Experiencing Space

Christer Fuglesang

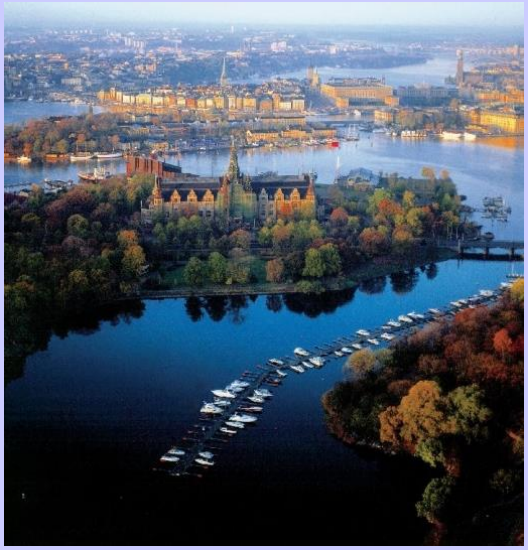
Astronaut

Professor KTH

MELiSSA Conference

Toulouse 8-Nov-2022

A long, long time ago
"Early Preparations"

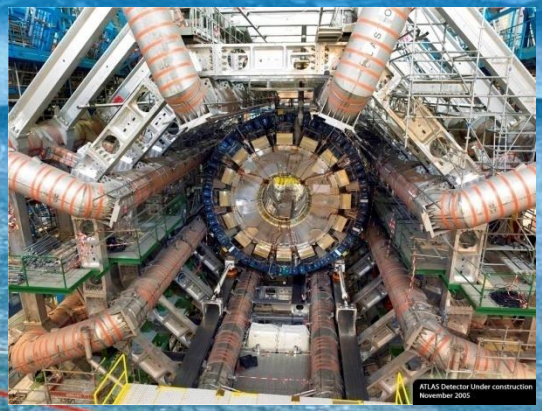


Born, grew up in Stockholm, Sweden

Master of Engineering Physics at KTH Royal Institute of Technology, Stockholm 1981

Sailor on the Atlantic 1979-80

Ph.D. at Stockholm Univ 1988



Particle physicist at CERN, Geneva 1988-1991

Swedish Newspaper June 1990

THE EUROPEAN SPACE AGENCY

is looking for up to

10 ASTRONAUTS

to take part in the forthcoming European space missions: the Hermes and Columbus manned space flights, preparatory missions on the NASA Shuttle (with Eureca, Spacelab), and Hermes development flights.

Applicants must be nationals of ESA Member States (Austria, Belgium, Denmark, Federal Republic of Germany, France, Ireland, Italy, the Netherlands, Norway, Spain, Sweden, Switzerland, United Kingdom) or Associate Member State (Canada), preferably aged 27 to 37, be in very good health, measuring 1.53 to 1.90 m, and also speak English.

They must have a university degree in Natural Sciences, Engineering, or Medicine and should also have three years of post-graduate related professional experience, or piloting experience acquired as test, military, or airline pilot.

Applicants who are selected as candidate astronauts will be offered ESA contracts. They will be located in Porz-Wahn near Cologne in the Federal Republic Germany but will be called upon to travel extensively during their training and preparation for their missions.

The condition are those of an International Organization, including expatriation and family allowances, and a social security and pension scheme. Relocation expenses will be paid.

The selection of Swedish candidates will be made by the Swedish National Space Board (SNSB).

Applications can be made on special forms only. Those forms can be obtained from the SNSB. Written requests for application forms should be addressed to:

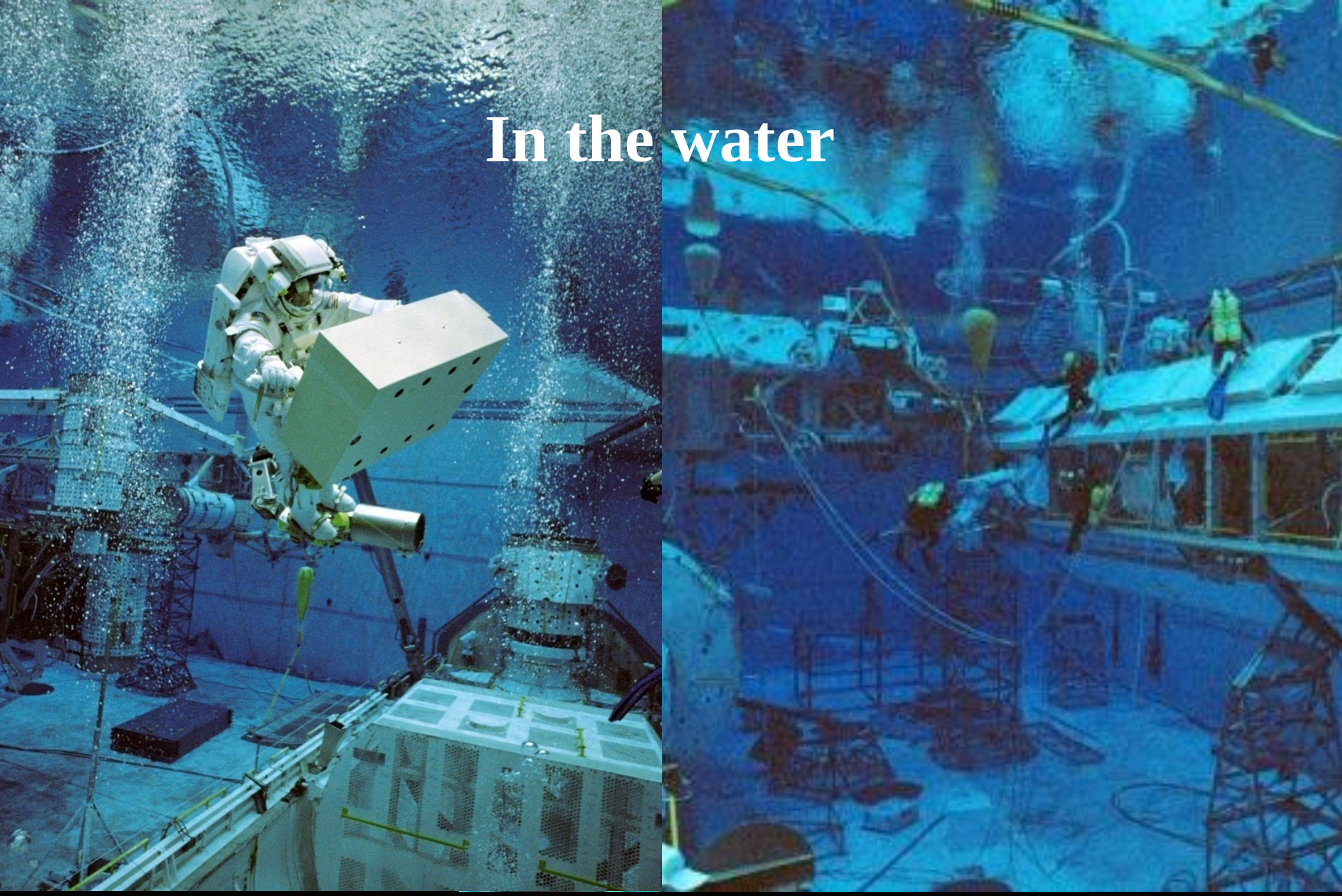
Swedish National Space Board – Rymddelegationen
Box 4006
171 04 SOLNA

The completed application forms, including a special health certificate, should have reached the SNSB no later than September 14, 1990.

Medical tests,
special tests,
physical tests,
psychological tests,
interviews,...


Star City, Russia
1993-1996

”The Sardines” - NASA astronaut group XVI, 1996



Neutral Boyuancy Laboratory

In the air

T-38

Cape Canaveral, Florida, Dec 9, 2006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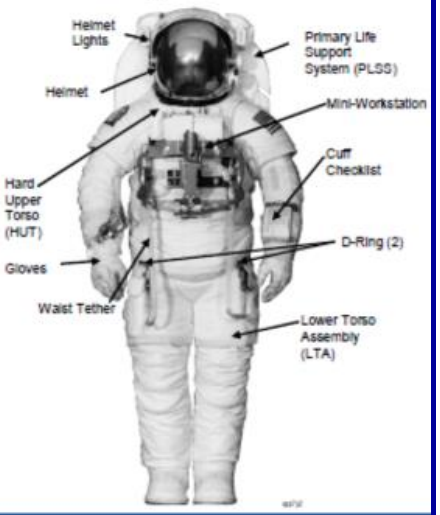
”Travel picture of the year 2006”

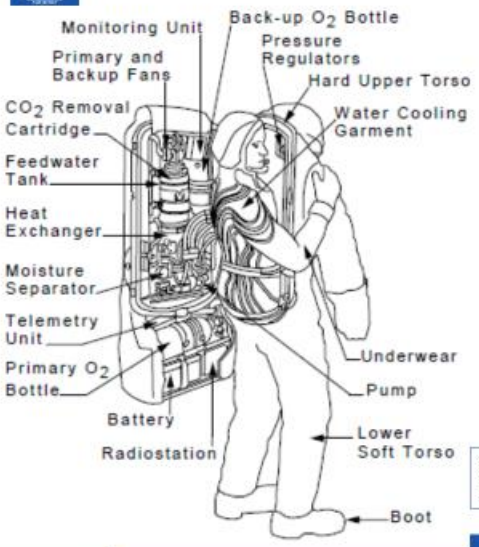
EVA Space Suit – a one-person space vehicle

US current EVA suit: EMU – Extravehicular Mobility Unit



SOME EMU NUMBERS
Suit weight: 55.3 kg
Total equipped weight: 145 kg
Primary life support: 8 hours
Backup life support: 30 min
Pressure: 0.29 atm
Sizing: Modular

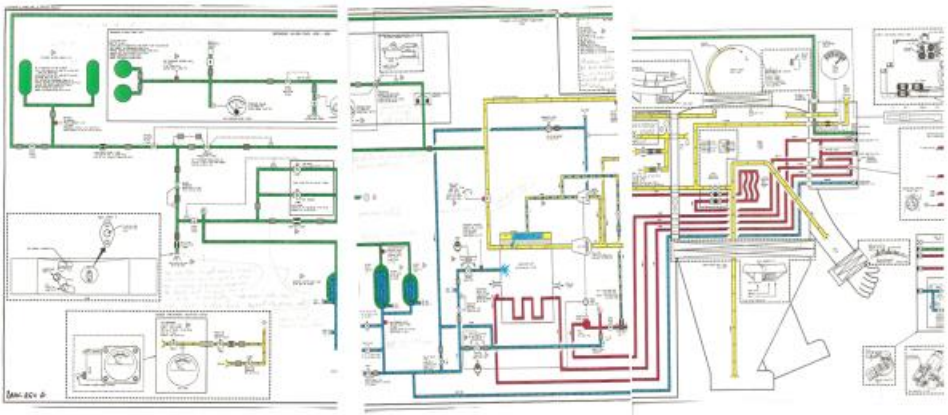
Russian EVA suit: *Orlan* (= Eagle)



Thomas Reiter w Orlan in Star City 1994

Orlan is easy to don – but less easy to work in. Higher pressure and gloves less good fit.

EMU interior work schematics



See also Canvas Ref material / EMU Schematics

SOME ORLAN NUMBERS
MKS model, used since 2017
Suit weight: 110 kg (total)
Primary life support: 7 hours
Pressure: 0.4 atm
Sizing: Somewhat modular

A more recent photo of Orlan´s inside


MISSION CONTROL CENTER
CAPCOM
EXTRAVEHICULAR ACTIVITIES
(EVA)


NASA

ISS - the International Space Station

Altitude: 350-420 km altitude
Inclination: 51.6º
Normal atmosphere inside
Crew: 7

First part launched 1998

Permanently manned since November 2000

The International Space Station is a fantastic, unique lab, with views up to space, down on Earth and weightlessness

Weightlessness! (µG)

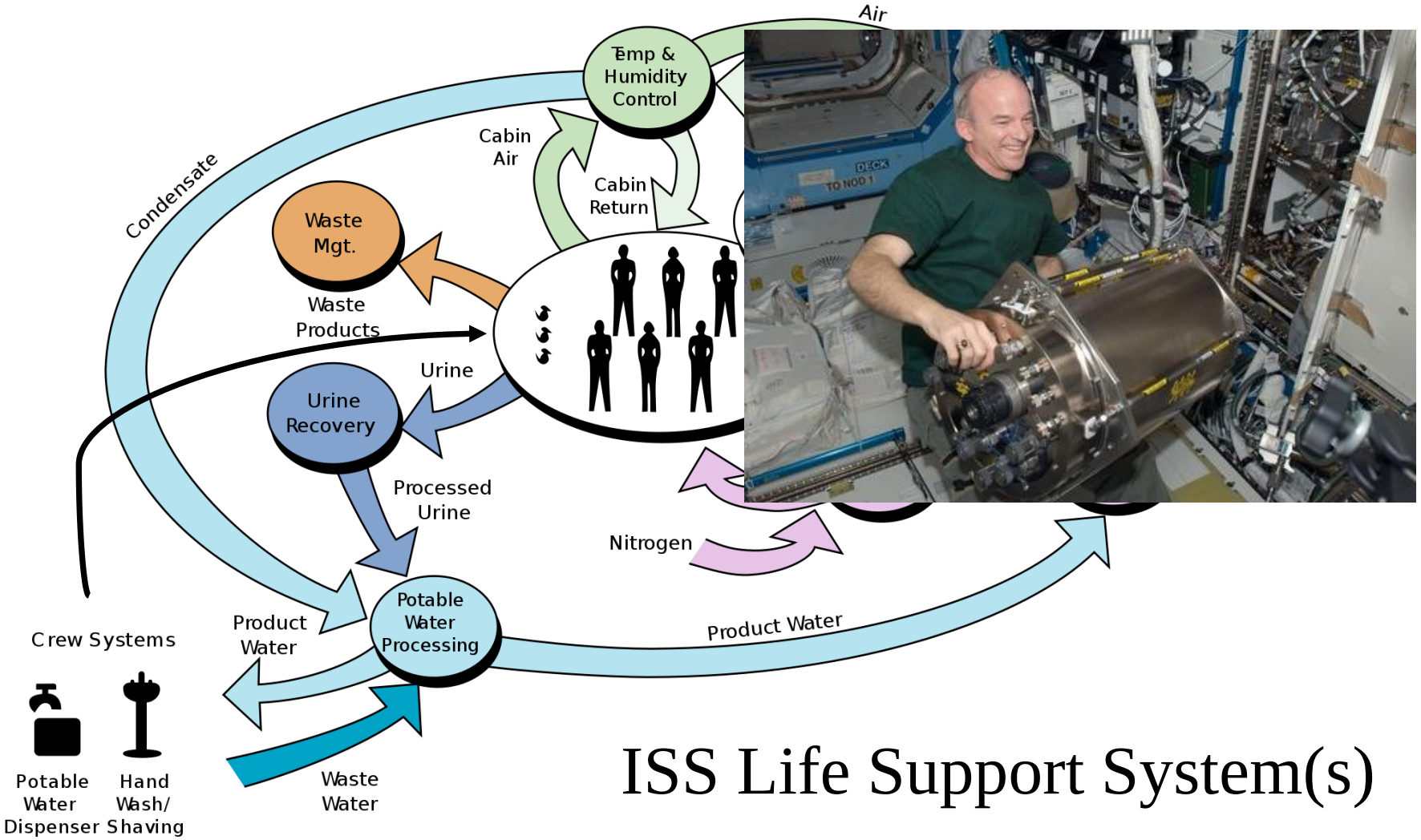
Physics

Biology

Medicine

Living in space:

Conserve your resources and recycle as much as possible!



ISS Life Support System(s)

3D-printing in space

Sleep

Hygiene

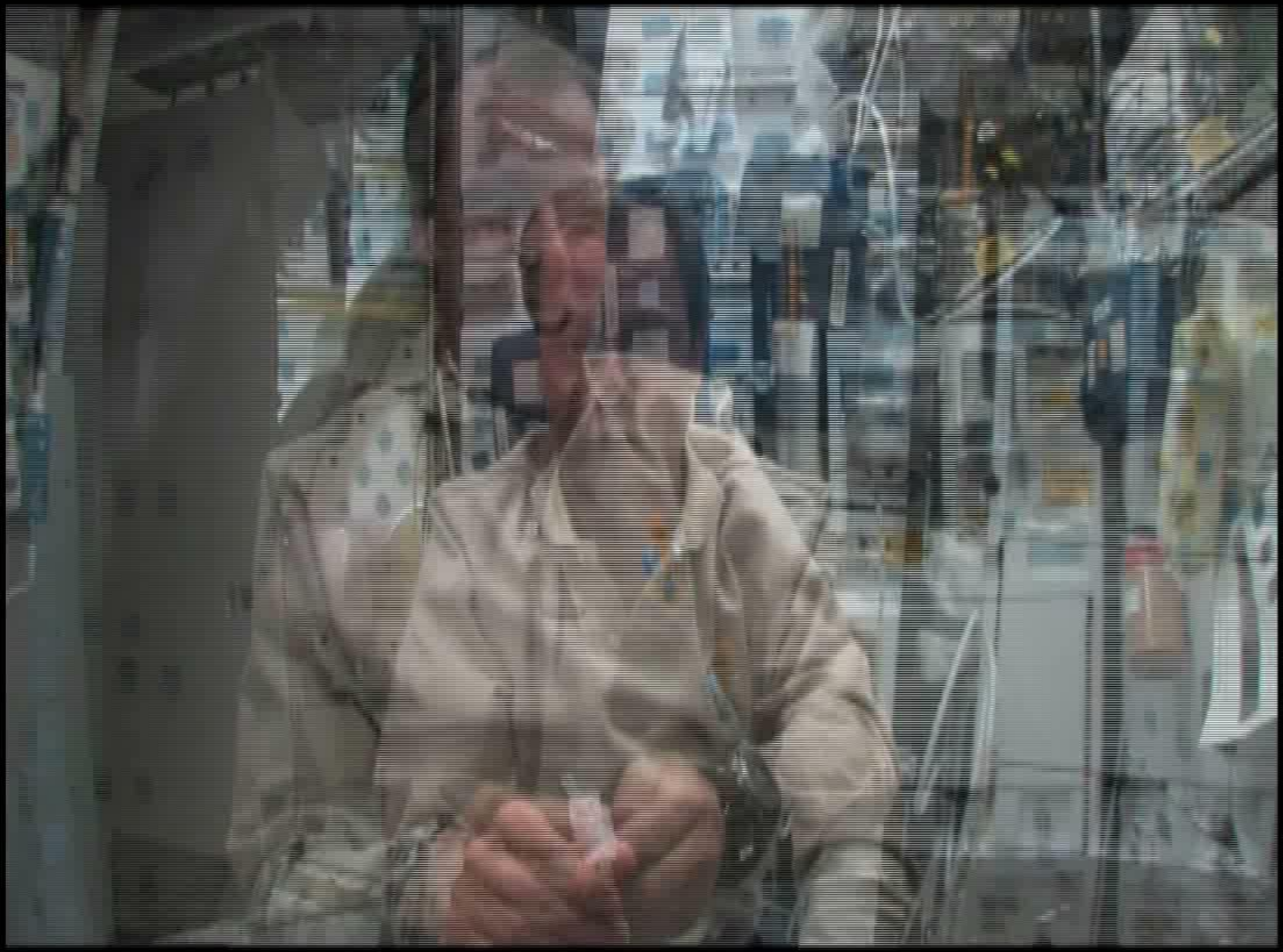
Excercise

Food

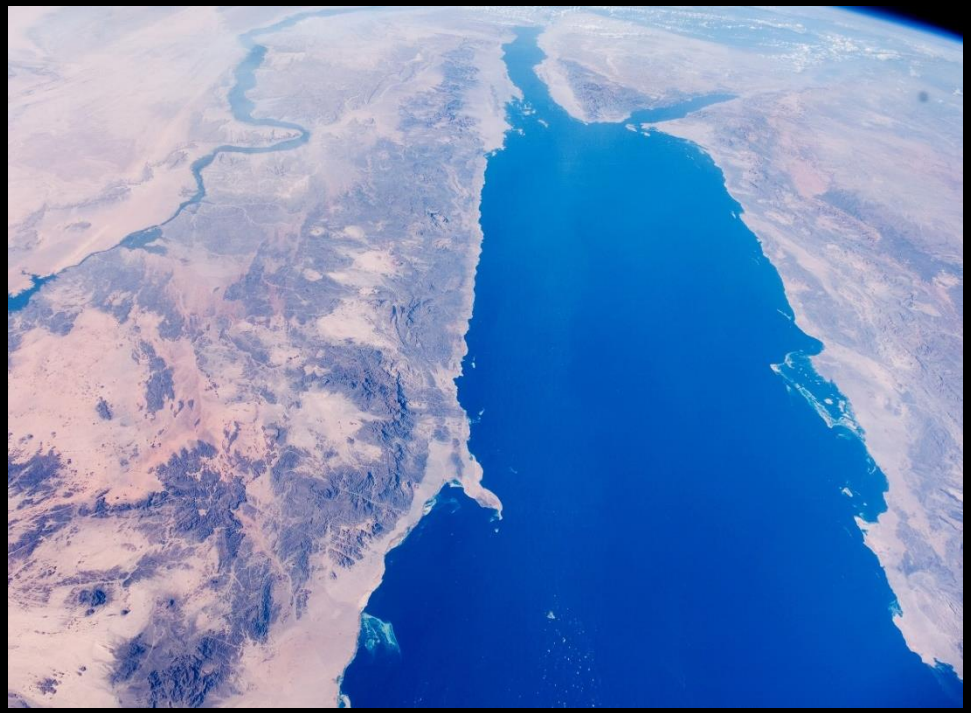

Kona Coffee
w/Cream & Sugar
Roman
09.08.09


MF14G
MF14H
MF28H
MF43G


PIZZA



Views from space



Fascinating colors and shapes in the oceans

Elizabeth Reef, Tasman Sea

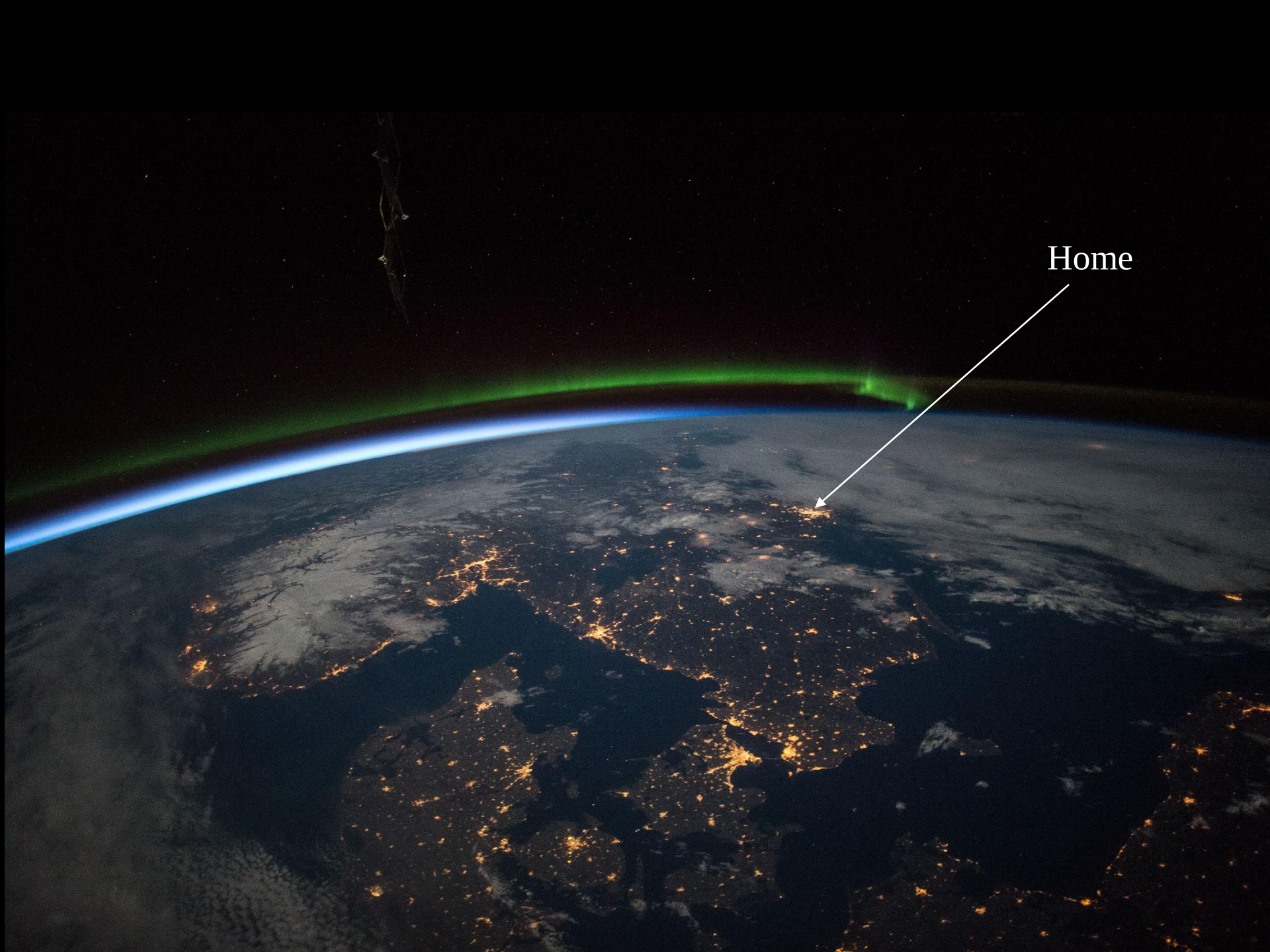
Occasionally human constructions are recognizable

A reservoir in Cameroon,
near the Mbam River

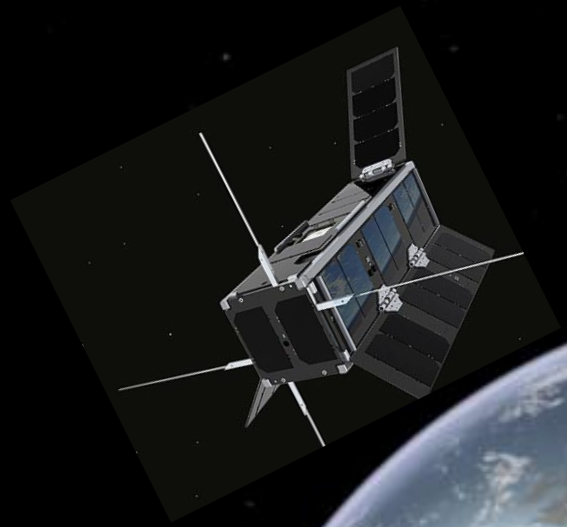
But night times there are thousands of dots of lights from cities

Southern Italy


The atmosphere looks so fragile!


Home

Space - Infrastructure for humans on Earth



Communication

Weather forcast

Earth observation

Navigation

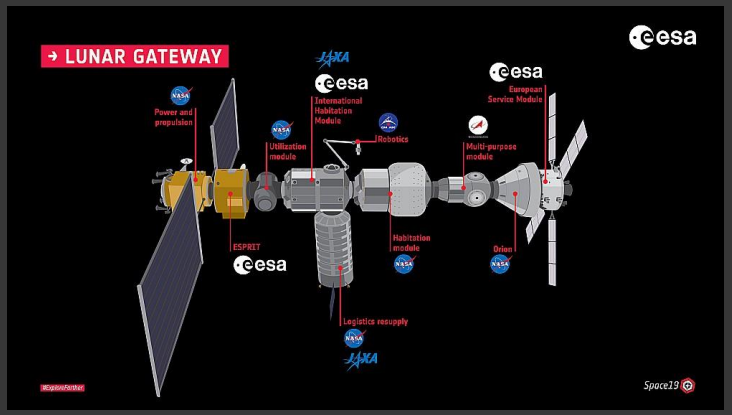
Time synchronisation

Research, Science
Exploration and
Inspiration!

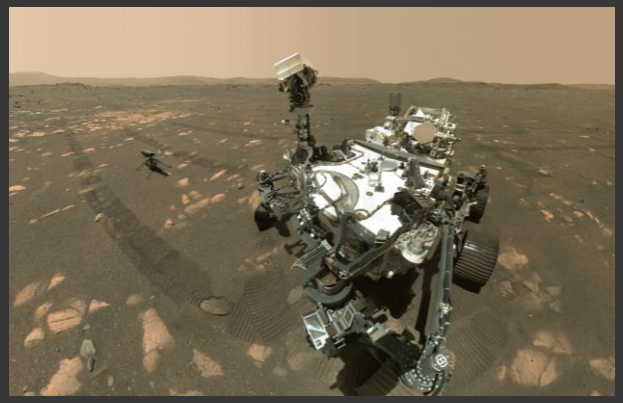
New launchers open new possibilities in space

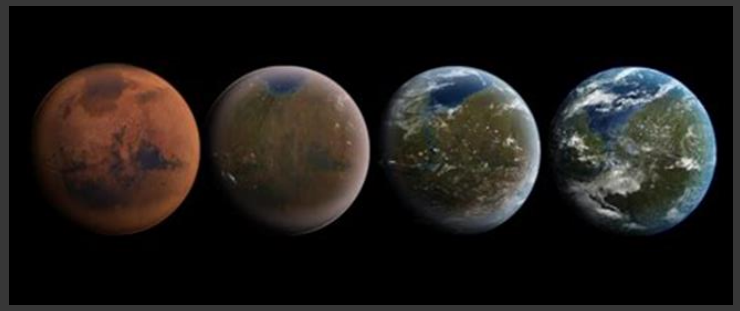
Big and small. Resusability.

Back to the Moon ca 2025-26

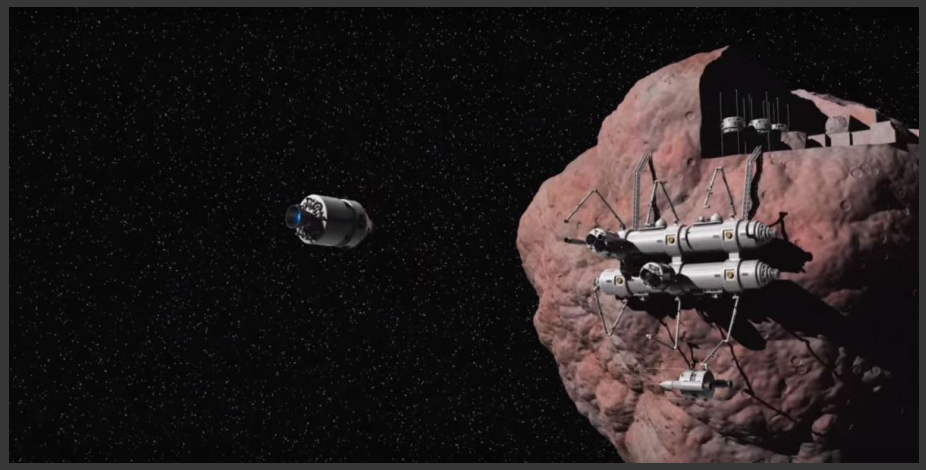


Mars in the late 2030:ies – and forward

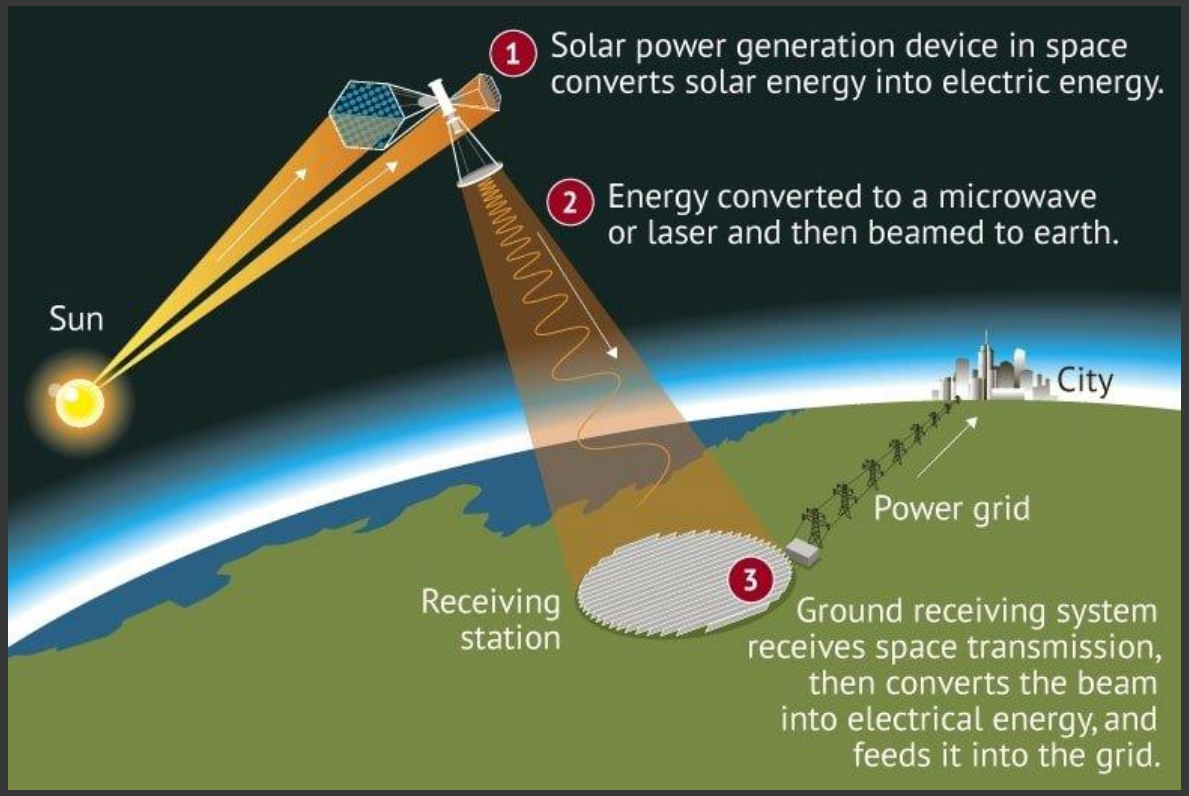


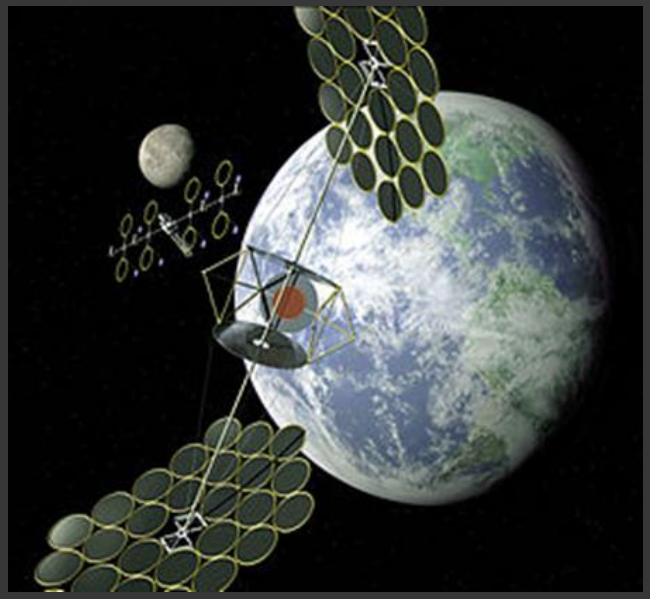


Mining asteroides



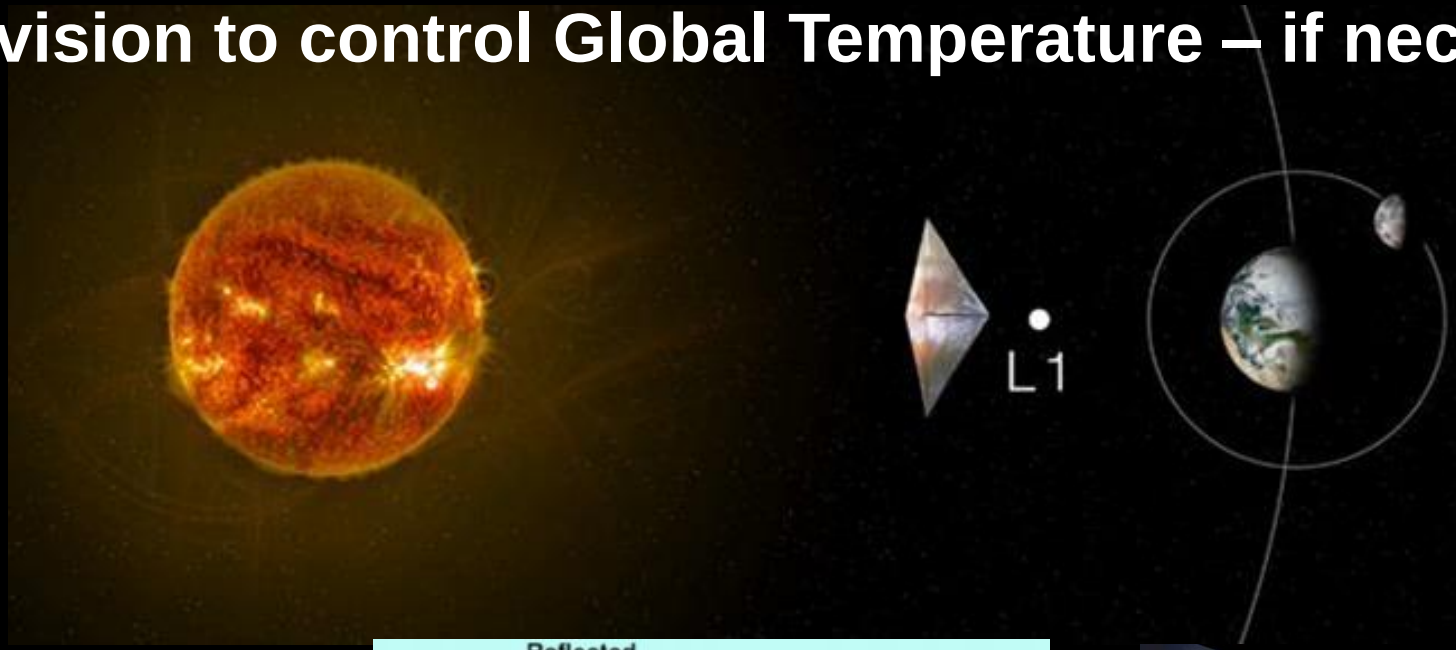
Space based electric powers production



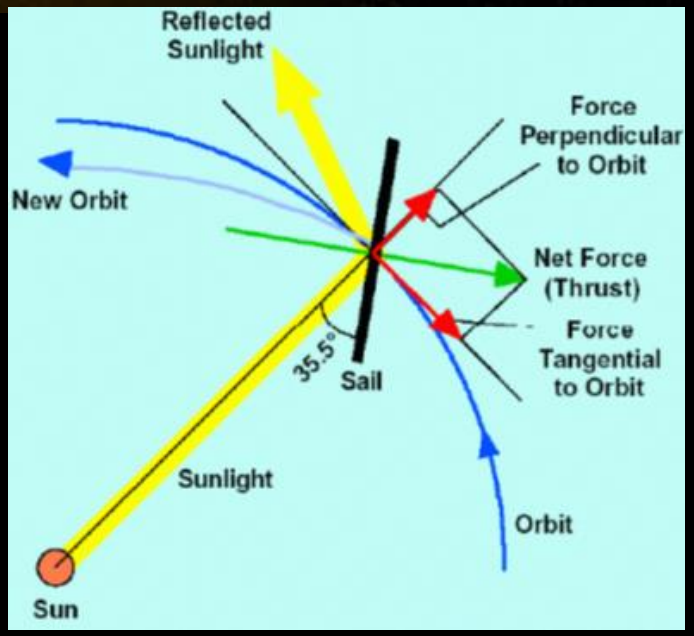


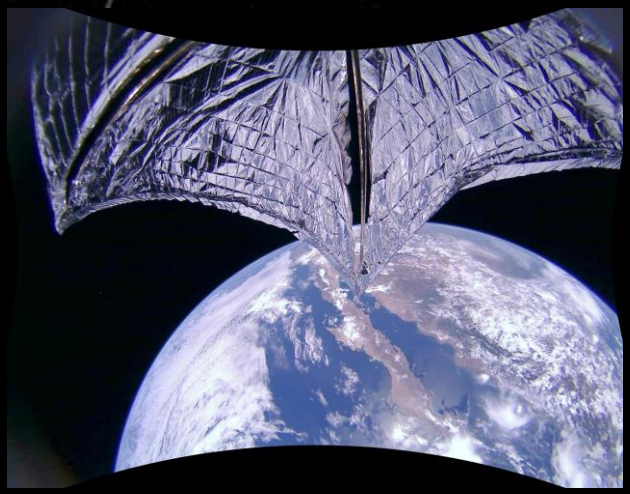
Sunshade near the Sun-Earth Lagrange point L1

A vision to control Global Temperature – if necessary



Solar sailing
to get there
”for free”





LightSail 2
Launched July 2019


Everyone wants to go to space!
Right?

Space tourism

Space hotels


Thank you!
Questions?
Total log: 17.840.661 km