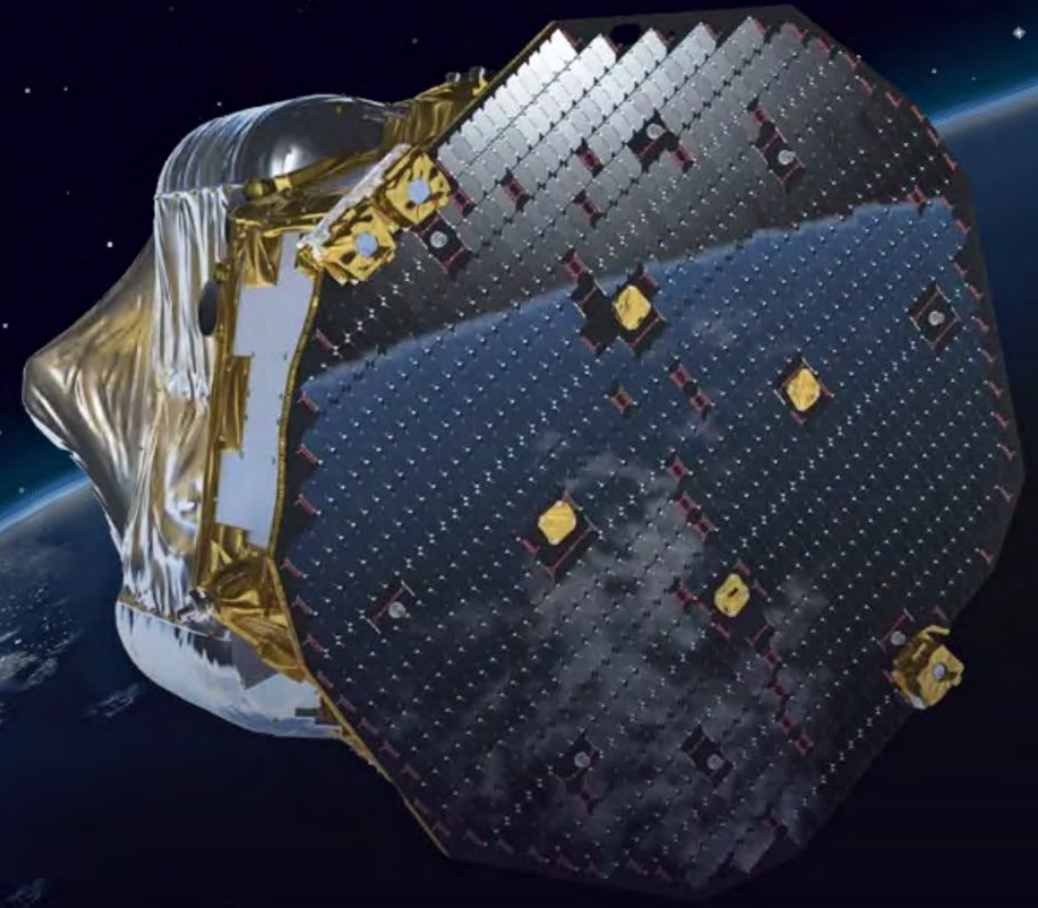


ETH Zurich | Space

Von der Forschung zu den Raumfahrtmissionen der Zukunft

Dr. Florian Kehl

Tage der Technik, 24. September 2026



Mission statement



ETH Zurich | Space boosts space activities to establish ETH Zurich as the leading university in space research and Earth observation, education and entrepreneurship within Europe and beyond.



<https://space.ethz.ch/>
[www.linkedin.com/
company/eth-zurich-space/](https://www.linkedin.com/company/eth-zurich-space/)



Thomas Zurbuchen
ETH Space Director



Richard Kornfeld
Managing Director

ETH Zurich | SPACE – Vision & Goals Going Forward



Education

Serve as a (and eventually the) premier (Aero-) Space Engineering teaching & research program in Europe



Research

Increase the rate of flight opportunities for PIs based in the Swiss space ecosystem (both science & tech demo).



Entrepreneurship & Industry Collaborations

Serve as a catalyst for entrepreneurship in space and to maximize synergies in the space ecosystem in Switzerland, Europe and beyond.



GeoLab

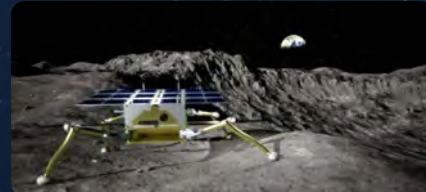
Transform abundant space data into practical solutions that create economic value and address Switzerland's most pressing challenges



LIFE Space Mission

Position Switzerland at the forefront of exoplanet exploration through the development of a flagship mission to detect habitable worlds and search for signs of life.

Serve as technical center of excellence for supporting or guiding Swiss space policy.



PROJECT HUB PORTFOLIO

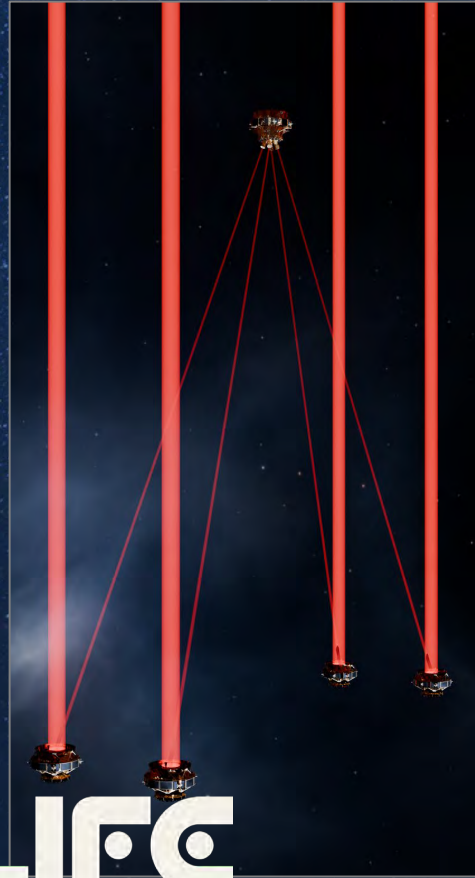
LunarLeaper

PIs: A. Mittelholz & M. Hutter



LIFE

PI: S. Quanz



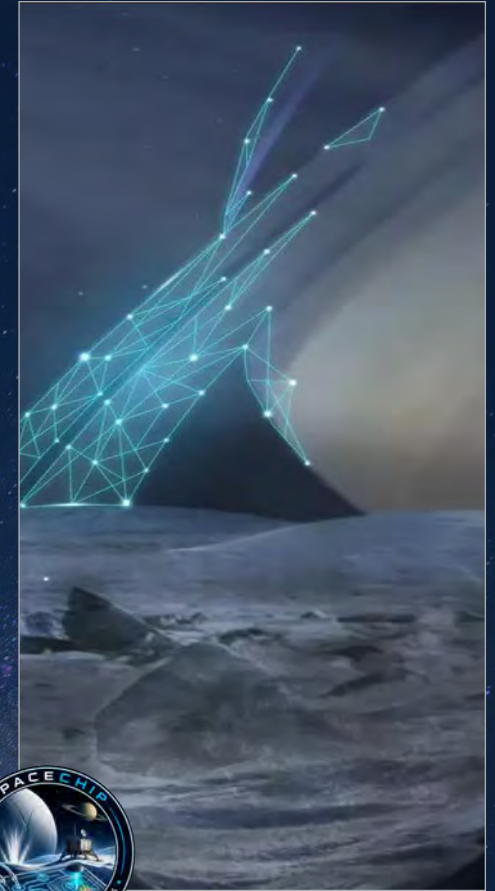
LISA

PIs: D. Giardini & M. Vallisneri



SpaceChip

PI: F. Kehl



ETH zürich



Lunar
Leaper



maxon



beyond gravity

Royal Observatory
of Belgium

u^b

UNIVERSITÄT
BERN



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Home Affairs FDHA
State Secretariat for Education and Research SER
Swiss Space Office



LunarLeaper

The challenges of building a legged robot on the Moon

Anna Mittelholz, Simon Stähler, Hendrik Kolvenbach

Valentin Bickel, Leon Brendel, Joseph Church, Aurélie Cocheril,
Oliver Fischer, Adrian Fuhrer, Matthias Grott, Svein-Erik Hamran,
Marco Hutter, Ozgür Karatekin, Richard Kornfeld, Elena Krasnova,
Judy Lai-Norling, Charles Lambelet, Hans-Dieter Lang, Raffaella
Menet, Raphaël Naire, Sidharth Paranjape, Nicola Ramagnano,
Adrian Senn, Nico Steinert, Yusuke Tanaka, Marco Trentini,
Christian Vogt



Swiss National
Science Foundation

**Lunar
Leaper**

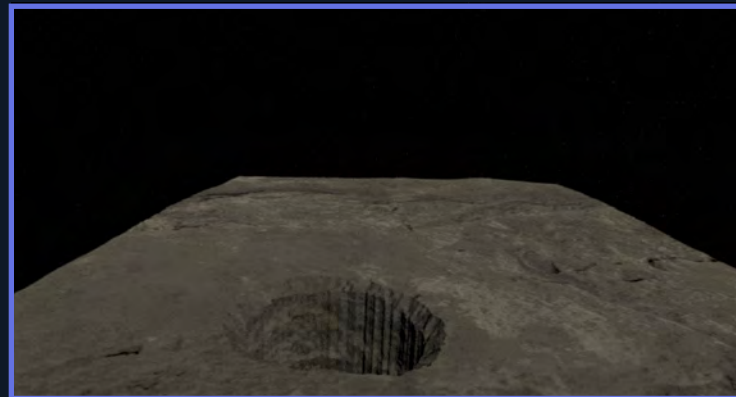
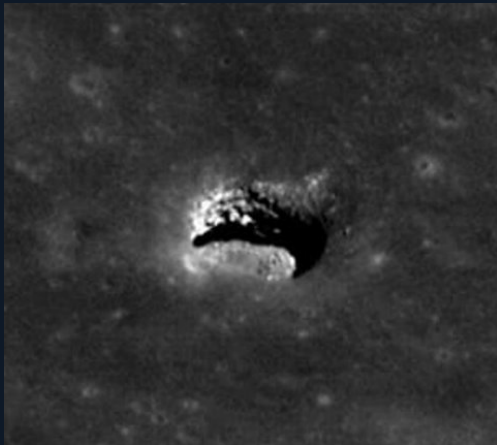
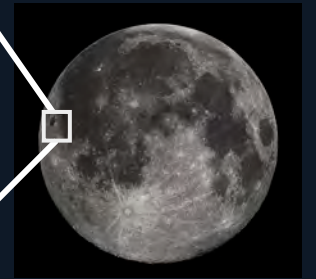
Our mission

Our goals

The robot

Challenges

Our Mission: Exploring Lava Tubes on the Moon



The Marius Hills Pit

Lunar Leaper

Our mission

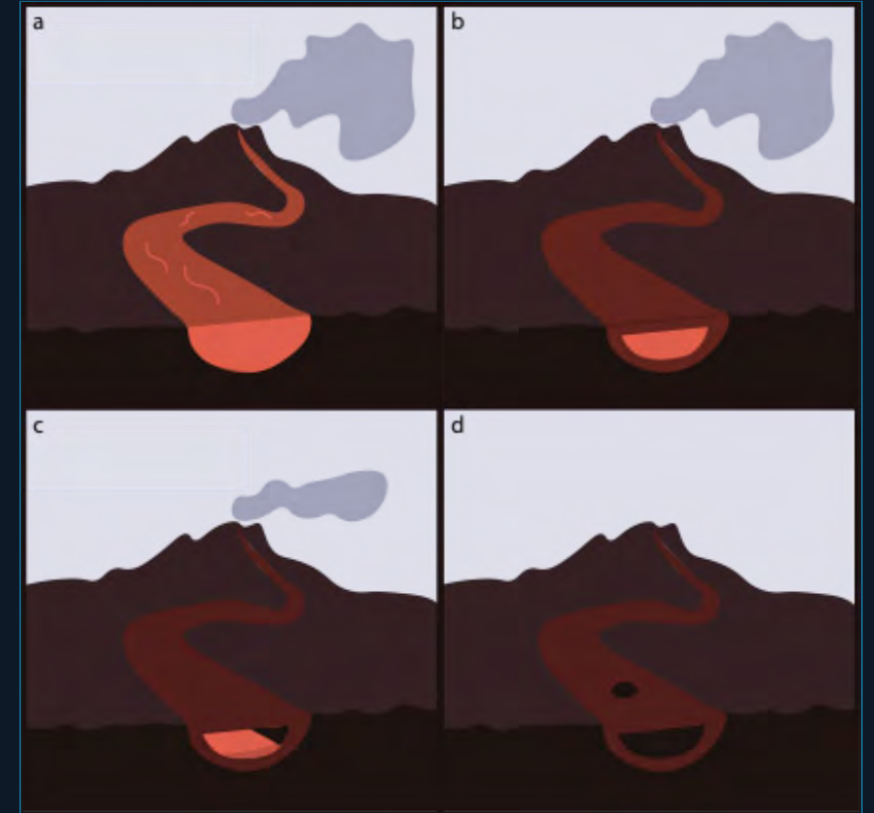
Our goals

The robot

Challenges



Wikipedia: Thurston Lava Tube im [Hawai'i-Volcanoes-Nationalpark](#), right: WGS/DNR



Lunar Leaper

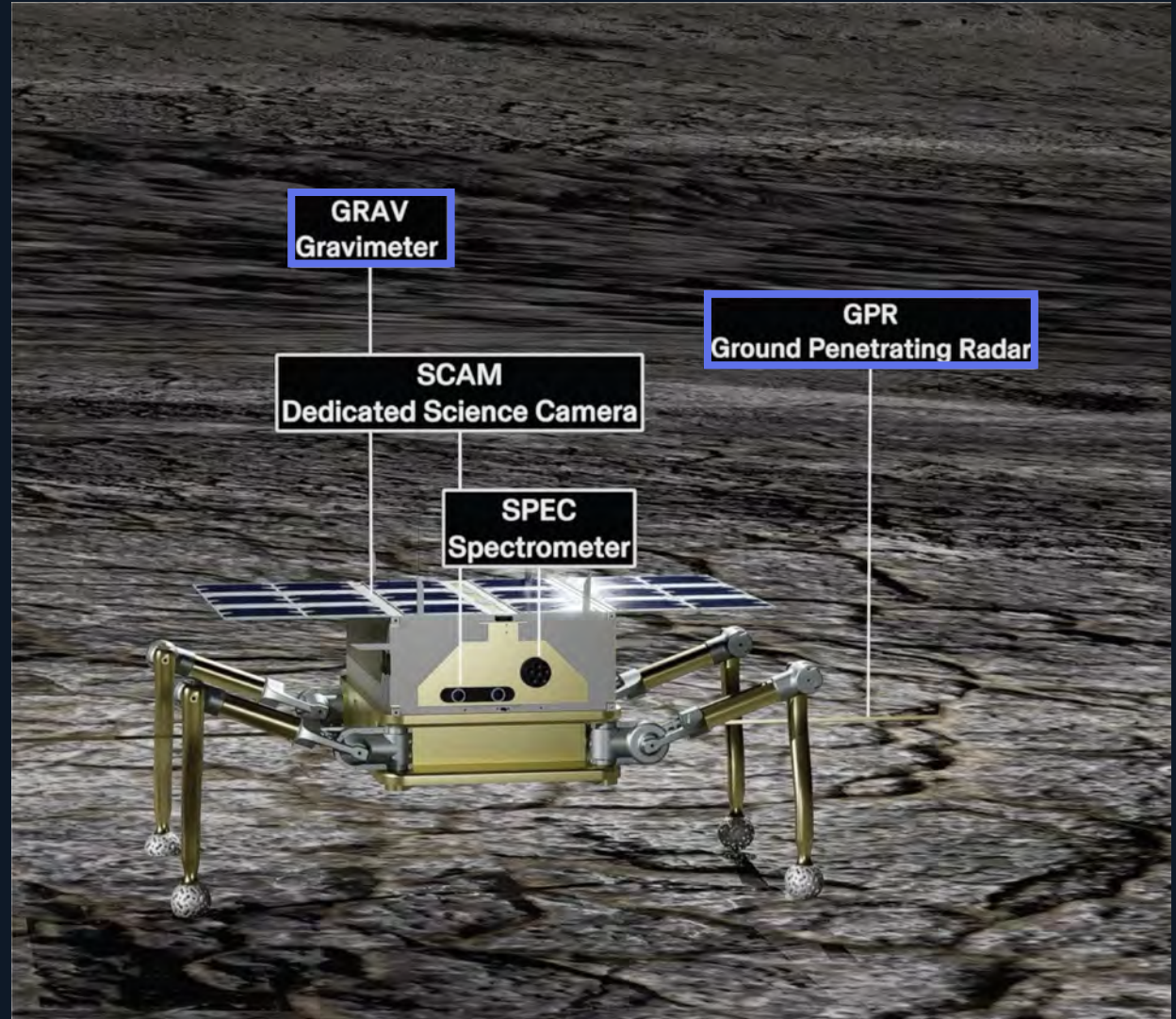
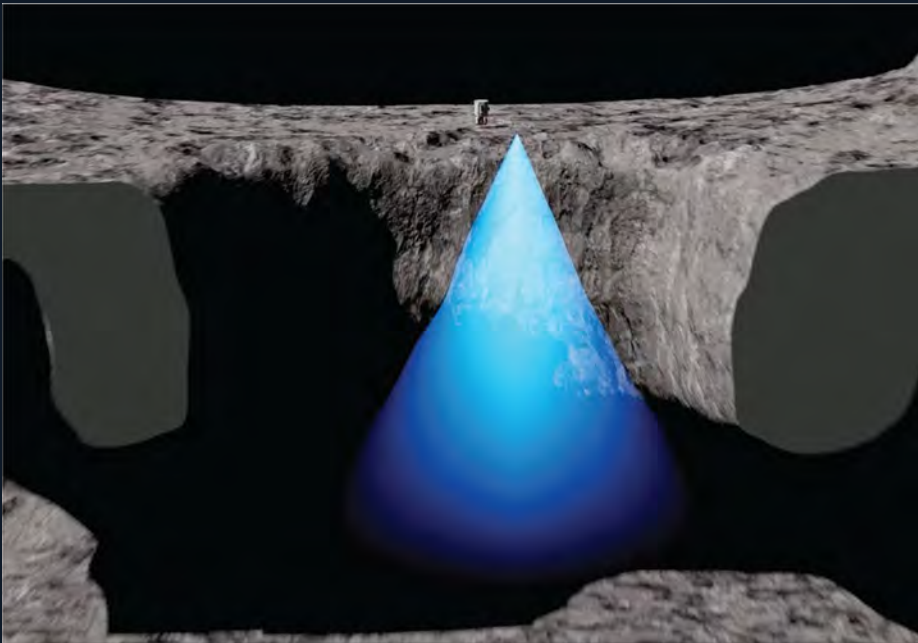
Our mission

Our goals

The robot

Challenges

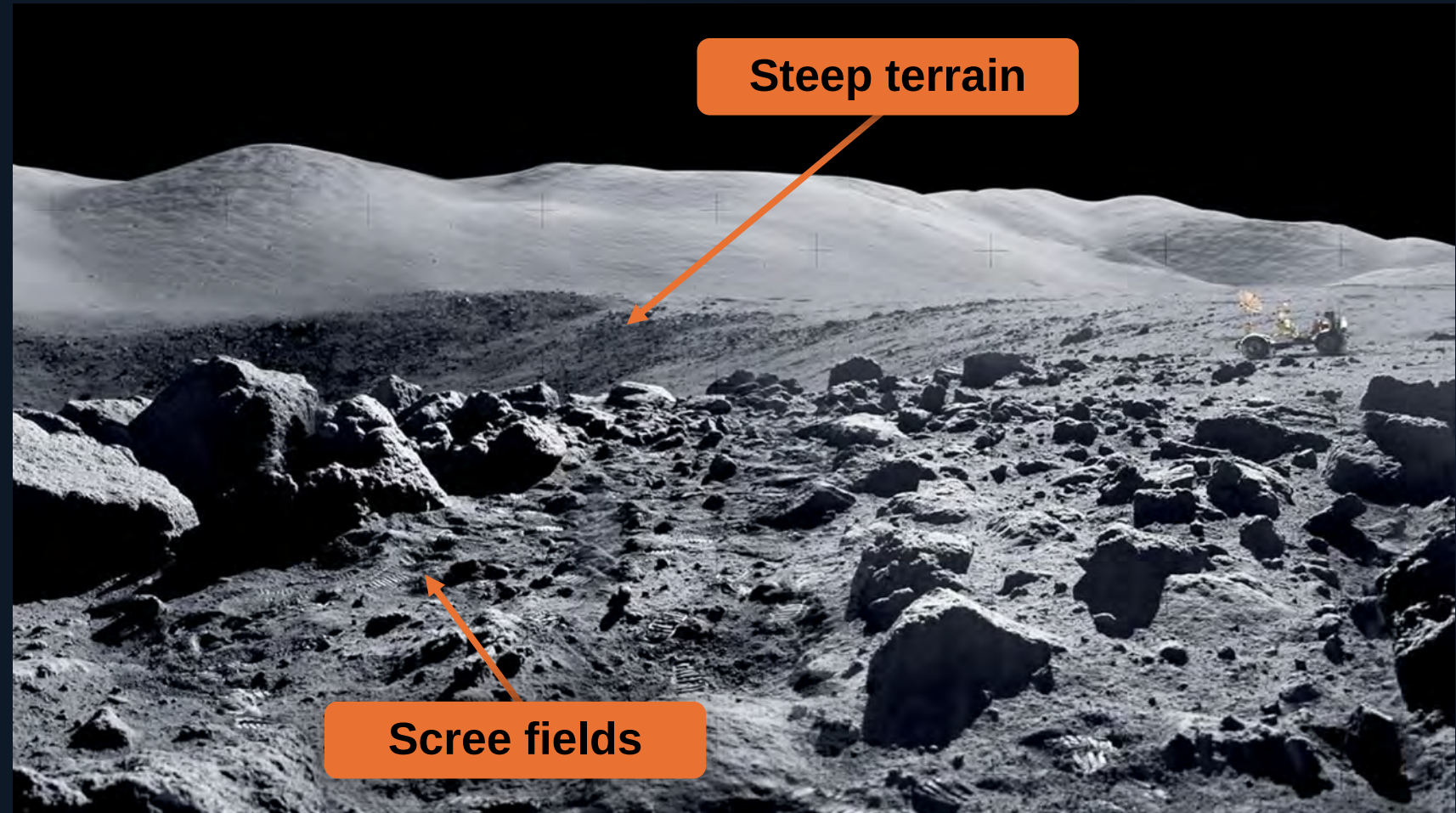
Characterization of the subsurface



Credit: M. Tempest

Legged robot

**Demonstrate
legged
locomotion on
the Moon**



PROJECT HUB PORTFOLIO

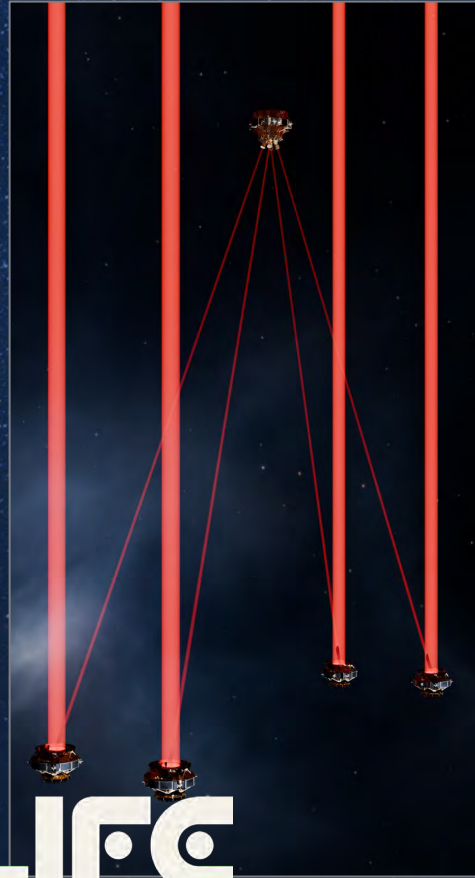
LunarLeaper

PIs: A. Mittelholz & M. Hutter



LIFE

PI: S. Quanz



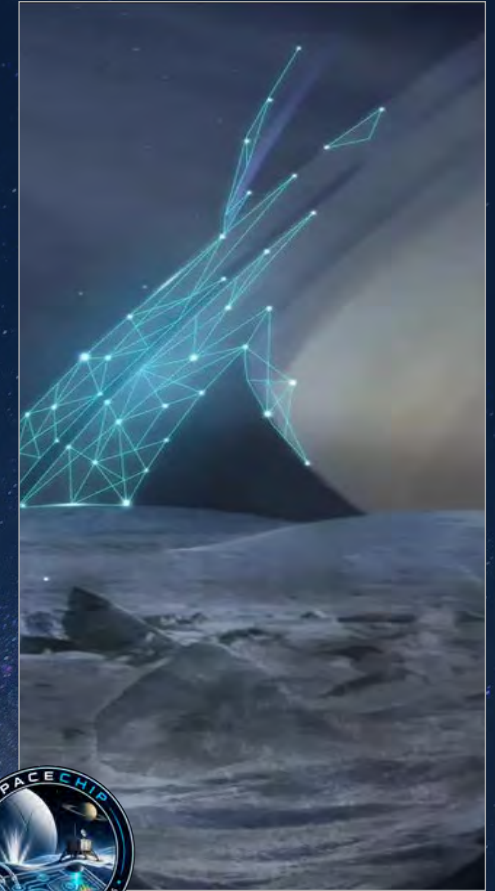
LISA

PIs: D. Giardini & M. Vallisneri



SpaceChip

PI: F. Kehl



A screen capture from the movie "E.T. the Extra-Terrestrial" showing the alien's face and a hand holding a glowing object. A large red 'X' is superimposed over the center of the image.

DIE **SUCHE** NACH SPUREN VON EXTRA-TERRESTRISCHEM LEBEN

Screen capture "E.T. the Extra-Terrestrial"
Image credit: Universal Pictures, Amblin Entertainment



MOLEKULARE BAUSTEINE DES LEBENS



SCHLÜSSELZUTATEN FÜR LEBEN*

WASSER

ZEIT

CHEMIE

ENERGIE



Image credit: NASA/ESA/Hubble/HLA

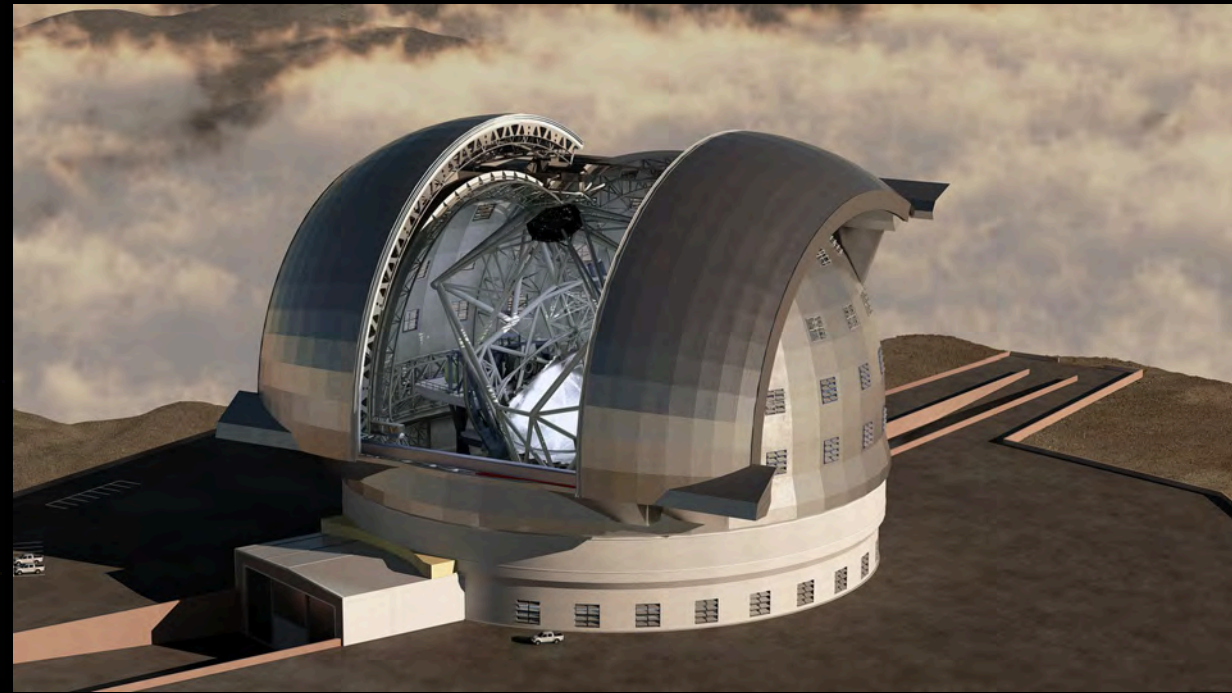
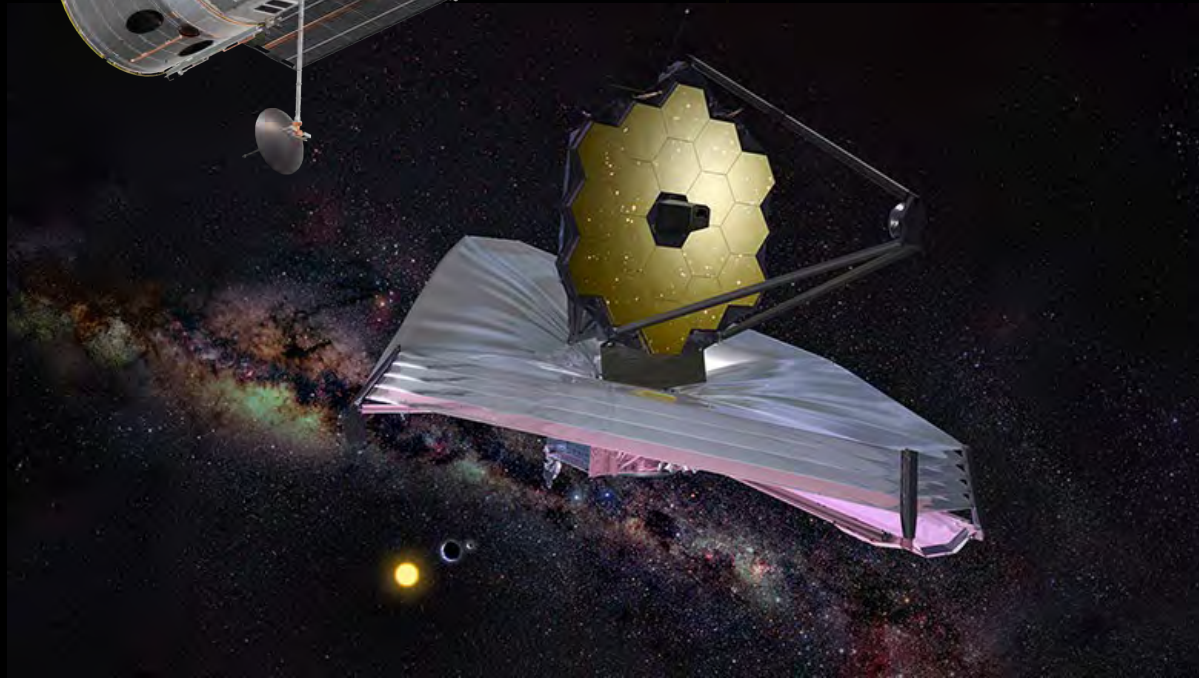
LET'S HUNT SOME ALIEN!

➤ ABER WO? ➤

Image Credit: NASA, ESA, Hubble, HLA;
Processing & Copyright: Domingo Pestana

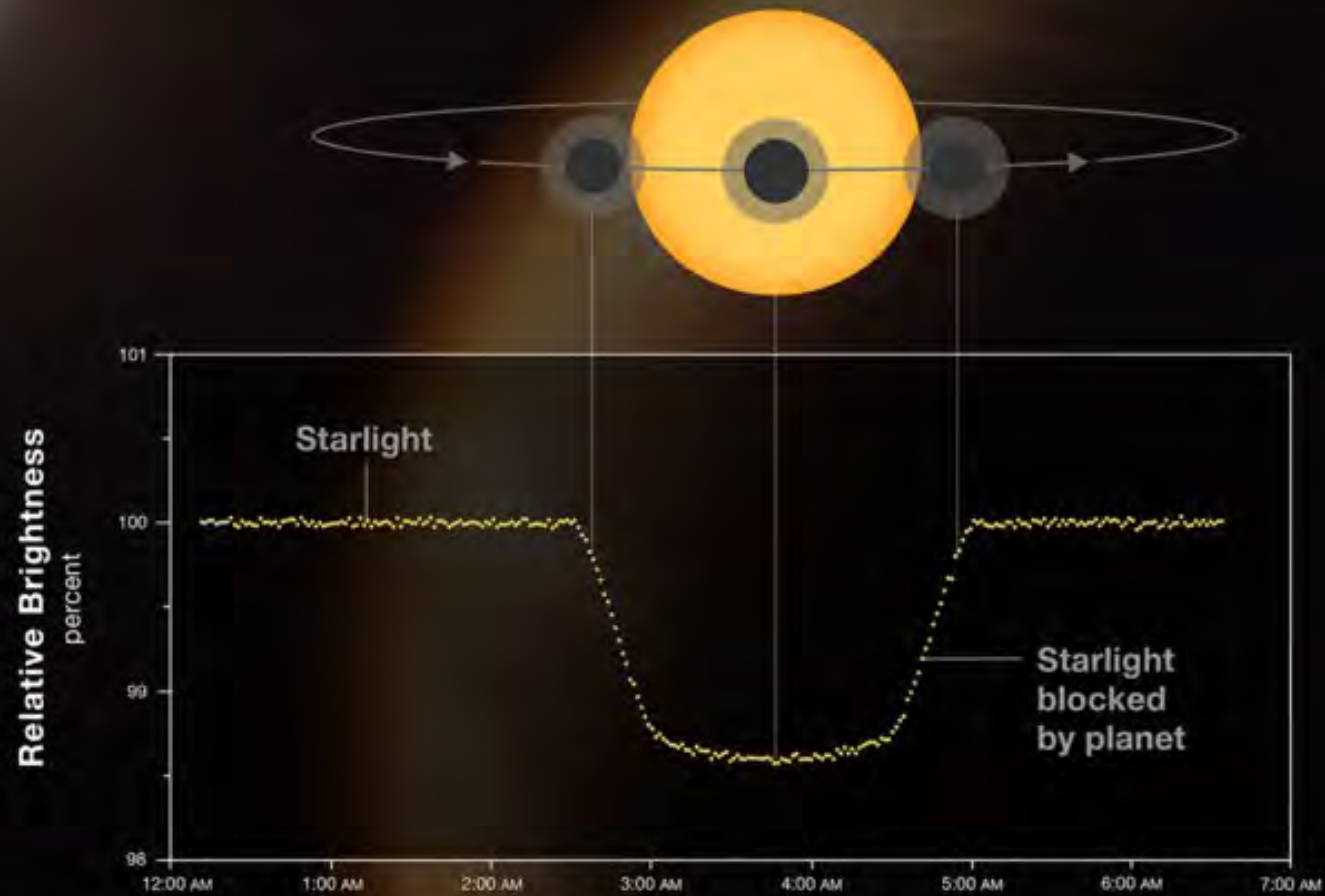
UND WIF?

REMOTE:
(MIT OPTISCHEN TELESKOPEN)



HOT GAS GIANT EXOPLANET WASP-96 b TRANSIT LIGHT CURVE

NIRISS | Single-Object Slitless Spectroscopy



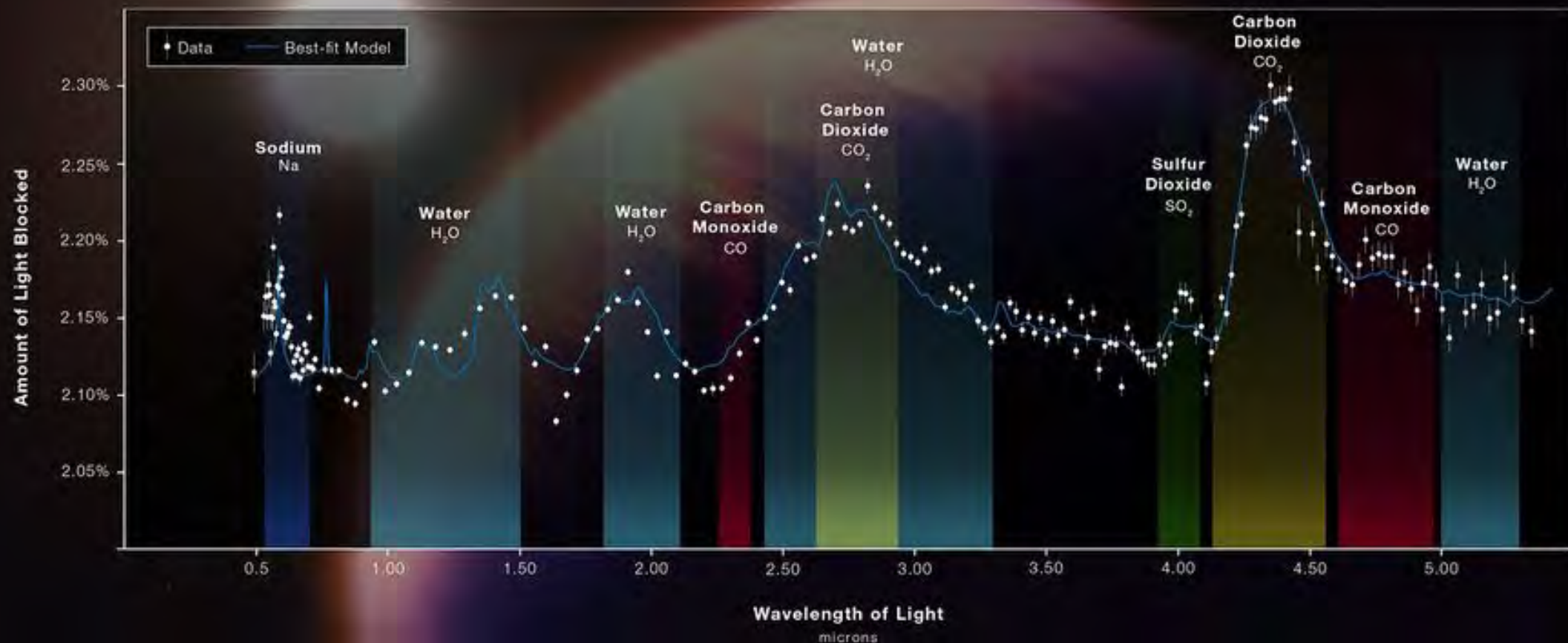
Time in Baltimore, Maryland
June 21, 2022

WEBB
SPACE TELESCOPE

HOT GAS GIANT EXOPLANET WASP-39 b

ATMOSPHERE COMPOSITION

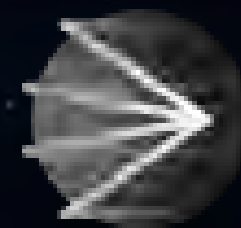
NIRSpec PRISM



WEBB
SPACE TELESCOPE



Prof. Dr. Sascha Quanz



LIFE

UND WIE?

REMOTE: TECHNOSIGNATUREN
(MIT RADIO TELESKOPEN)



UND WIE?

METEORITEN: KOSMISCHE BOTSCHAFTER

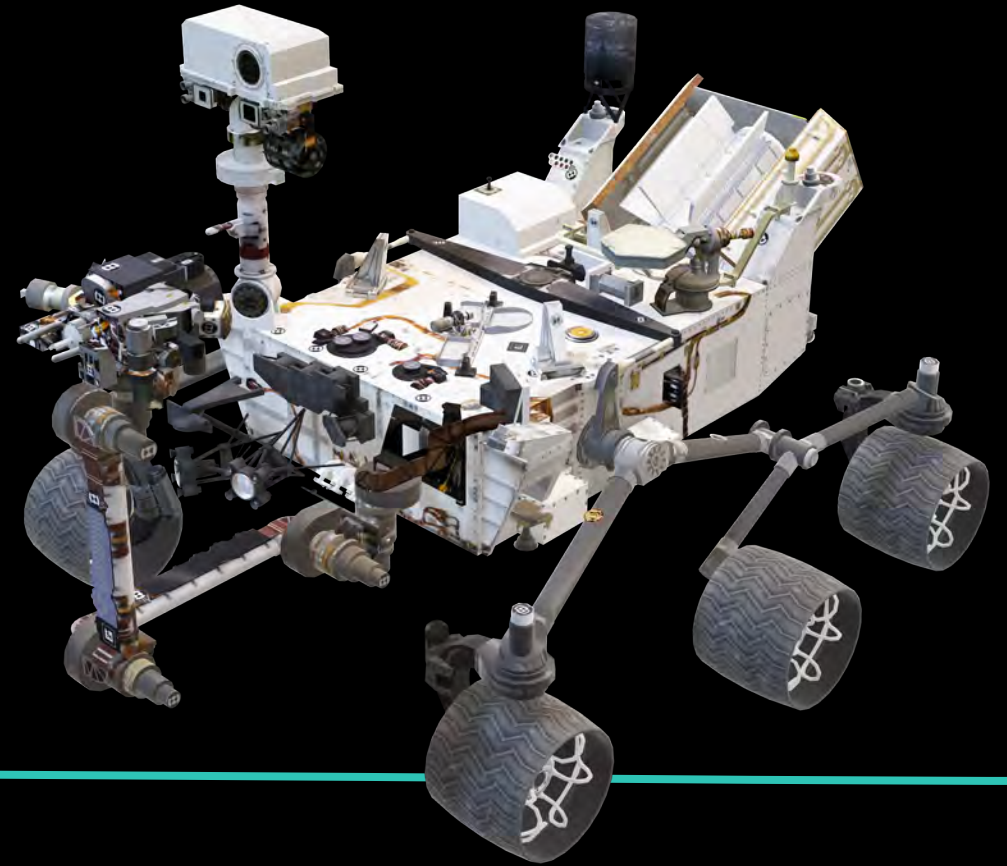


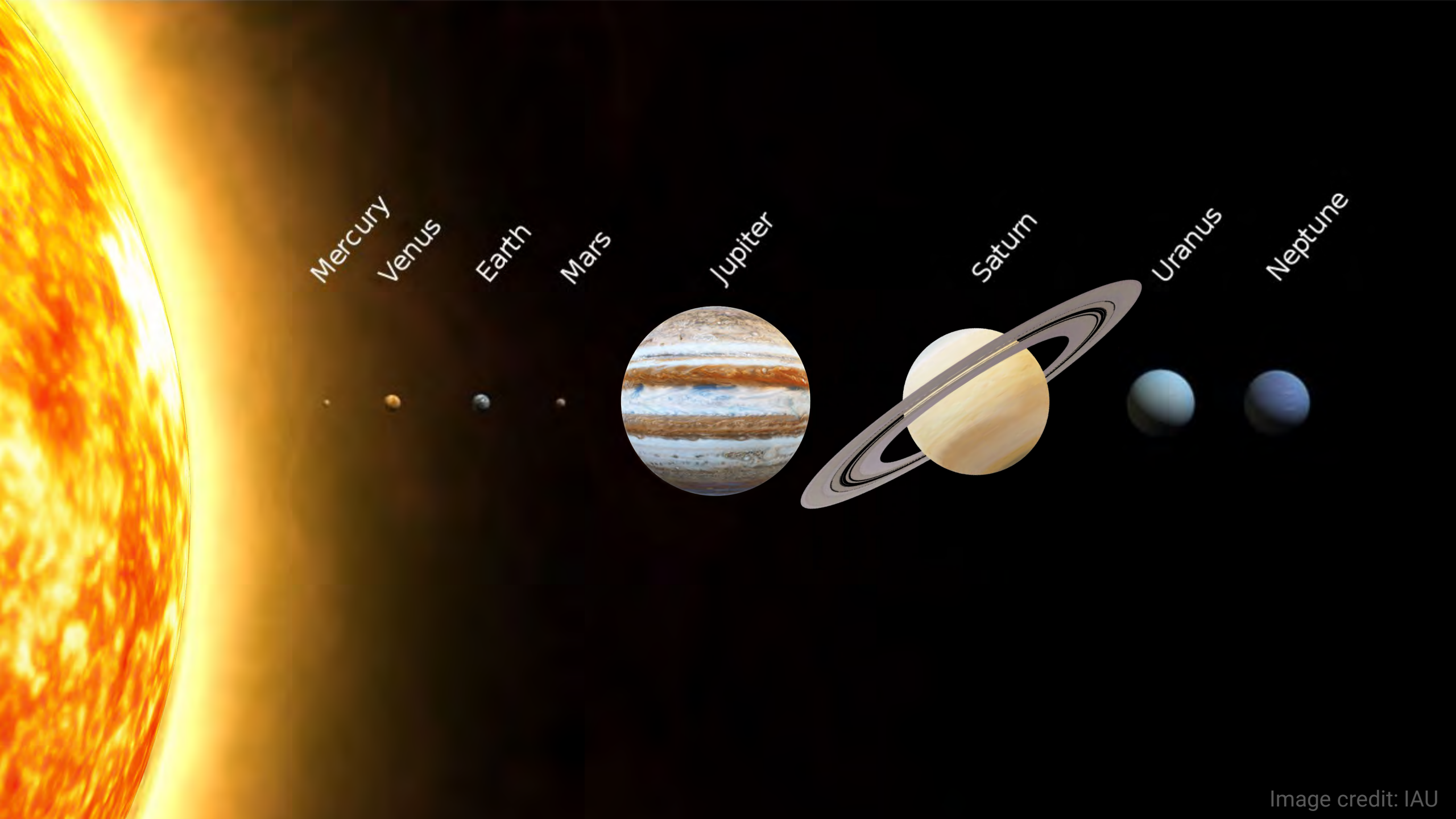
UND WIE?

IN-SITU: IN UNSEREM SONNENSYSYSTEM
(MIT ROBOTERN)



ESA/DLR/CNES/NASA





Mercury

Venus

Earth

Mars

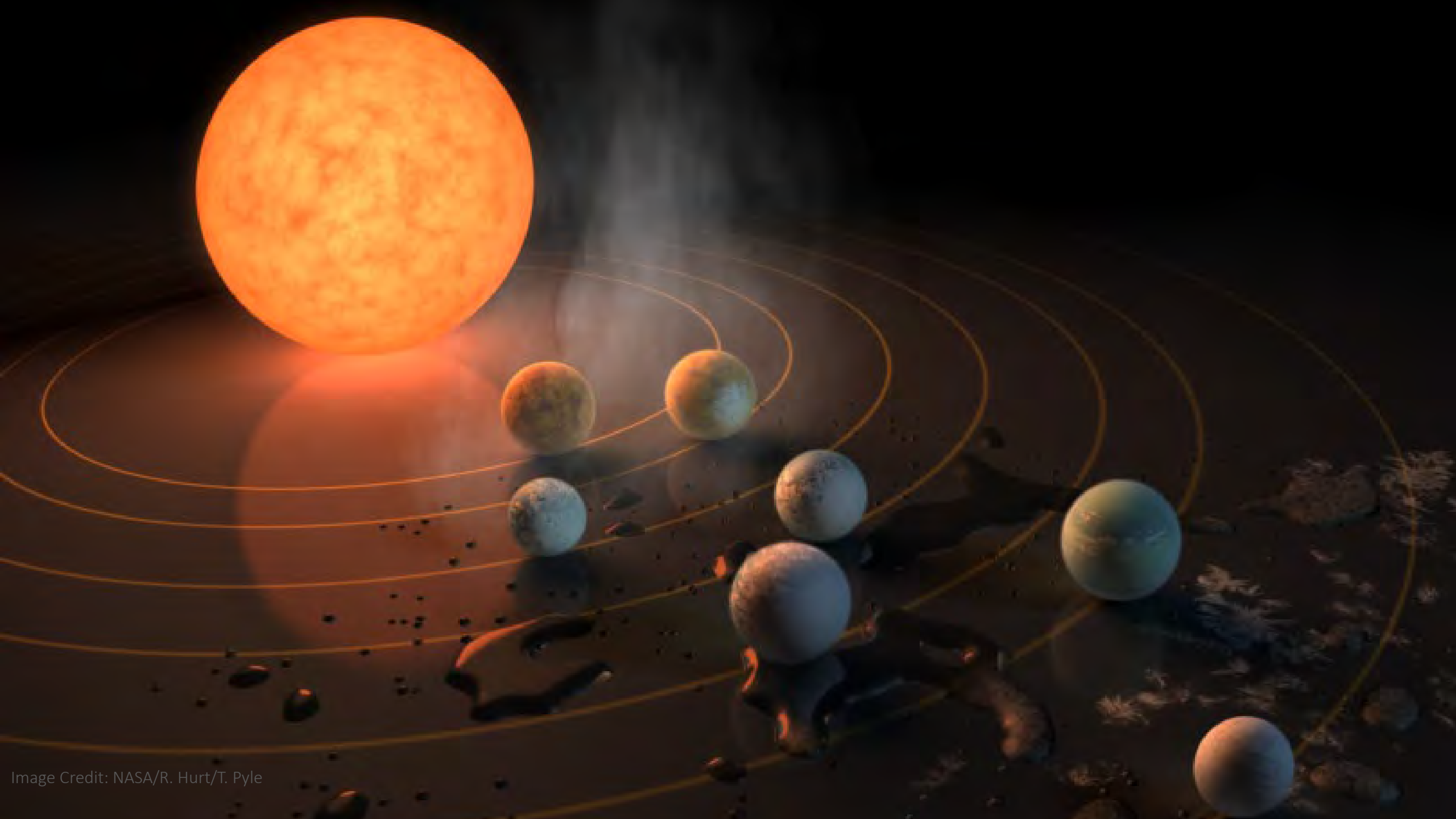
Jupiter

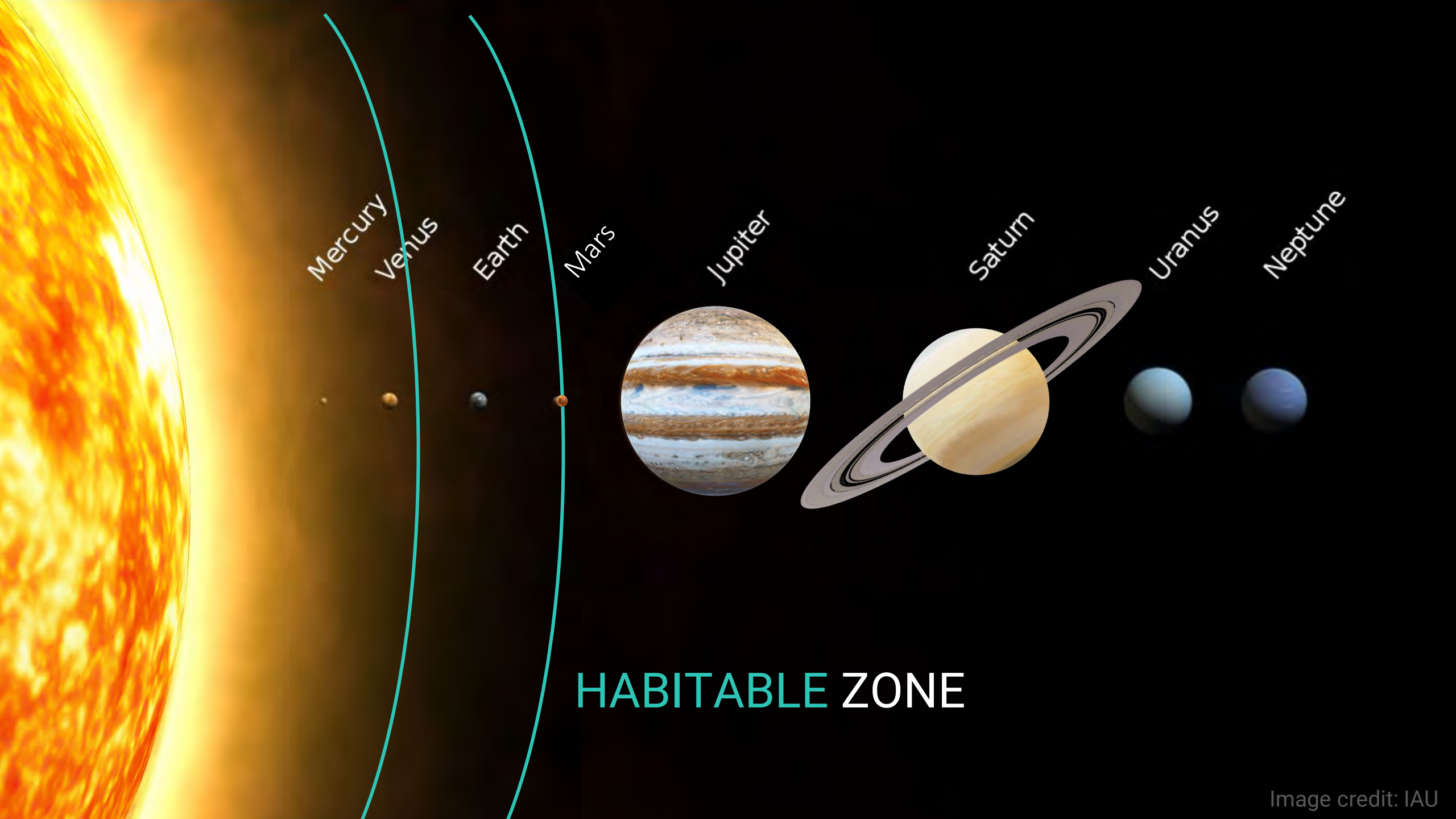
Saturn

Uranus

Neptune







Mercury

Venus

Earth

Mars

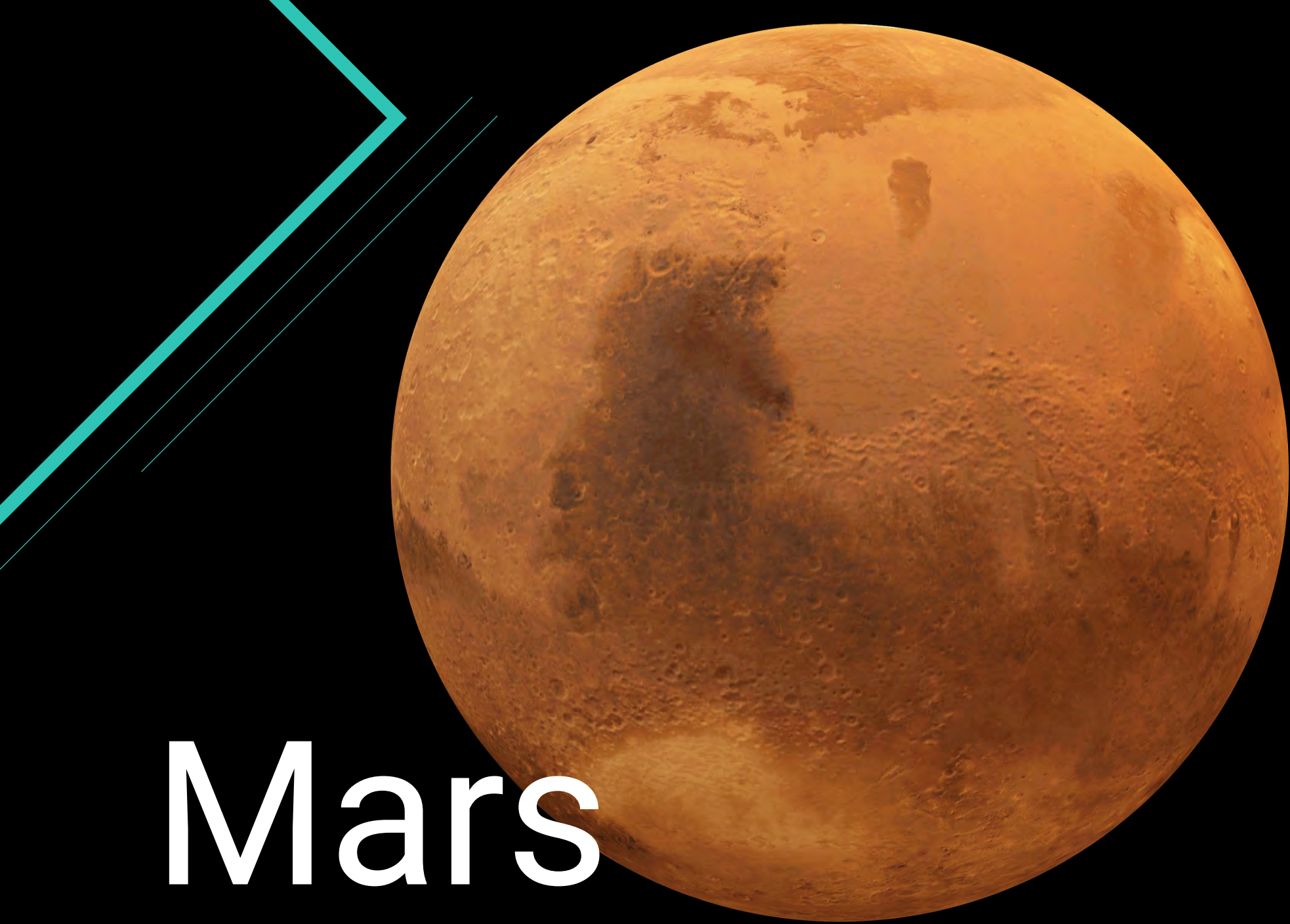
Jupiter

Saturn

Uranus

Neptune

HABITABLE ZONE



Mars

AUS DEM ORBIT

EHEM. FLUSSDELTA

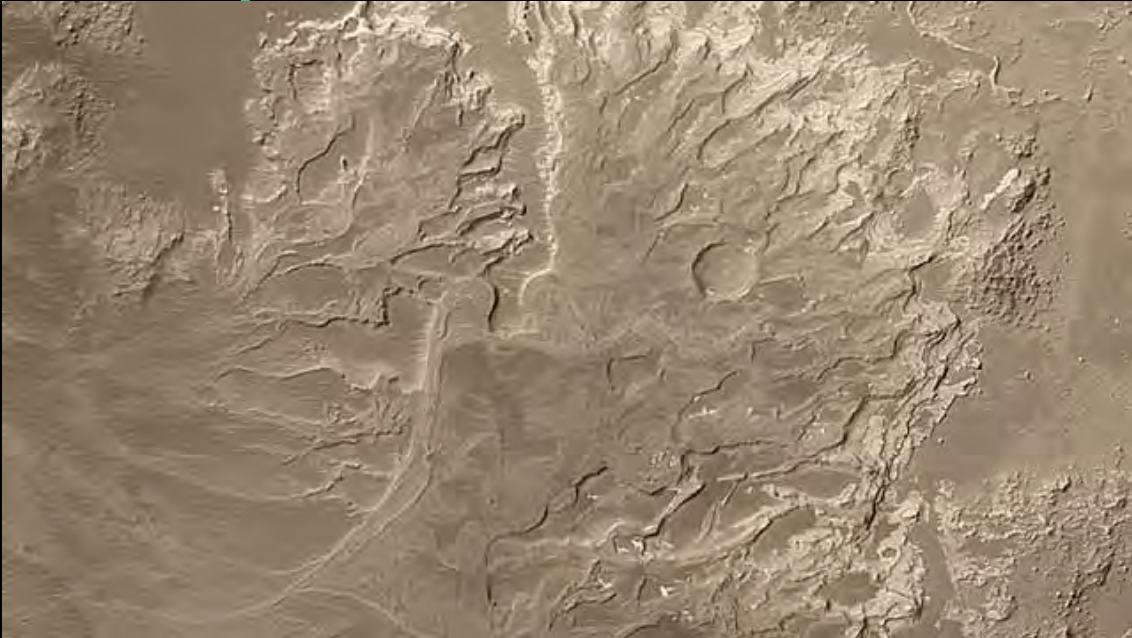


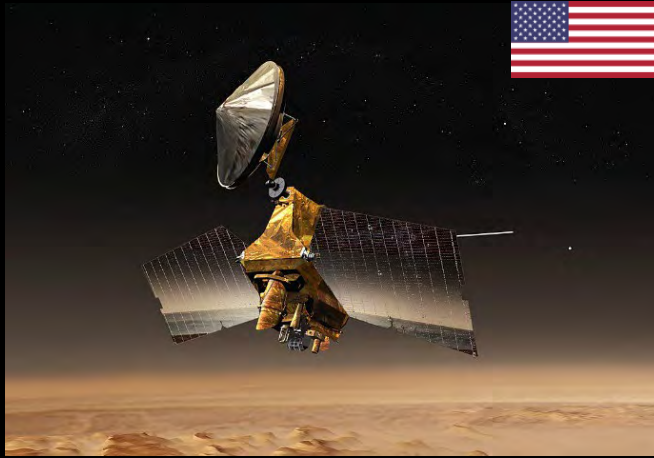
Image Credit: NASA/JPL-Caltech/MSSS

EHEM. FLUSSBETT

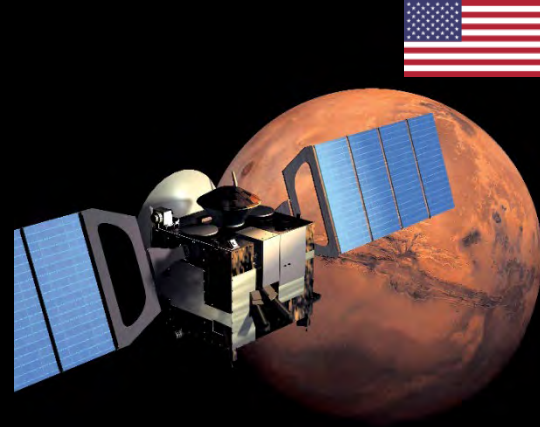


Image Credit: ESA/DLR/FU Berlin

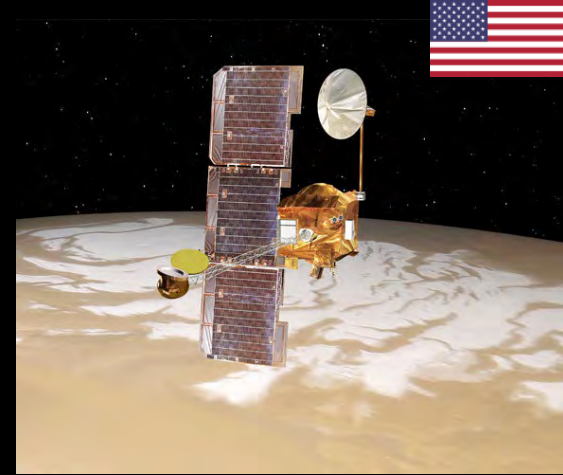
Mars Reconnaissance Orbiter



Mars Express



Mars Odyssey



MAVEN

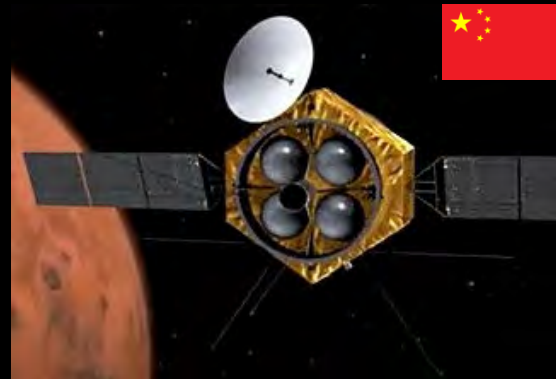


AUS DEM ORBIT

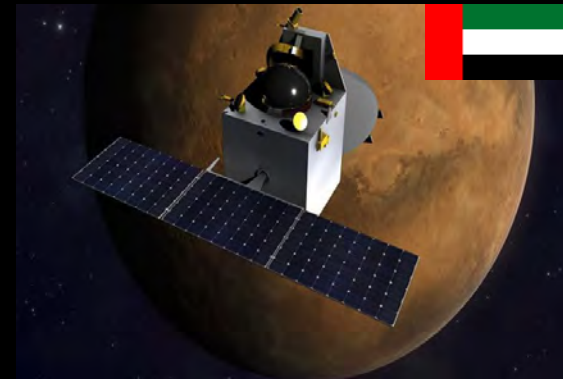
Trace Gas Orbiter



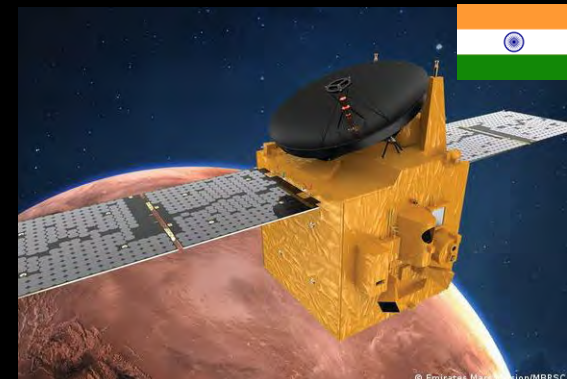
Tianwen-1



Emirates Mars Mission



Mars Orbiter Mission (Mangalyaan)



VON DER OBERFLÄCHE

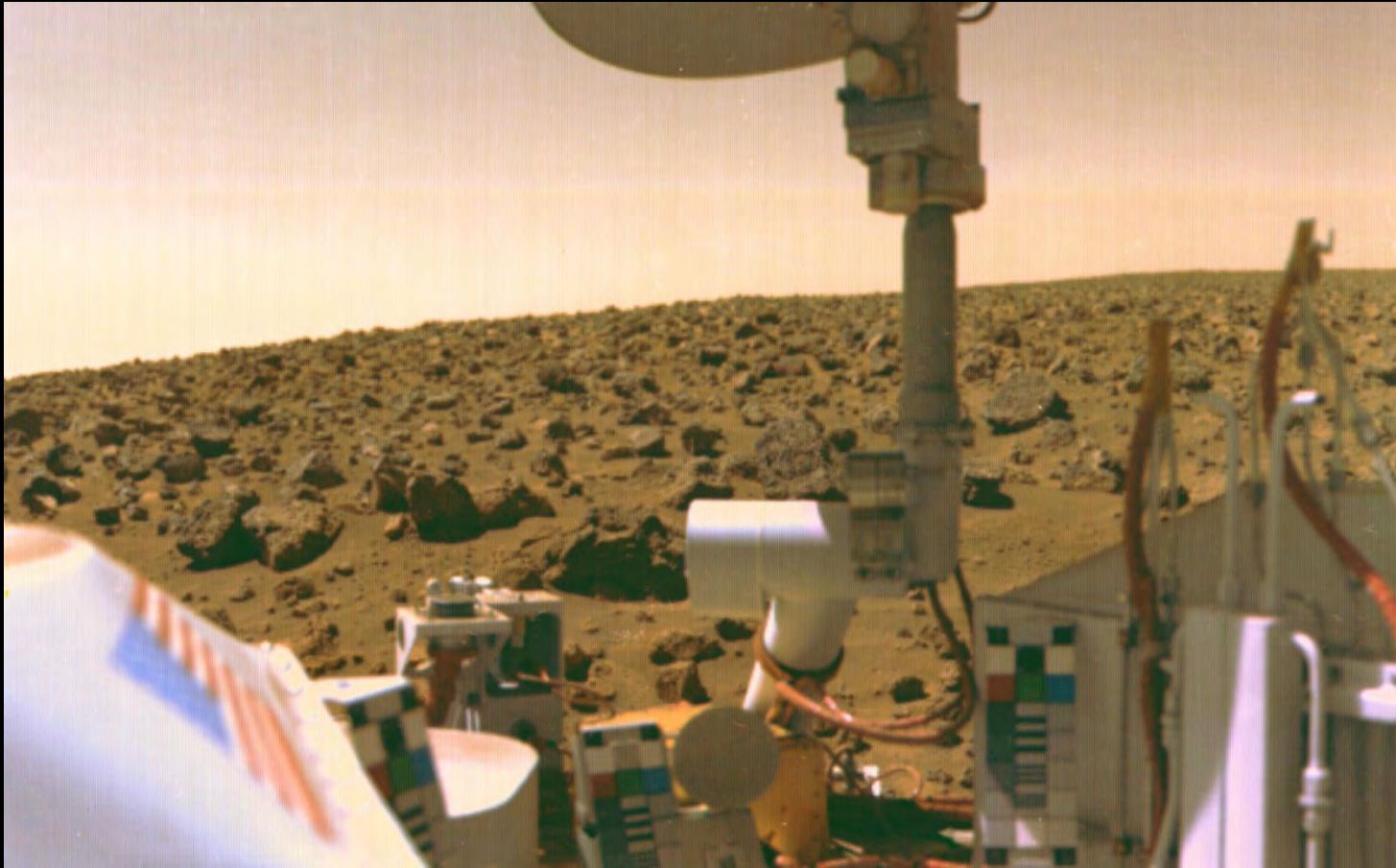
RUNDE MARS KIESELSTEINE



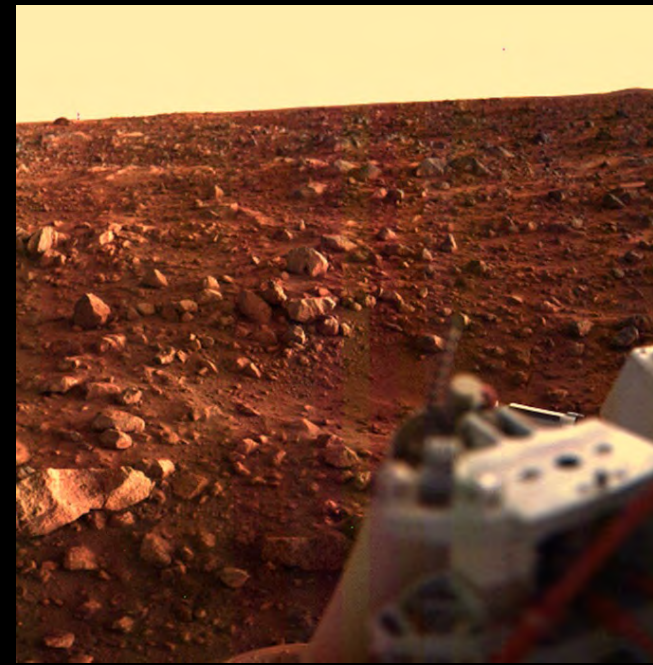
GETROCKNETER MARS SCHLAMM



VON DER OBERFLÄCHE



VIKING 1 & 2
1976



VON DER OBERFLÄCHE

MARS EXPLORATION ROVERS
"SPIRIT" & "OPPORTUNITY"

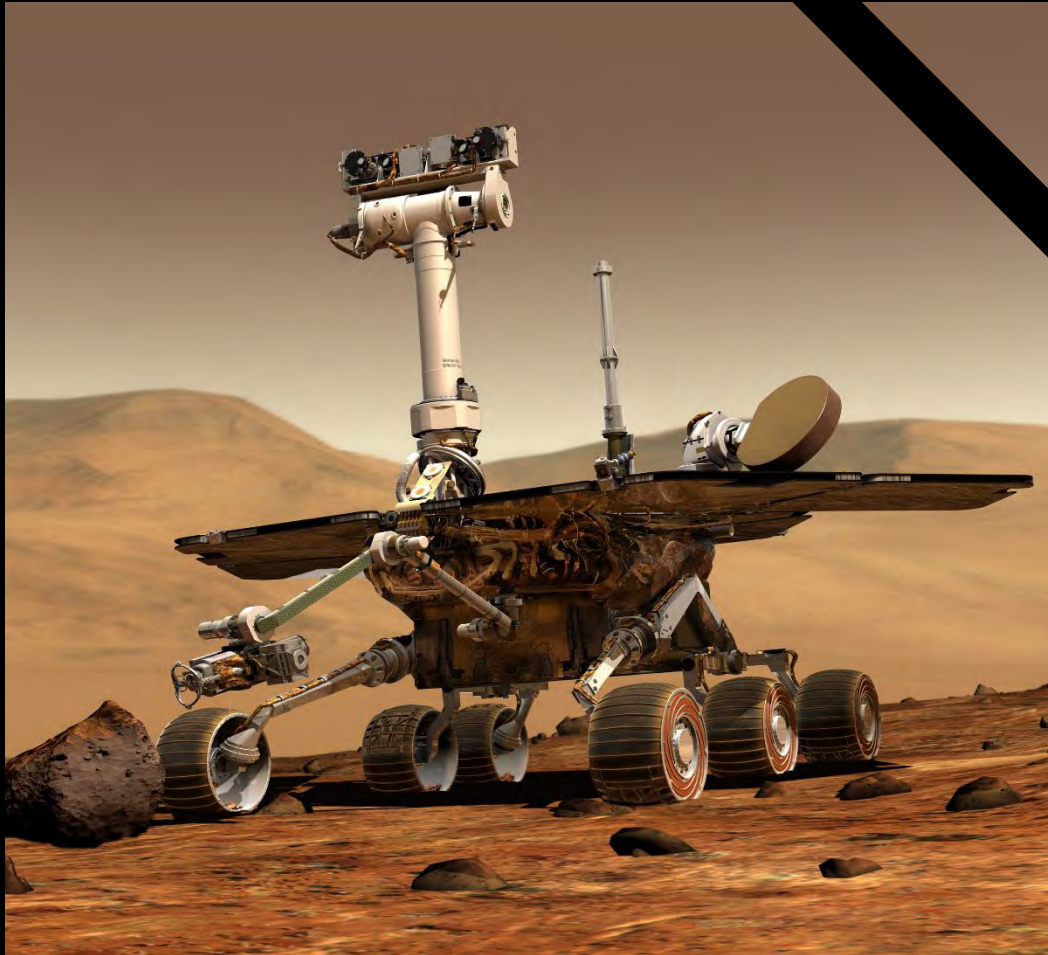


Image Credit: NASA/JPL-Caltech/Cornell University

MARS SCIENCE LABORATORY "CURIOSITY"
& MARS 2020 "PERSEVERANCE"

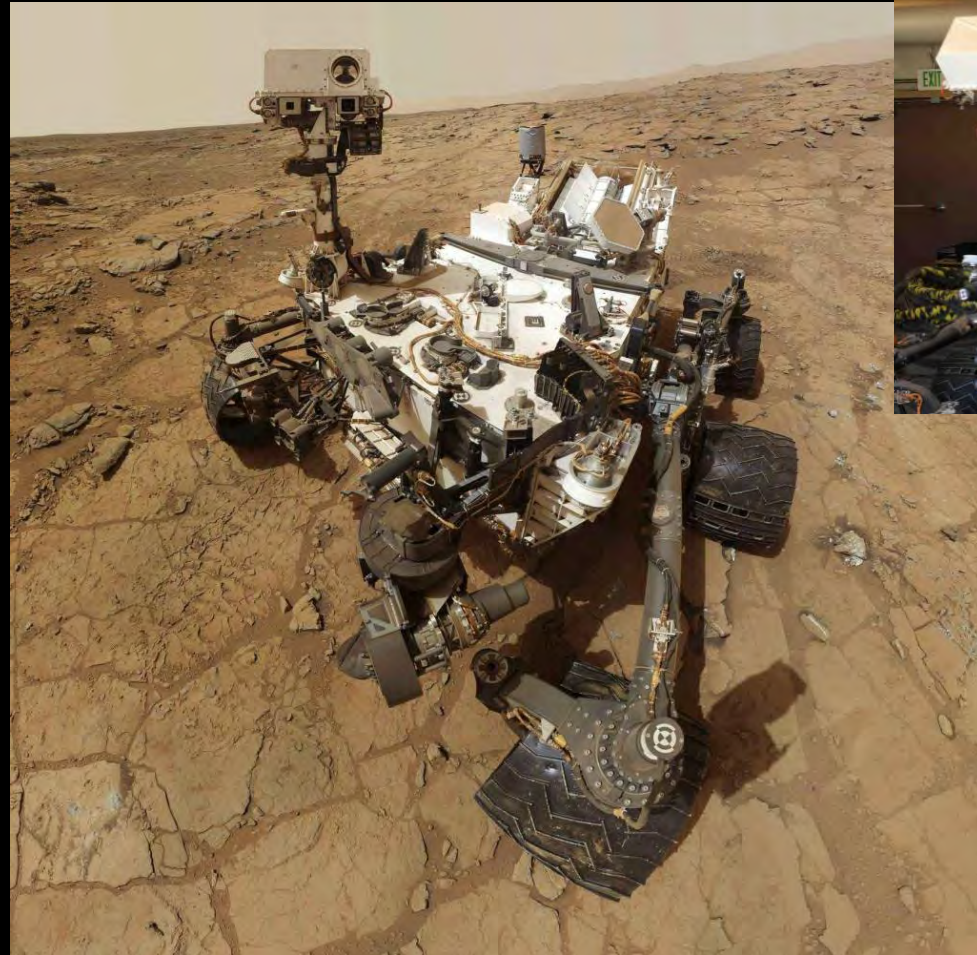
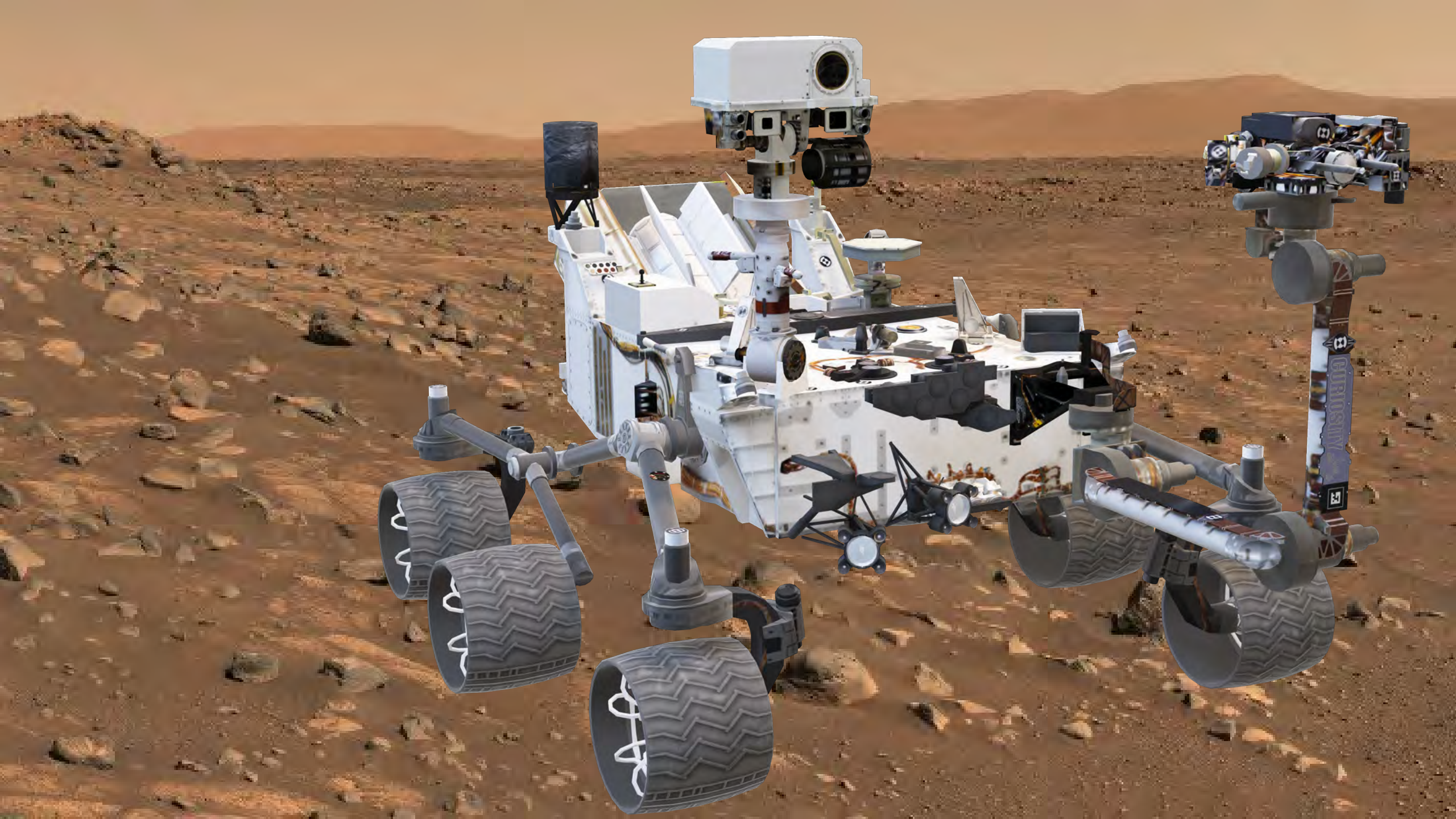


Image Credit: NASA/JPL-Caltech/MSSS





2011
Curiosity Rover

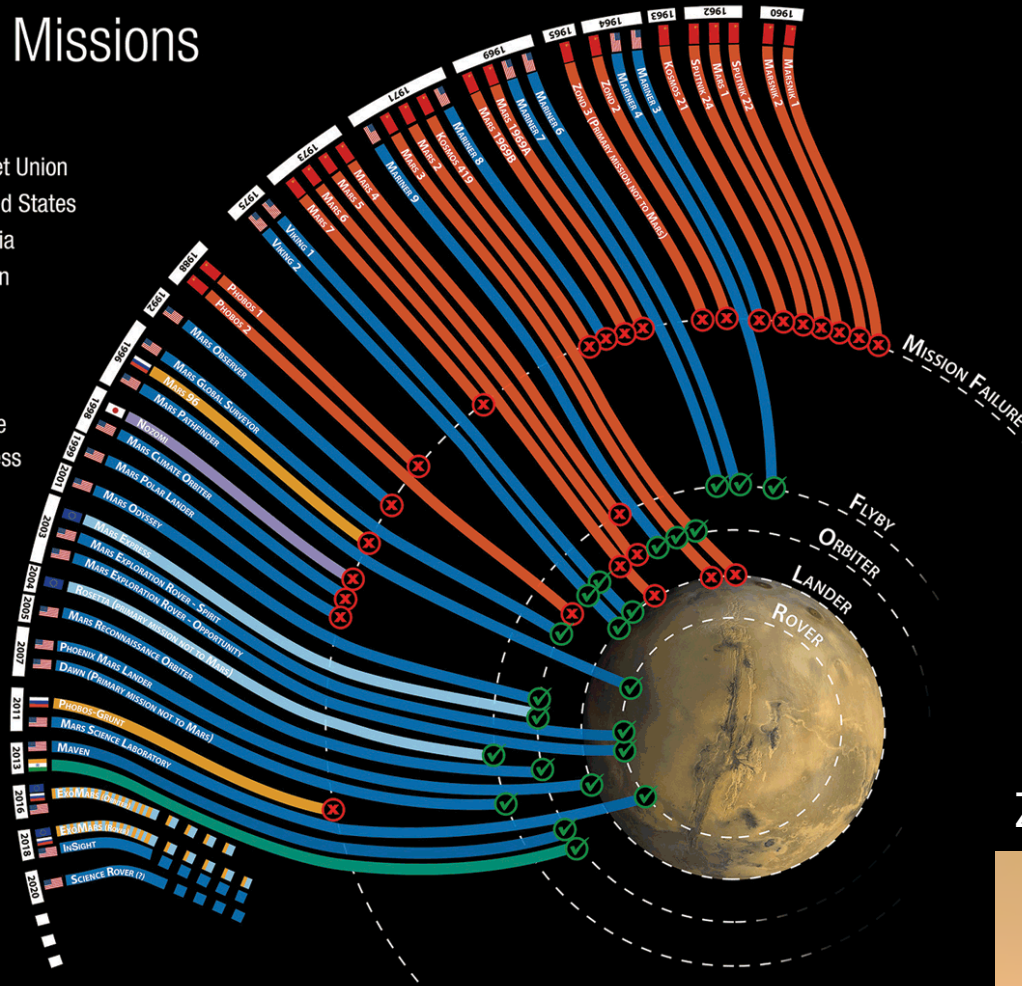
2011
Mini



Robotic Missions to Mars

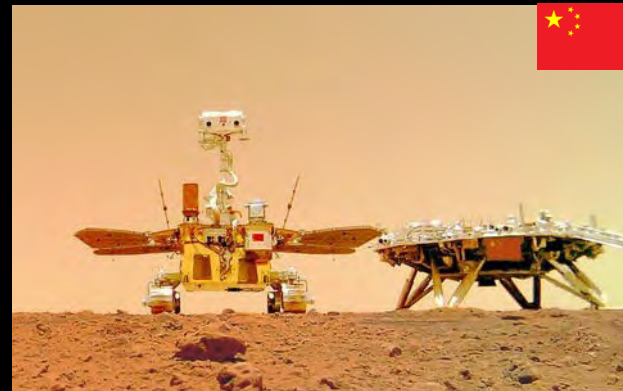
-  Soviet Union
-  United States
-  Russia
-  Japan
-  ESA
-  India

-  Mission Failure
-  Mission Success

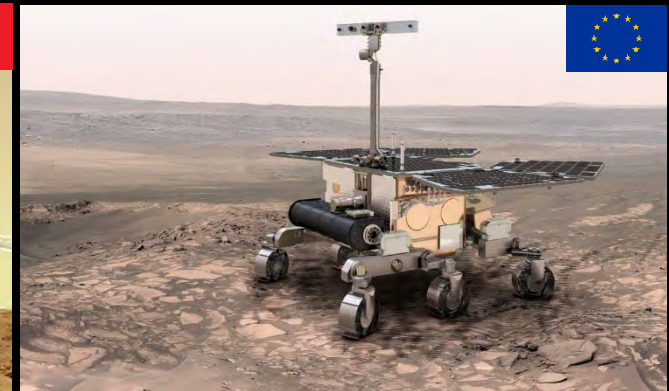


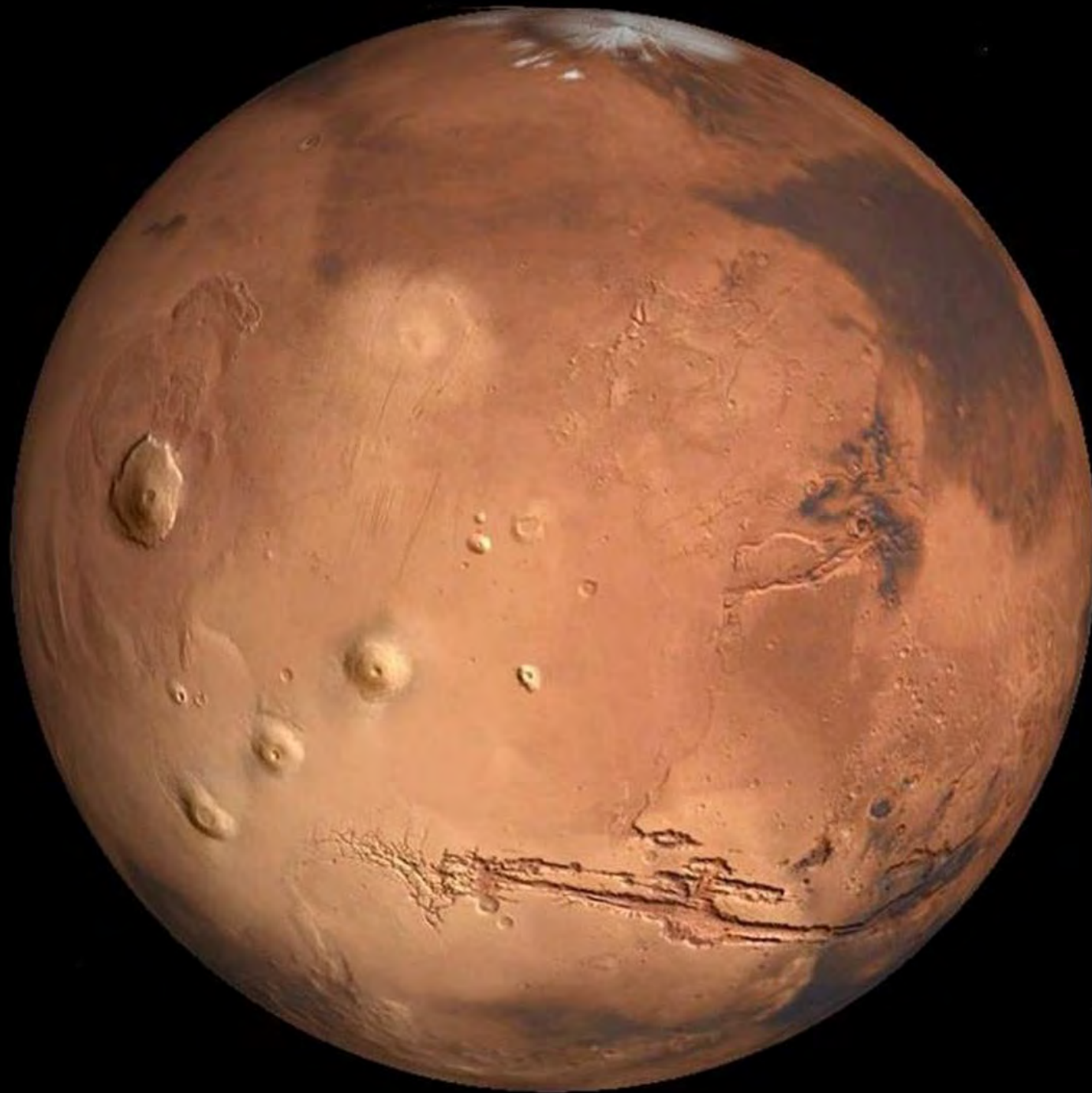
BEREITS 50 MISSIONEN ZUM MARS

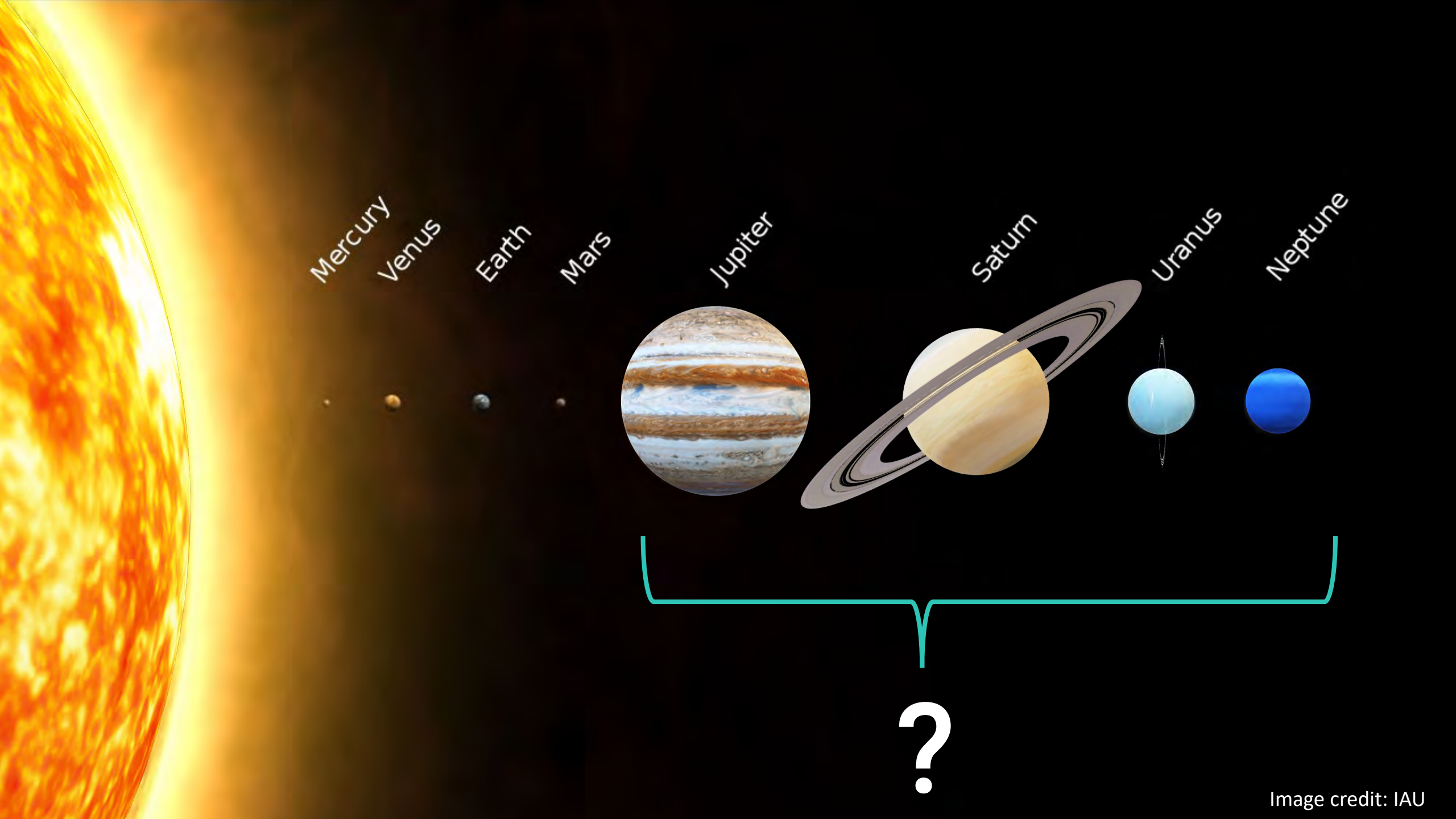
Zhurong Rover (2022)



ExoMars Rover (202X)







Mercury

Venus

Earth

Mars

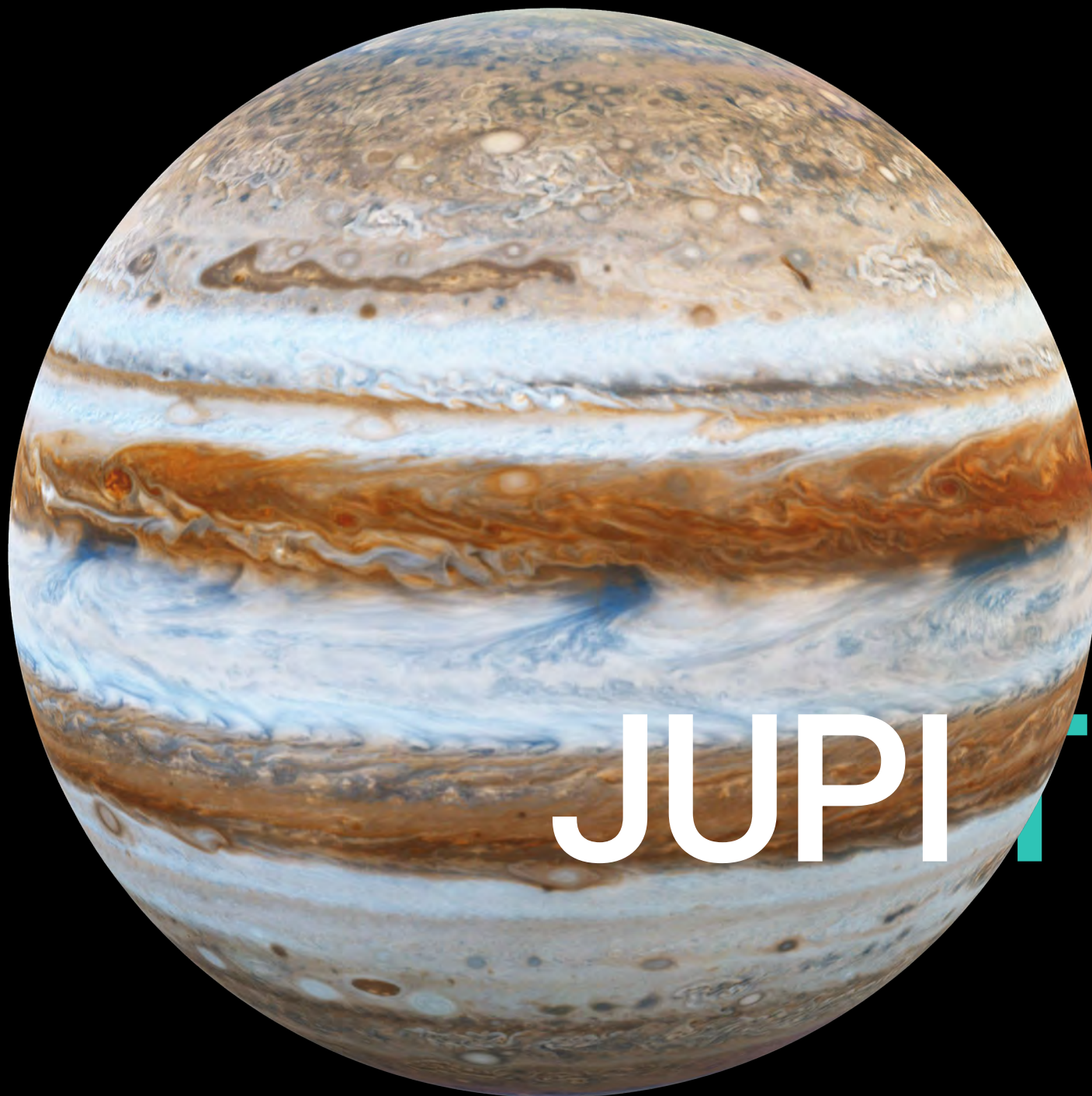
Jupiter

Saturn

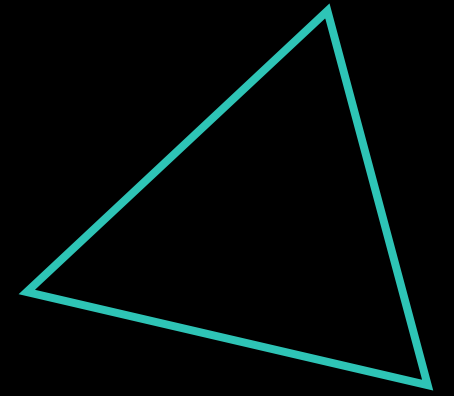
Uranus

Neptune

?



JUPITER



EISMOND EUROPA



OCEAN WORLD

OCEAN WORLD

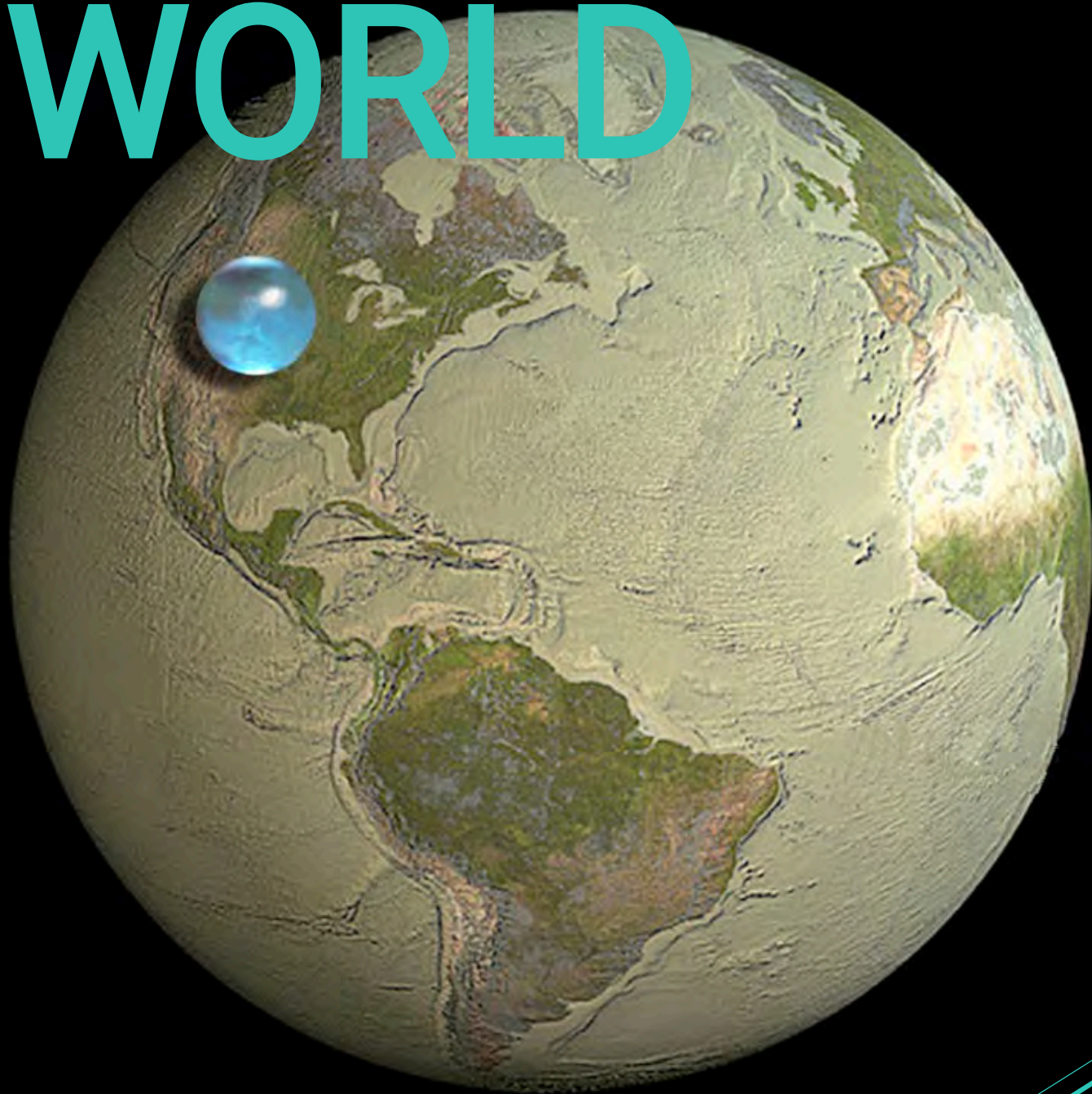
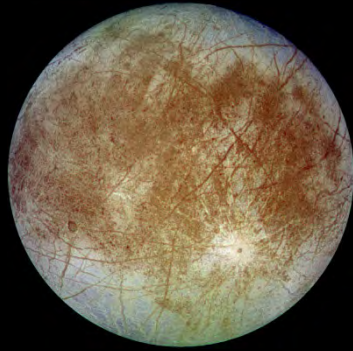


Image Credits: Kevin Hand (JPL-Caltech), Jack Cook (Woods Hole Oceanographic Institution), Howard Perlman (USGS)





SURFACE

PLUME
DEPOSITS

CHAOS, LINEAE
EXTENSIONAL FEATURES

OVERTURNED
BLOCKS

ICE

ICE FRACTURES
& VEINS

DIAPIRS

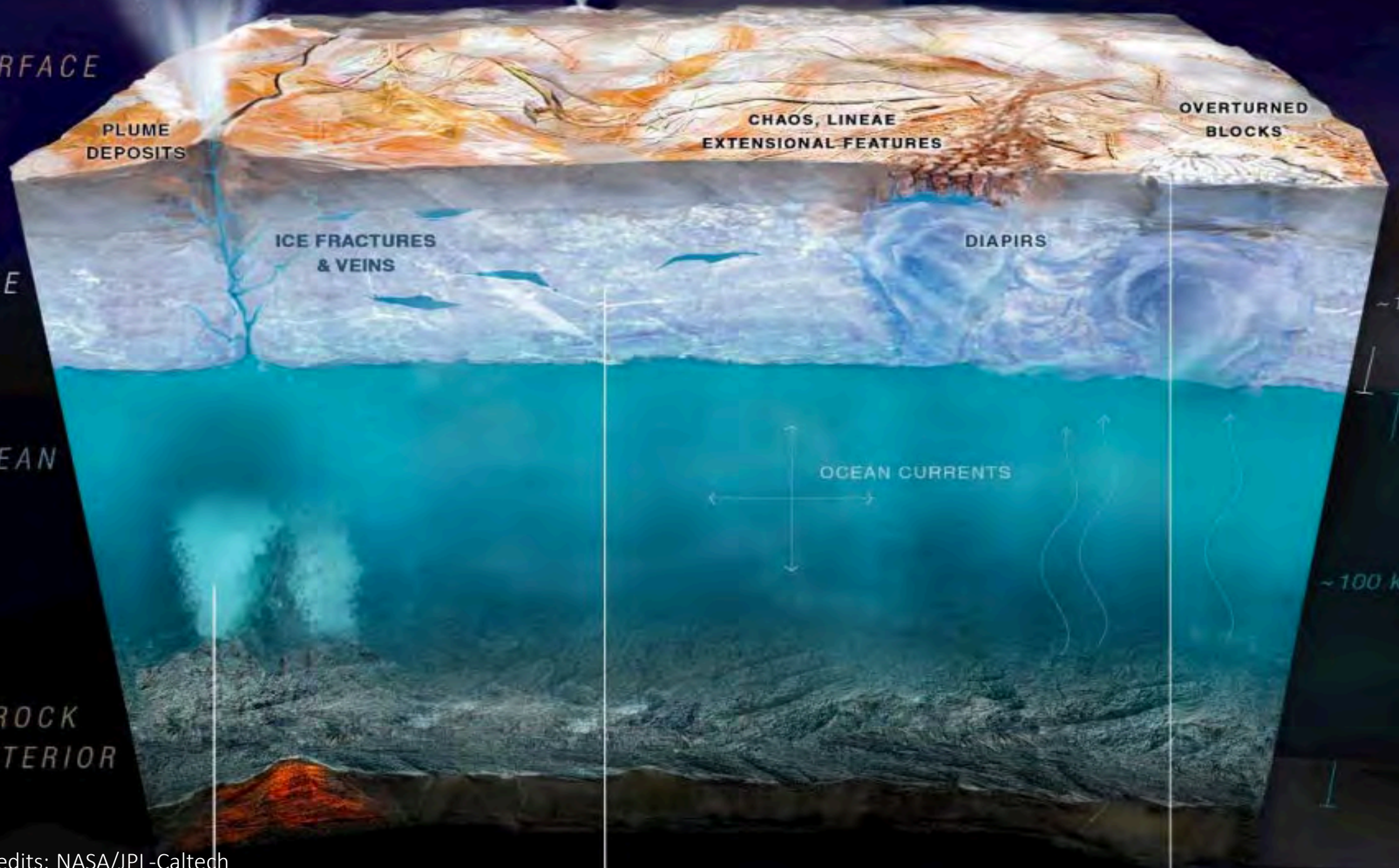
~ 10 km

OCEAN

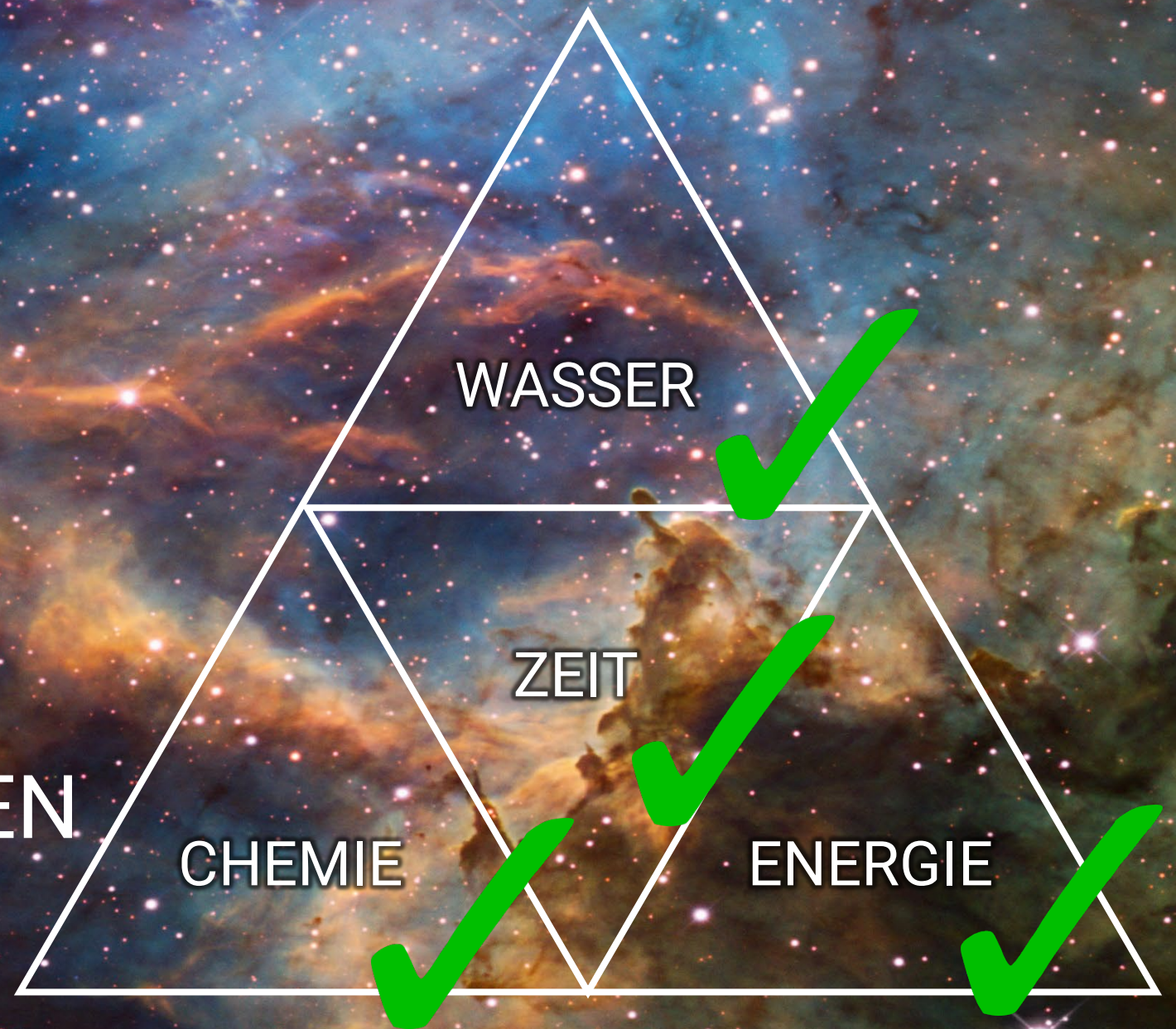
OCEAN CURRENTS

~ 100 km

*ROCK
INTERIOR*



SCHLÜSSELZUTATEN FÜR LEBEN*



OCEANWORLDS



Ganymede



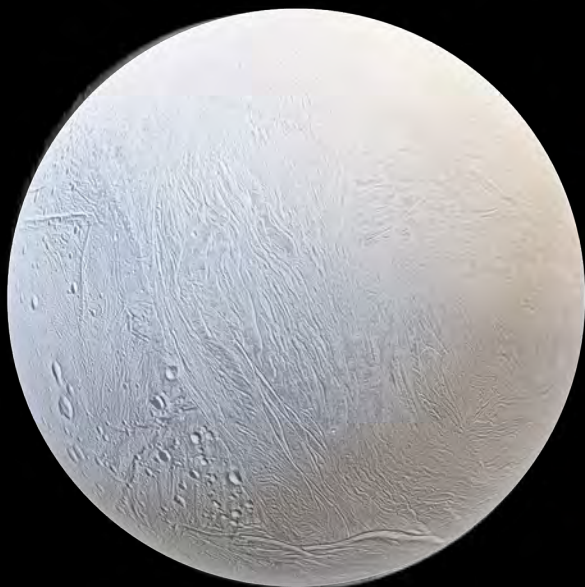
Callisto



Europa



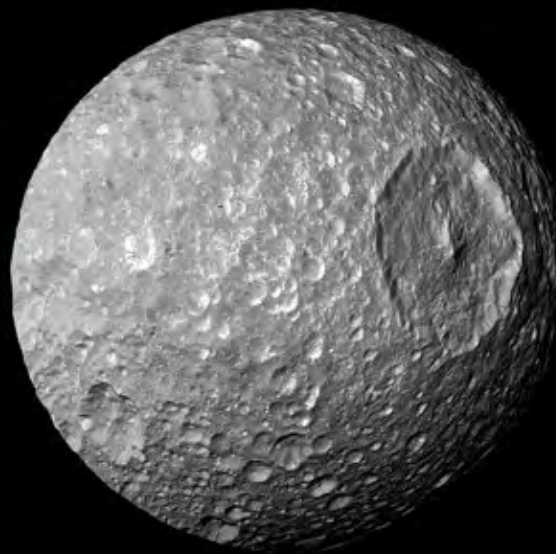
Triton



Enceladus



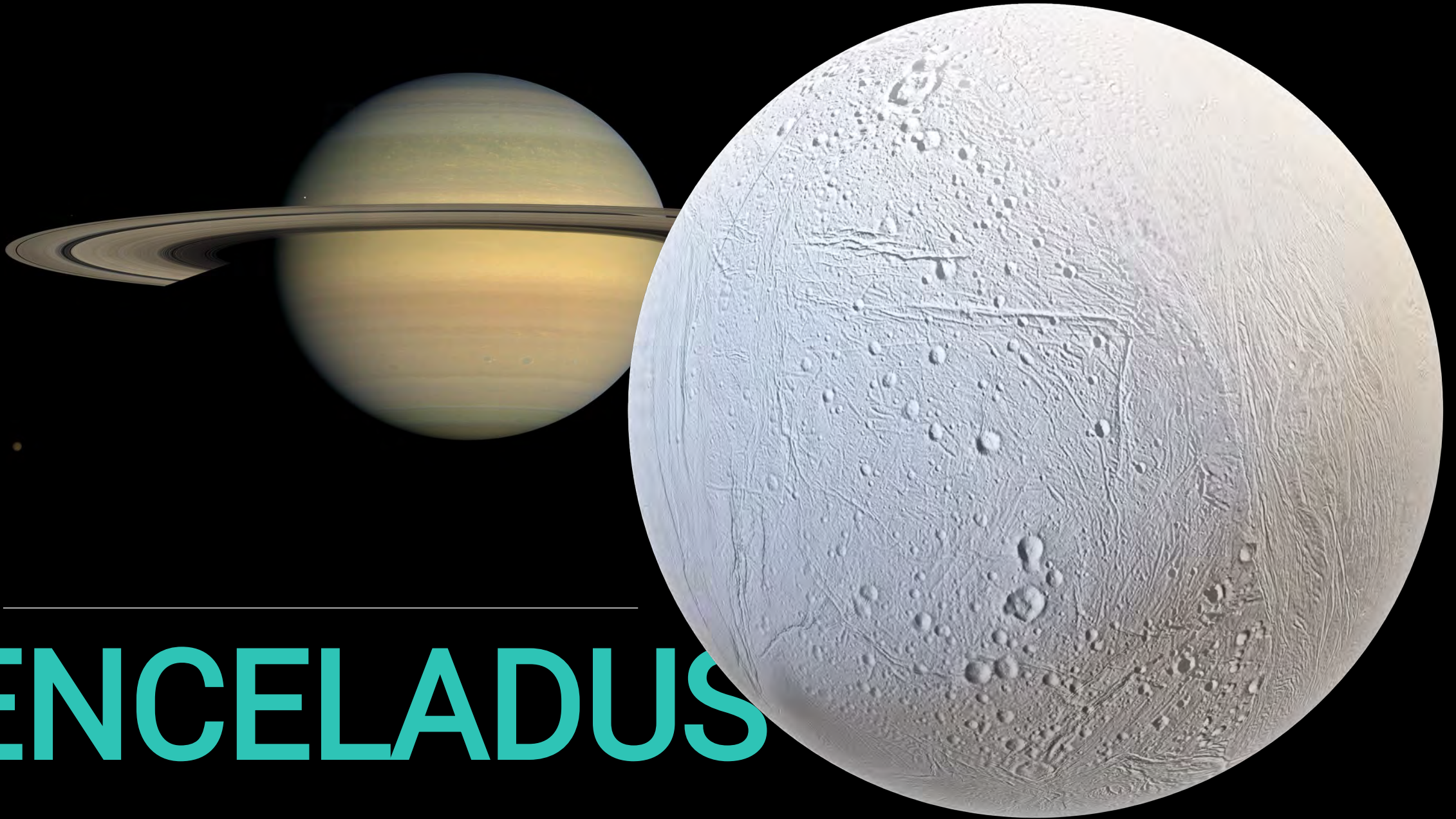
Titan



Mimas

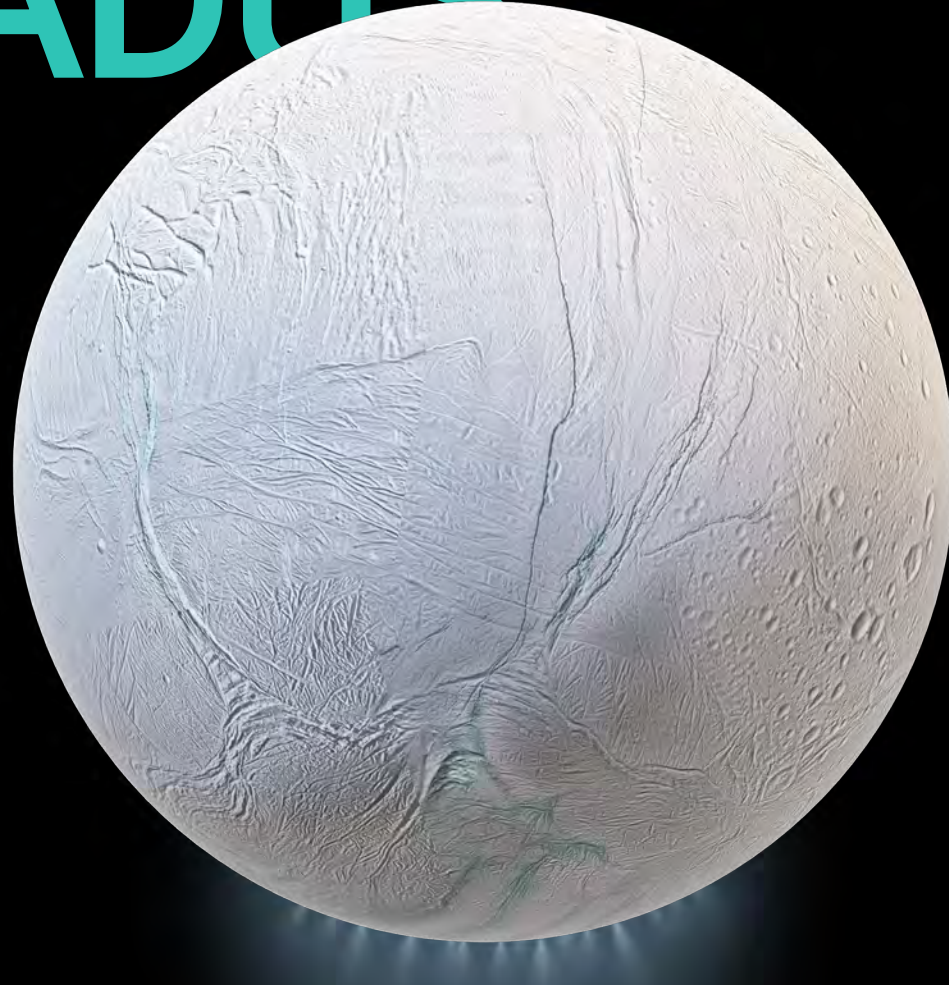


Pluto



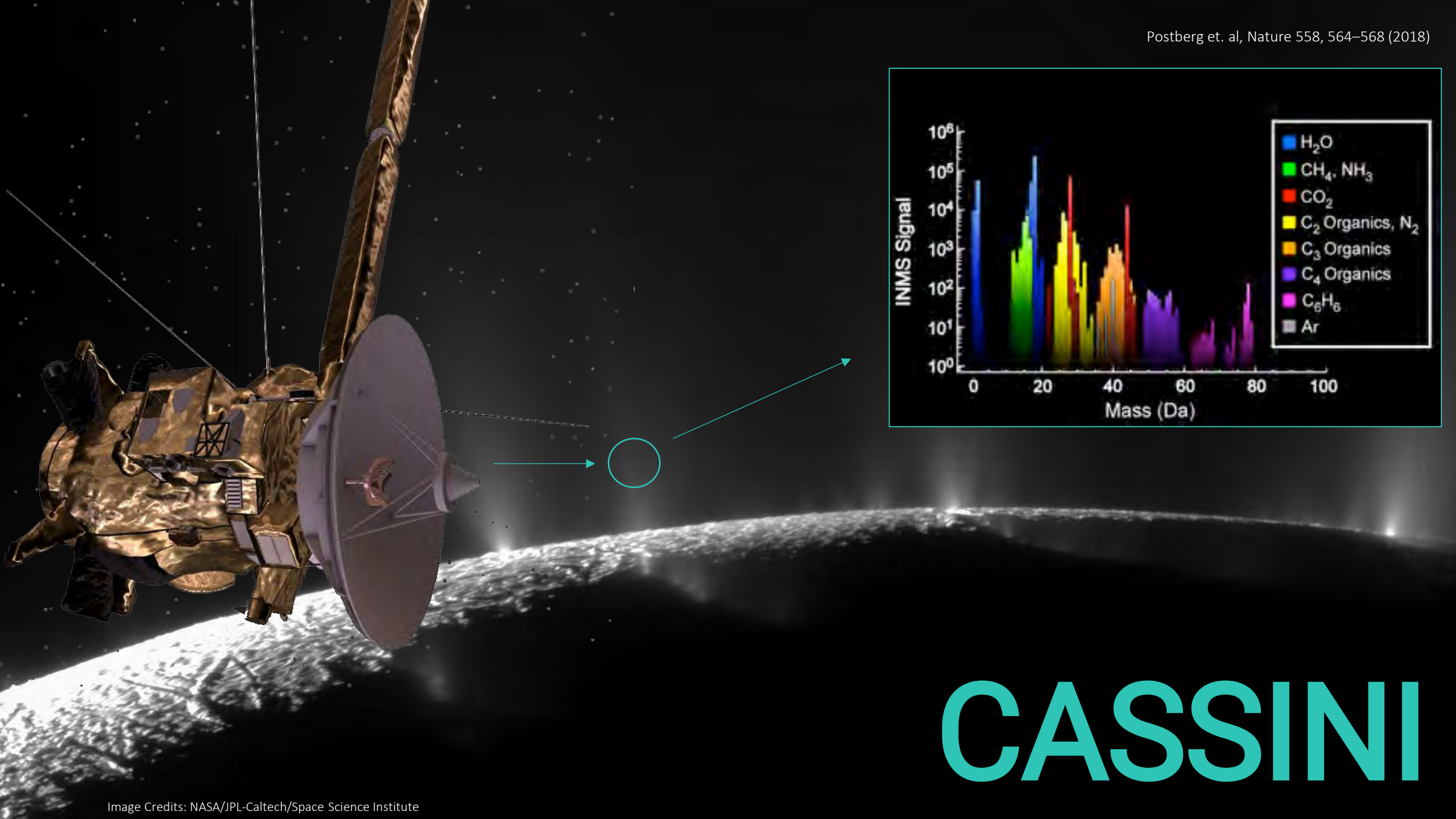
ENCELADUS

ENCELADUS



CASSINI

WESHALB WISSEN WIR DAS?



CASSINI



LAUNCH WITH TWO ARIANE 6 ROCKETS



ASSEMBLE IN SPACE



JOURNEY TO SATURN



ORBIT SATURN



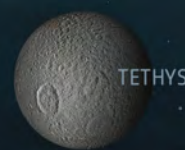
TITAN



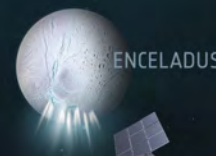
RHEA



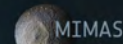
DIONE



TETHYS



ENCELADUS



MIMAS

FLY BY SATURN'S ICY MOONS



SAMPLE PLUMES



ORBIT ENCELADUS



LAND ON THE SOUTH POLE OF ENCELADUS







Credit: Sven Wittig, L4 Technology Coordinator, ESA



HERZLICHEN
DANK

FRAGEN



florian.kehl@eaps.ethz.ch

LinkedIn

