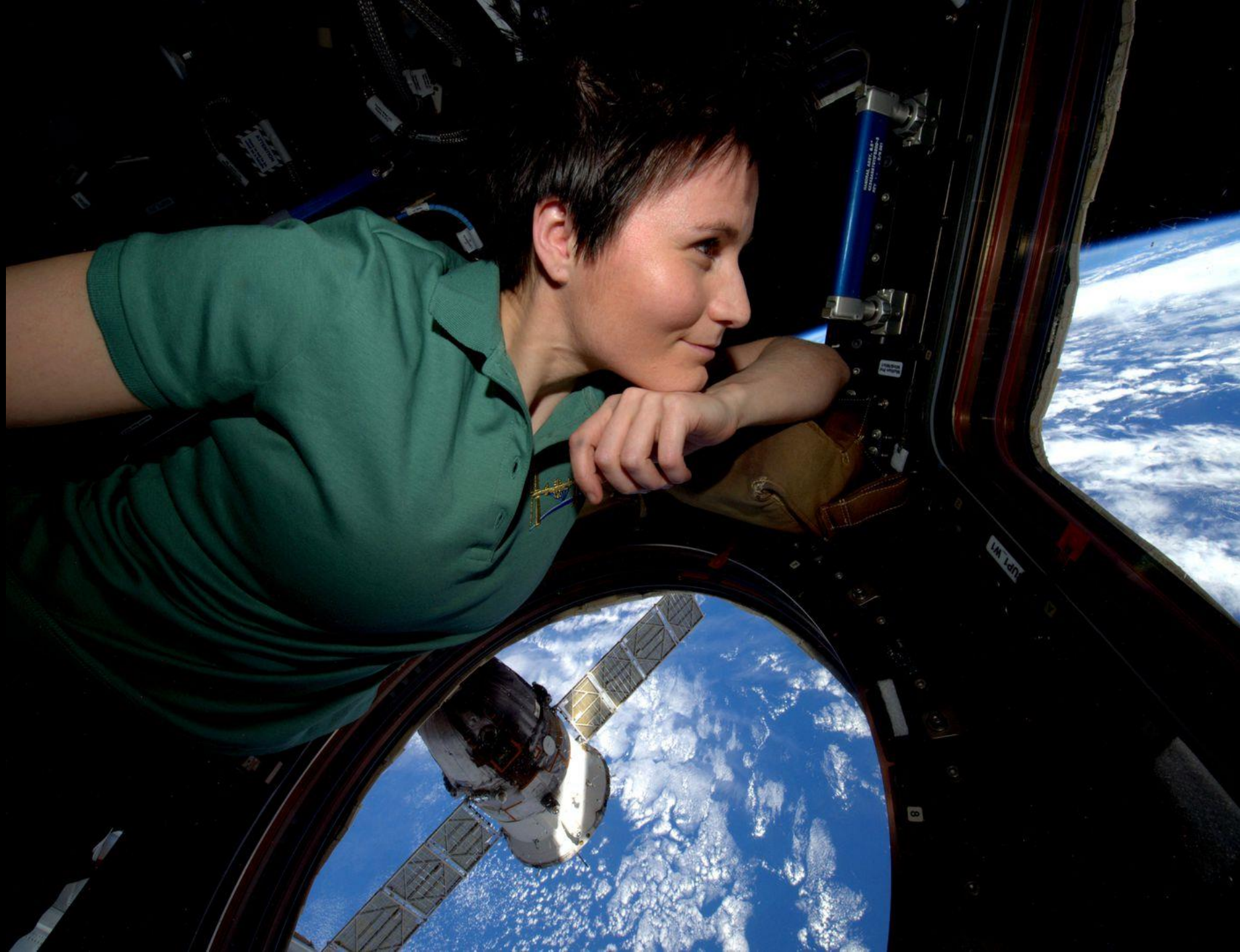


ESA's Life Sciences programme

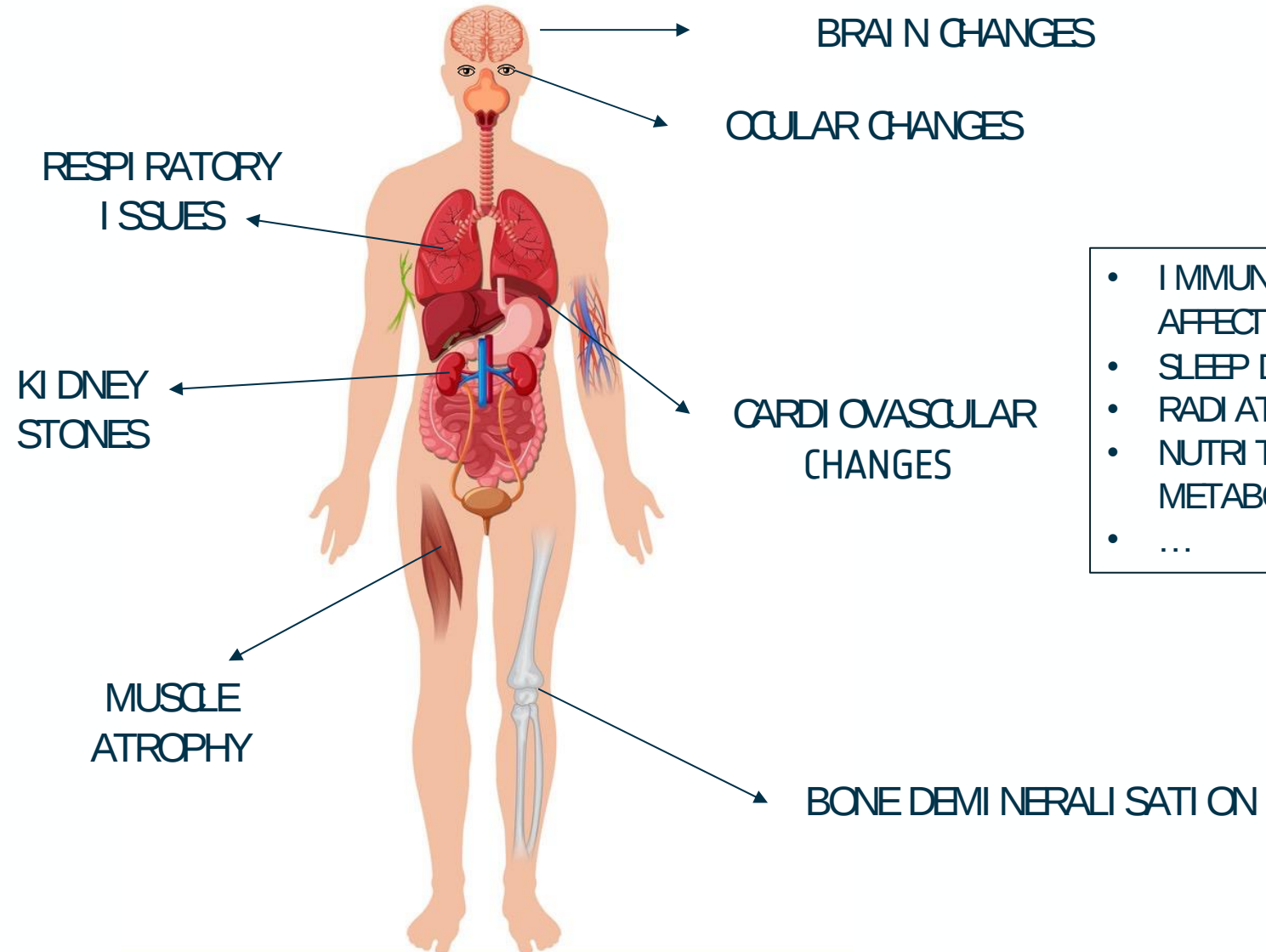
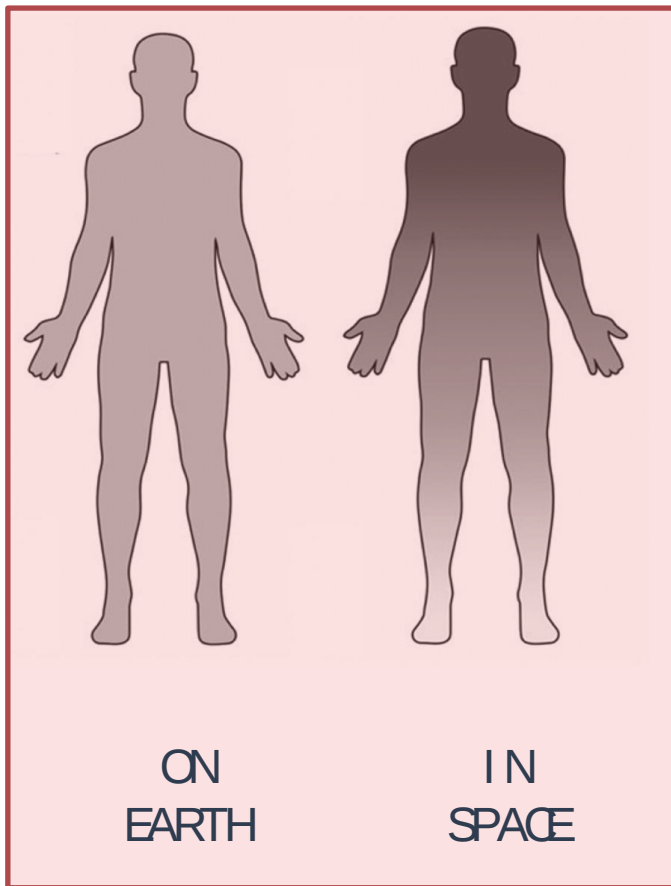
Space Exploration Research

19 April 2023

Dr. Angelique Van Ombergen
Discipline Lead for Life Sciences
SciSpacE Team, HRE



WHAT HAPPENS TO THE BODY IN SPACE?



- IMMUNE SYSTEM AFFECTED
- SLEEP DISTURBANCES
- RADIATION EXPOSURE
- NUTRITION AND METABOLISM
- ...

SEEKING KNOWLEDGE AND SERVE SOCIETY

Science in the space environment (SciSpacE)



What

SciSpacE delivers the science for the exploration programme.

Why

SciSpacE returns practical benefits to society back on Earth, and helps us understand how space affects fundamental physical and biological processes, and to find ways to explore and live sustainably in space.

Where

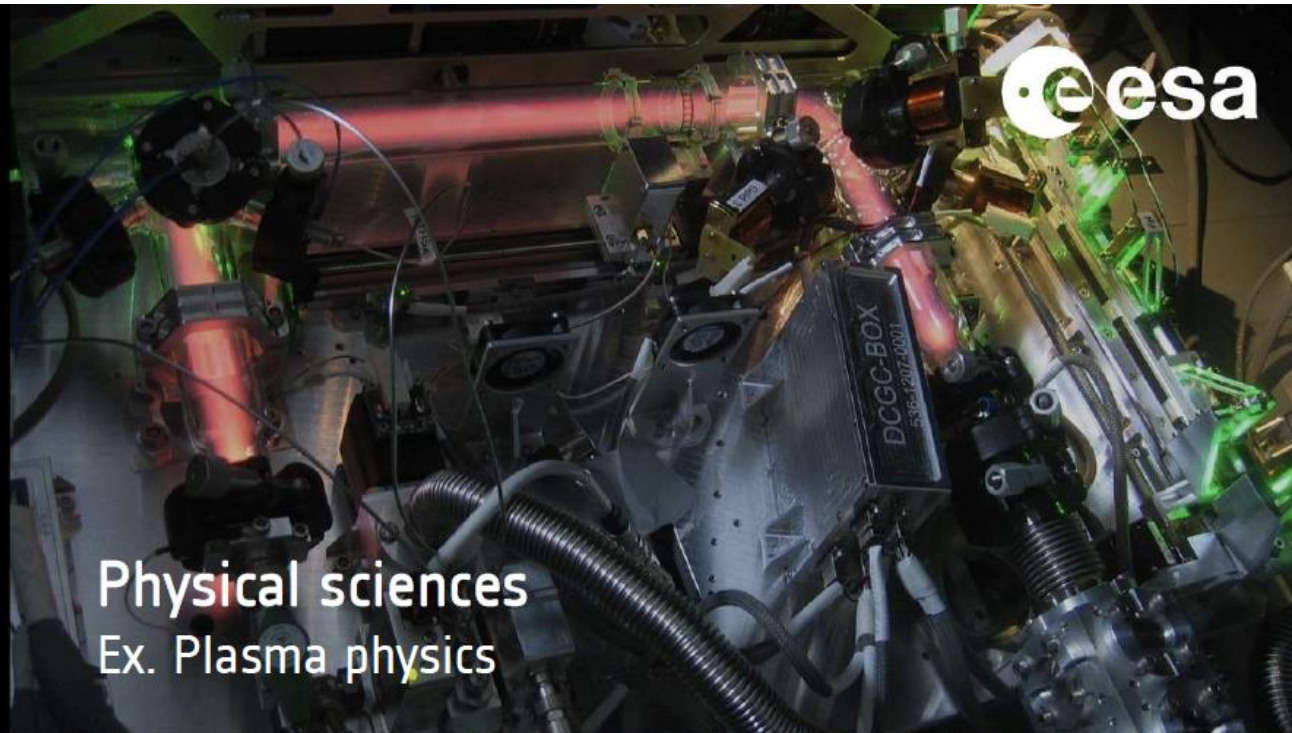
International Space Station, ground analogues of space, the Moon, and Mars.



GAINING KNOWLEDGE AND CLOSING GAPS

SciSpacE

Earth, Moon and Mars sciences
Ex. Atmosphere space interaction



Physical sciences
Ex. Plasma physics



Physical sciences
Ex. Fluids



Life sciences
Ex. Human physiology



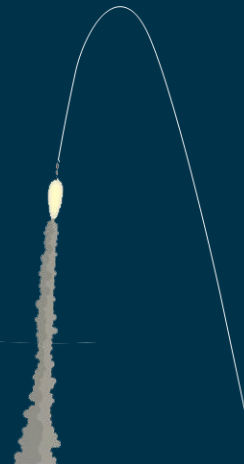
SciSpaceE - Research Ground Platforms



Bedrest



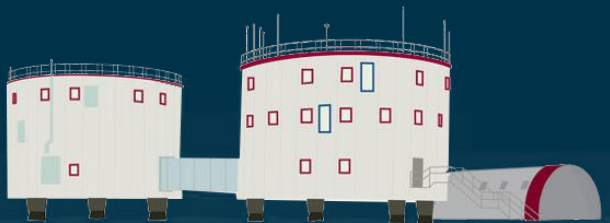
**Dry
Immersion**



Sounding Rocket



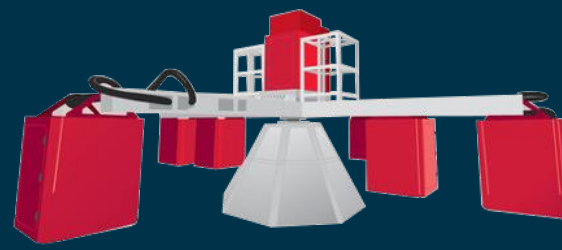
Drop Tower



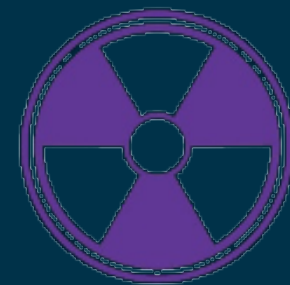
**Concordia, Antarctica
Isolation and Confinement**



Parabolic Flight

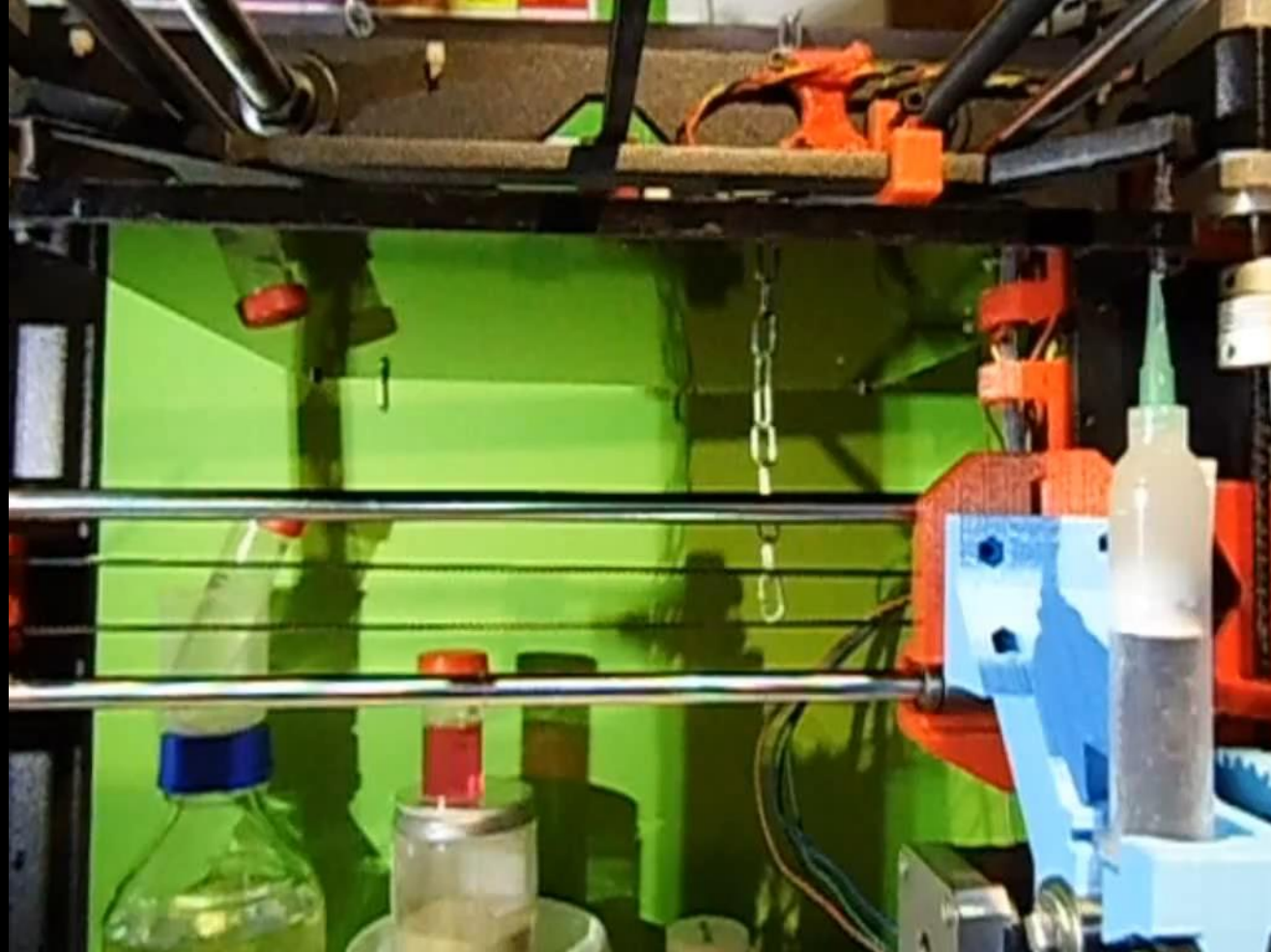


**Ground-based
facilities**



Radiation

3D BIOPRINTING IN SPACE

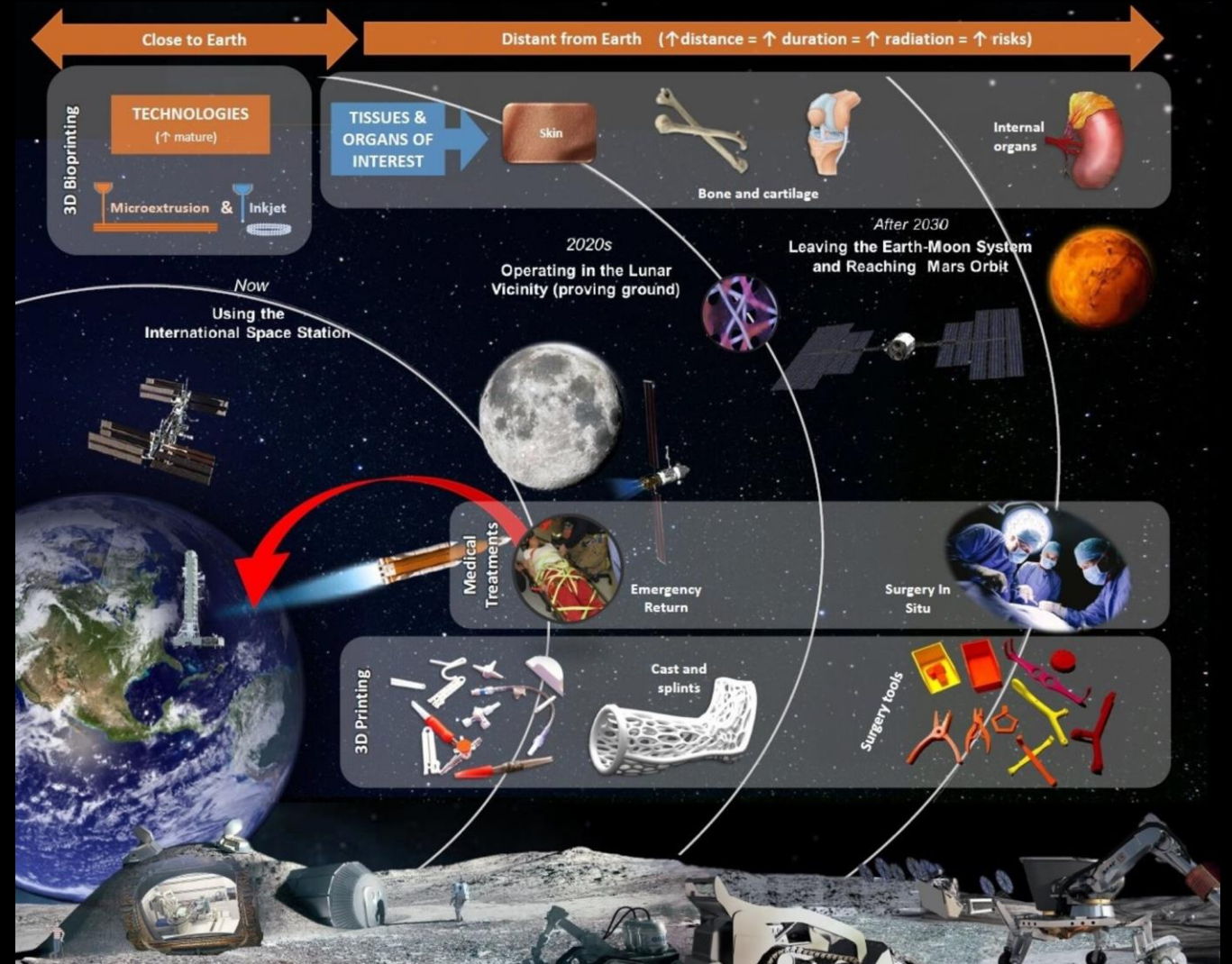
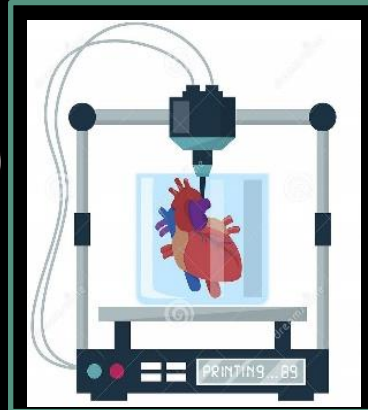
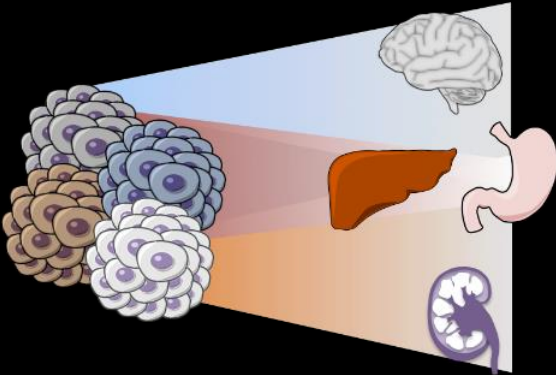


3DBioprinting upside-down
© N. Cubo Mateo/TU Dresden

3D BIOPRINTING IN SPACE



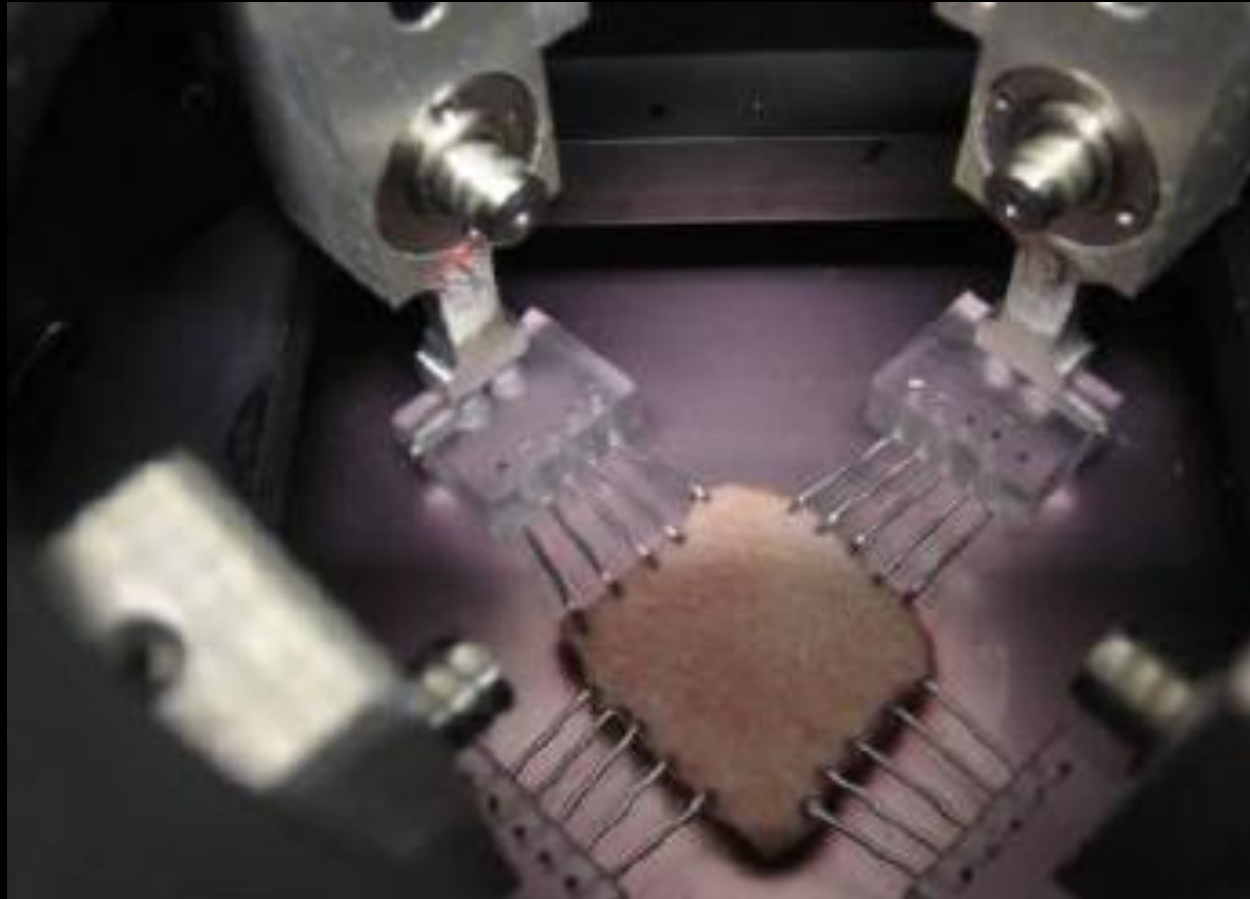
3D-printed bone © ESA-Remedia





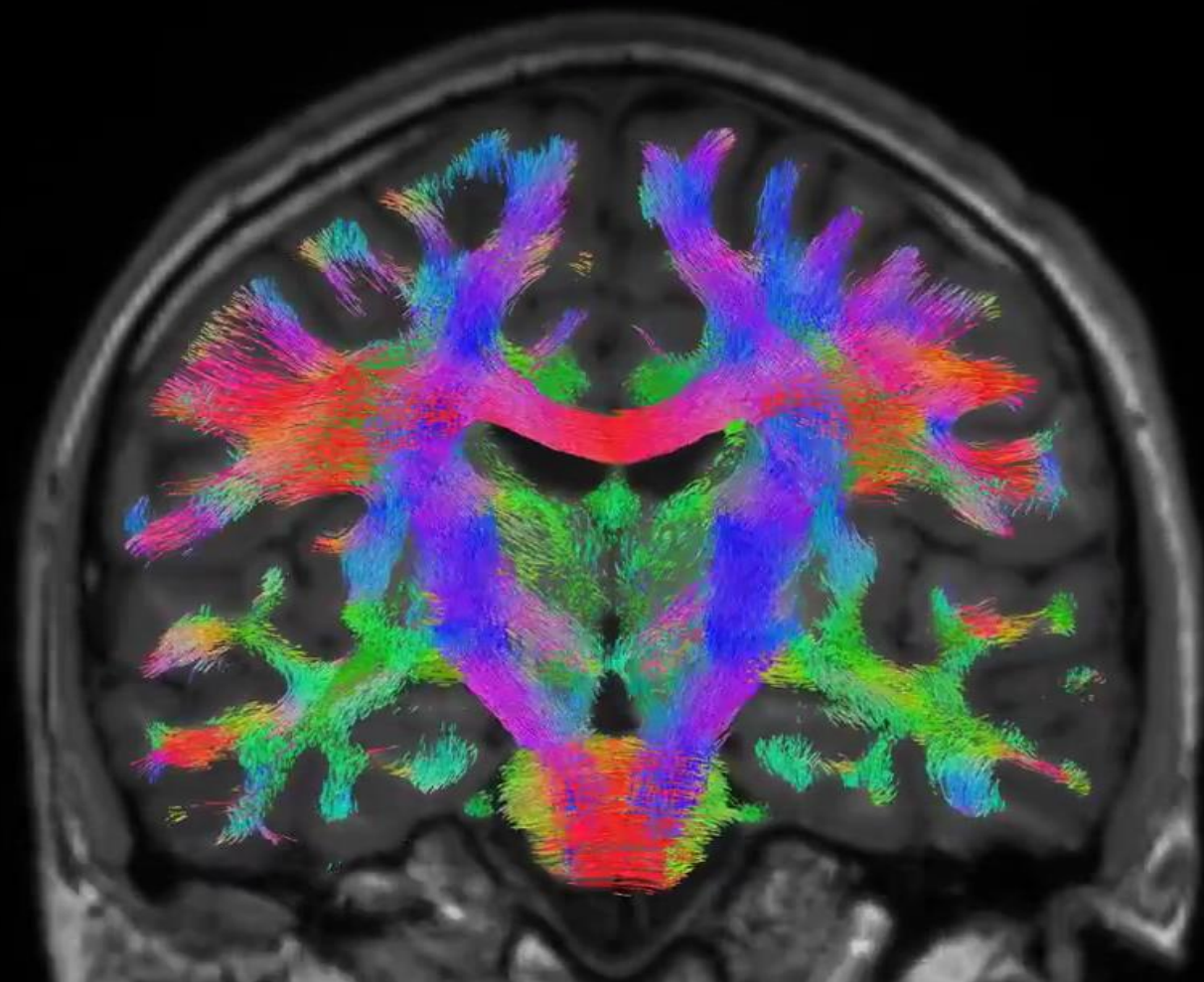
SUTURE IN SPACE

[M Monici et al.]



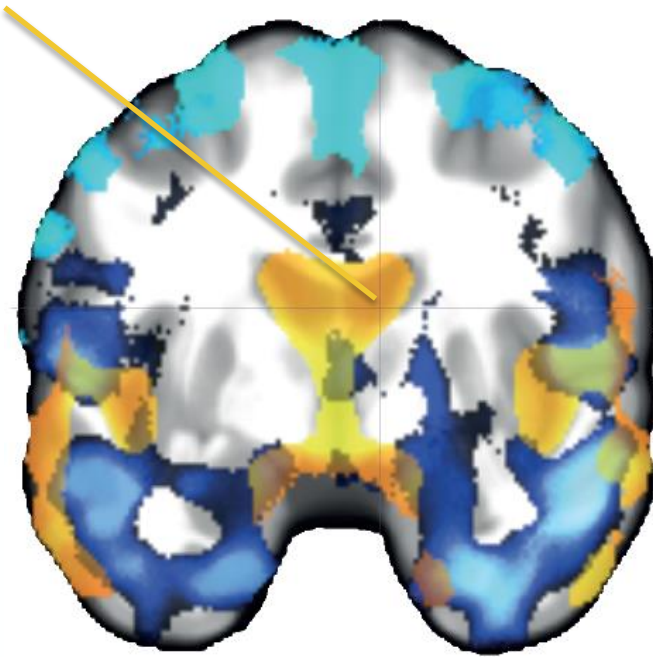
BRAIN-DTI

[F. Wuyts et al.]



BRAIN-DTI

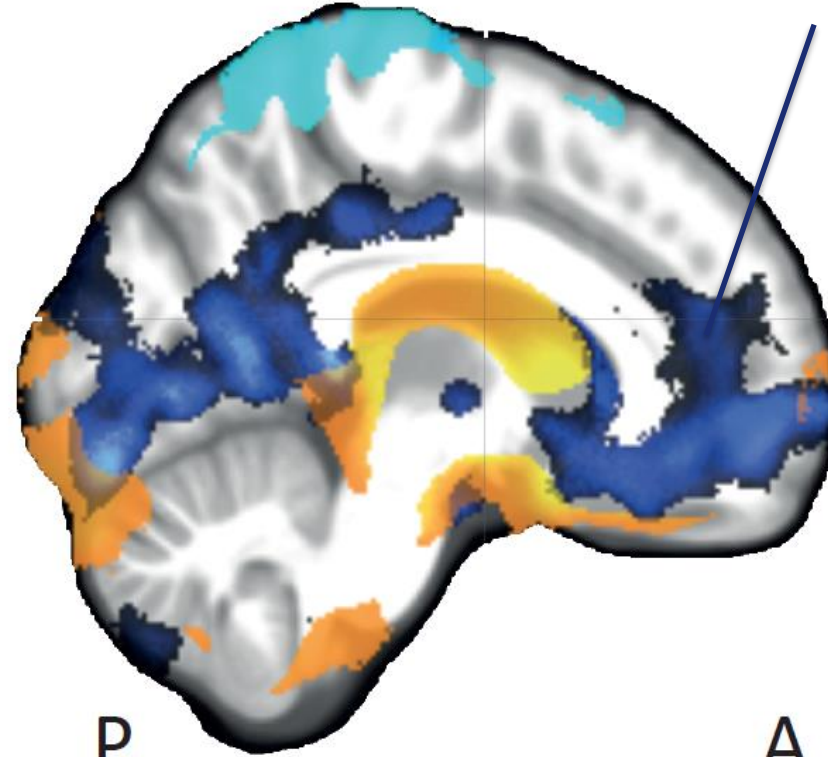
Increase in CSF



R

L

Decrease in grey
matter volume



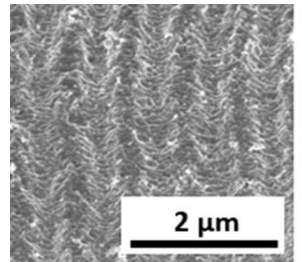
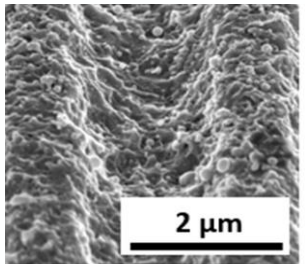
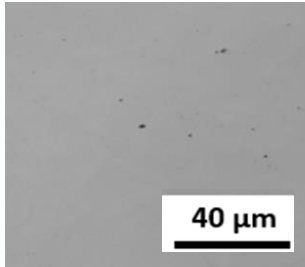
P

A

BIOFILMS

[R. Möller et al.]

Different surface topographies



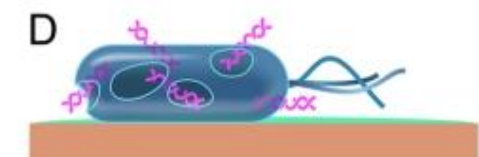
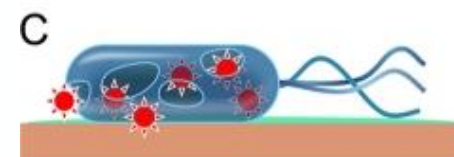
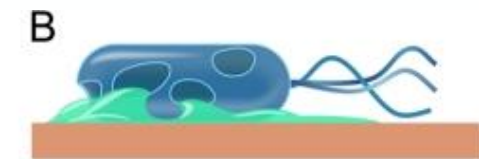
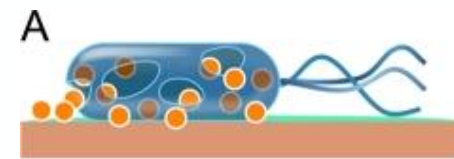
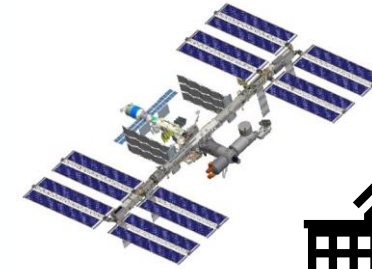
Müller et al., 2020



Antimicrobial properties of copper



Mold on ISS © NASA



Grass et al., [2011]

#SpaceCare





BEDREST

ARTIFICIAL GRAVITY / EXERCISE



DRY IMMERSION





CONCORDIA

PARABOLIC FLIGHT

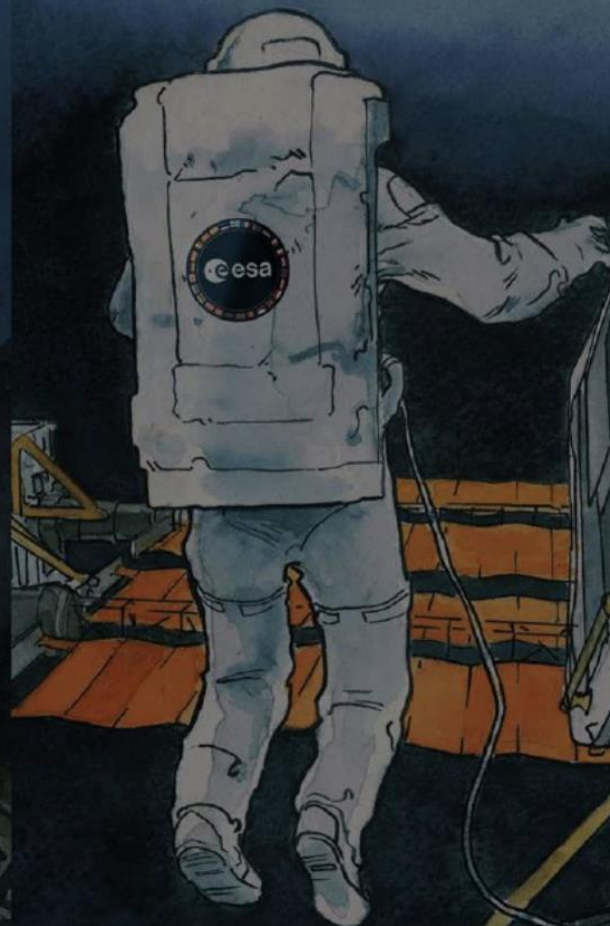


HIBERNATION



EUROPEAN AMBITION

An ambitious perspective for the current and next generations



TERRAE NOVAE 2030+



→ THE EUROPEAN SPACE AGENCY

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THANK YOU! – QUESTIONS?



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<https://scispace.esa.int> [coming soon]