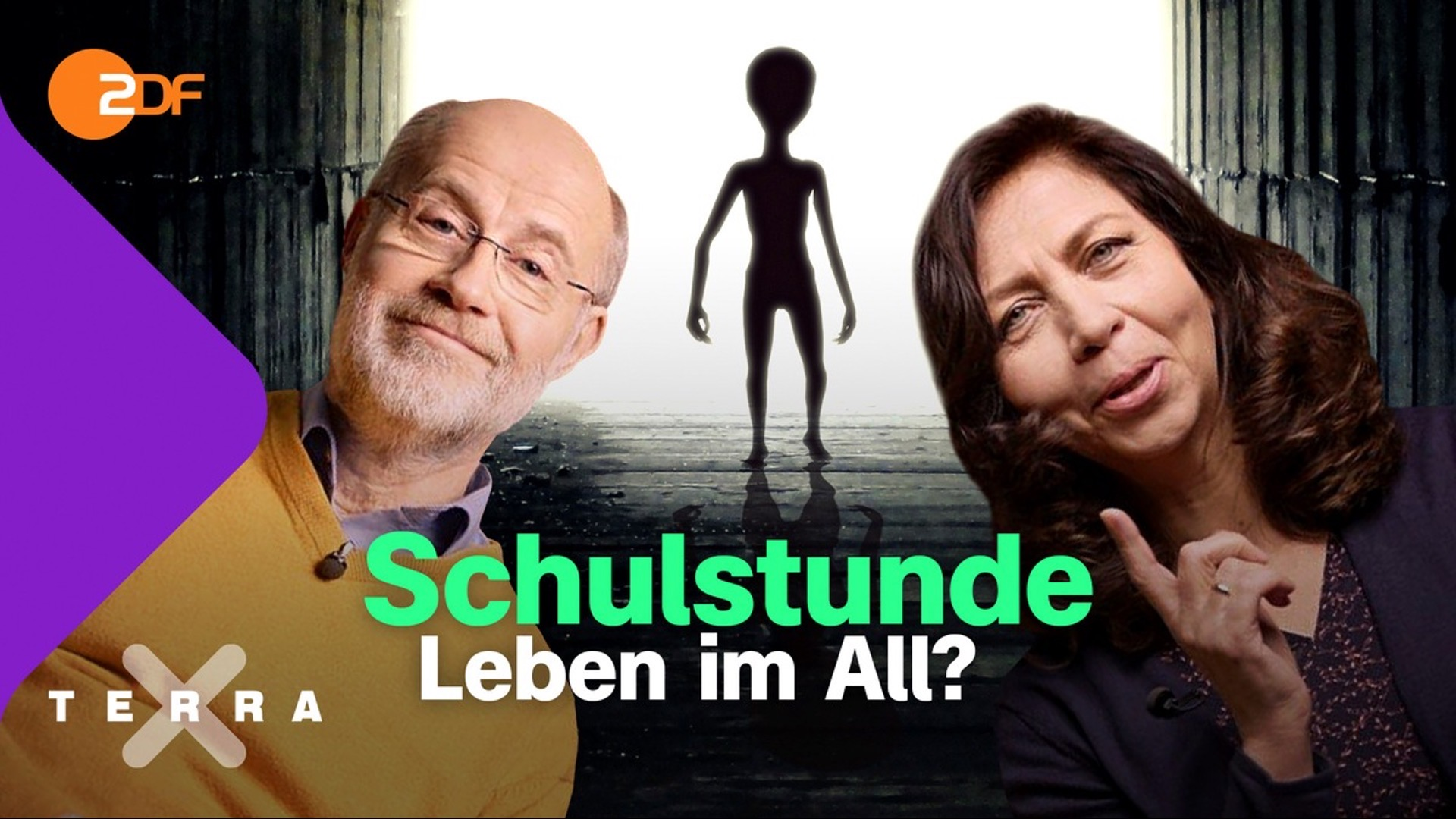

ZDF
TERRA X
Schulstunde
Leben im All?

ZDF

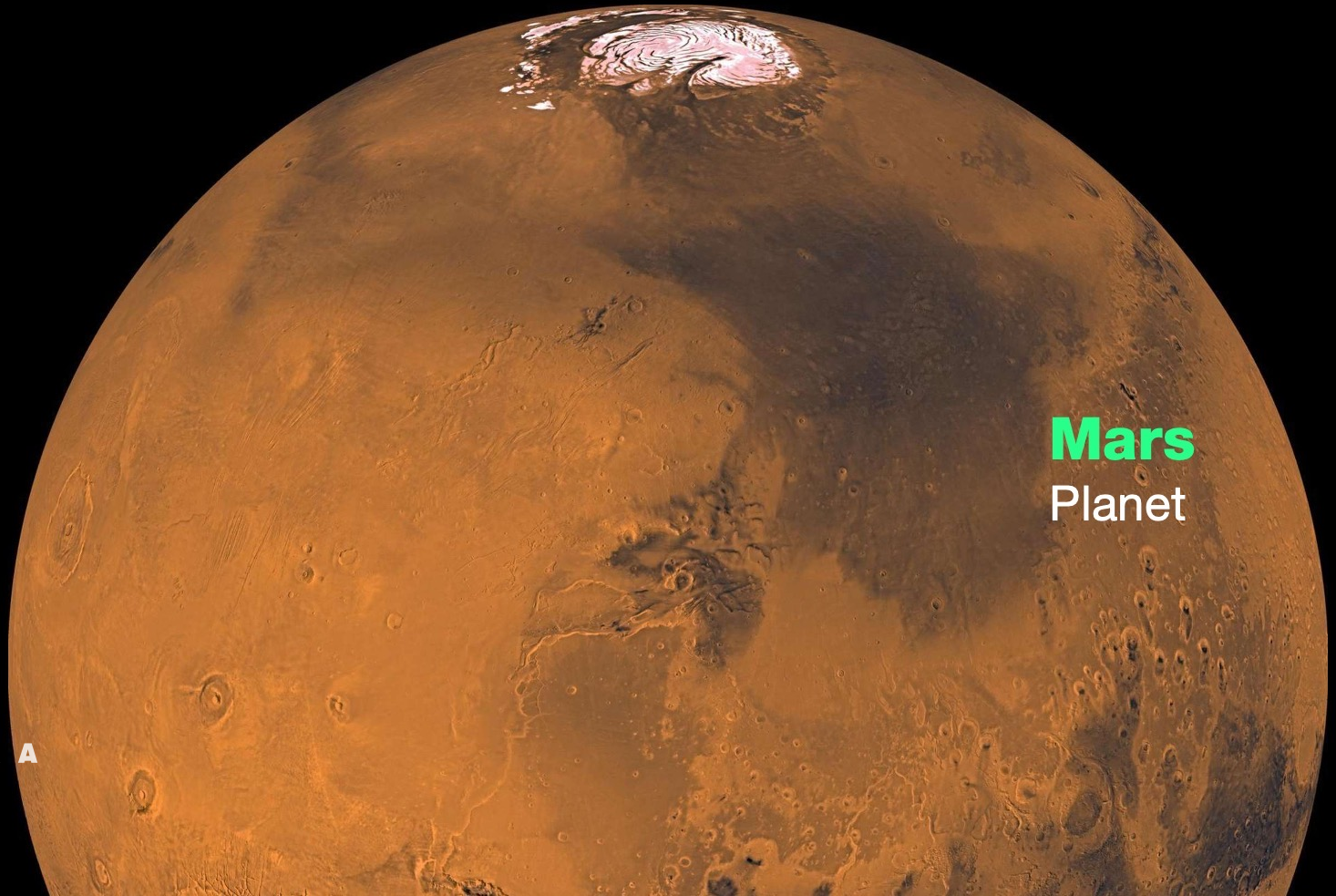
Gibt es Leben im All?

TERRA X

Dr. Cecilia Scorza und Prof. Harald Lesch
LMU Physik Fakultät

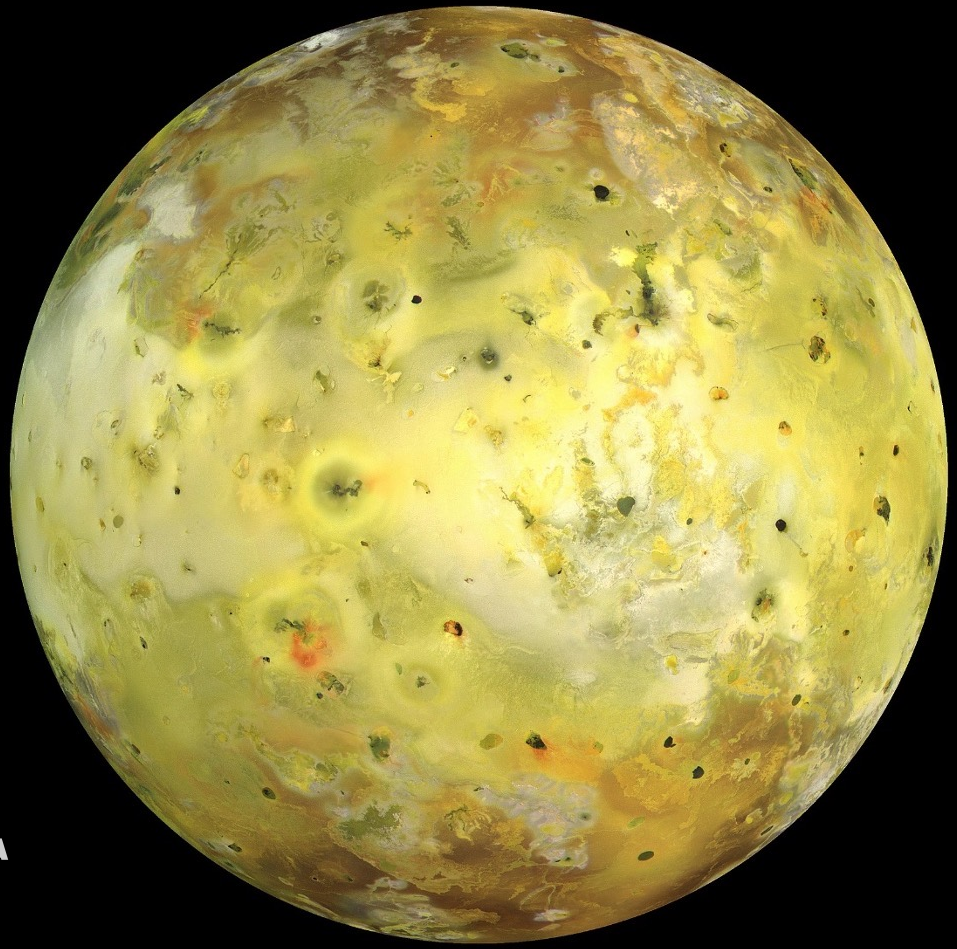
Unser Sonnensystem

Quelle: NASA



Quelle: NASA / JPL / UGSGS

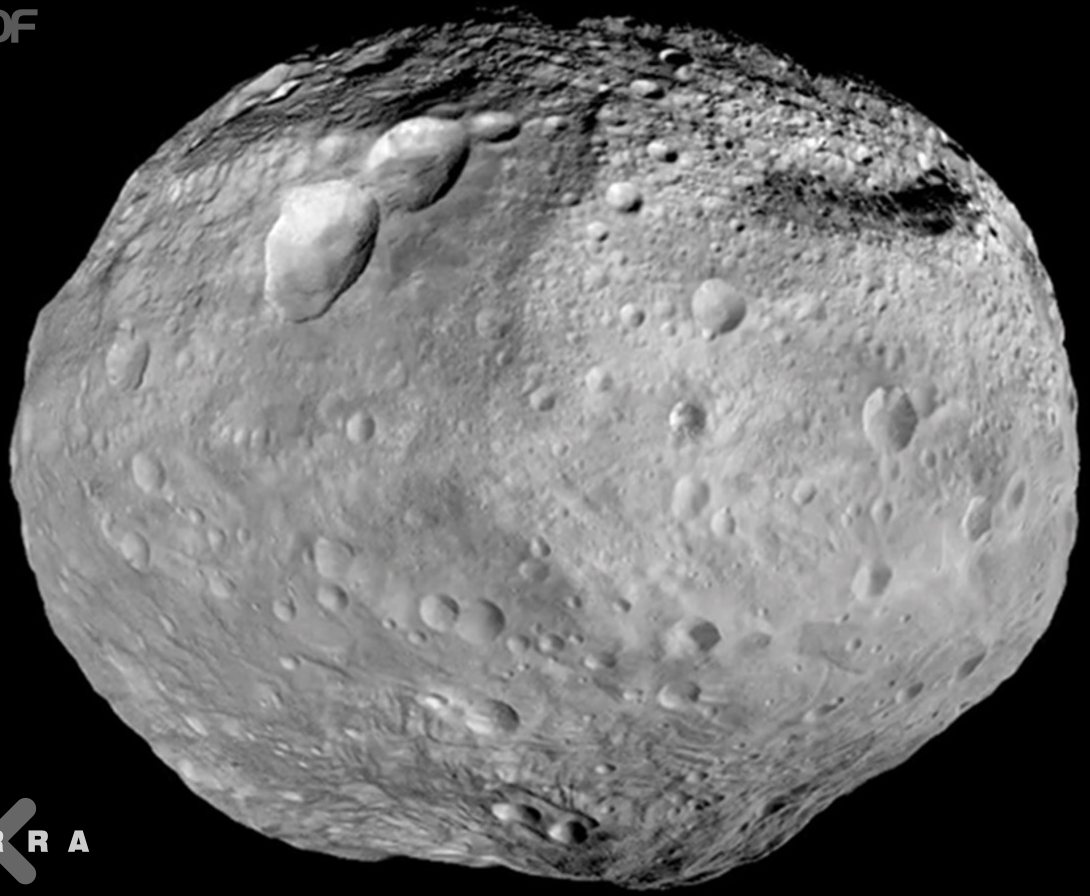
ZDF
Mars
Planet
TERRA X
Quelle: NASA



Jupitermond Io

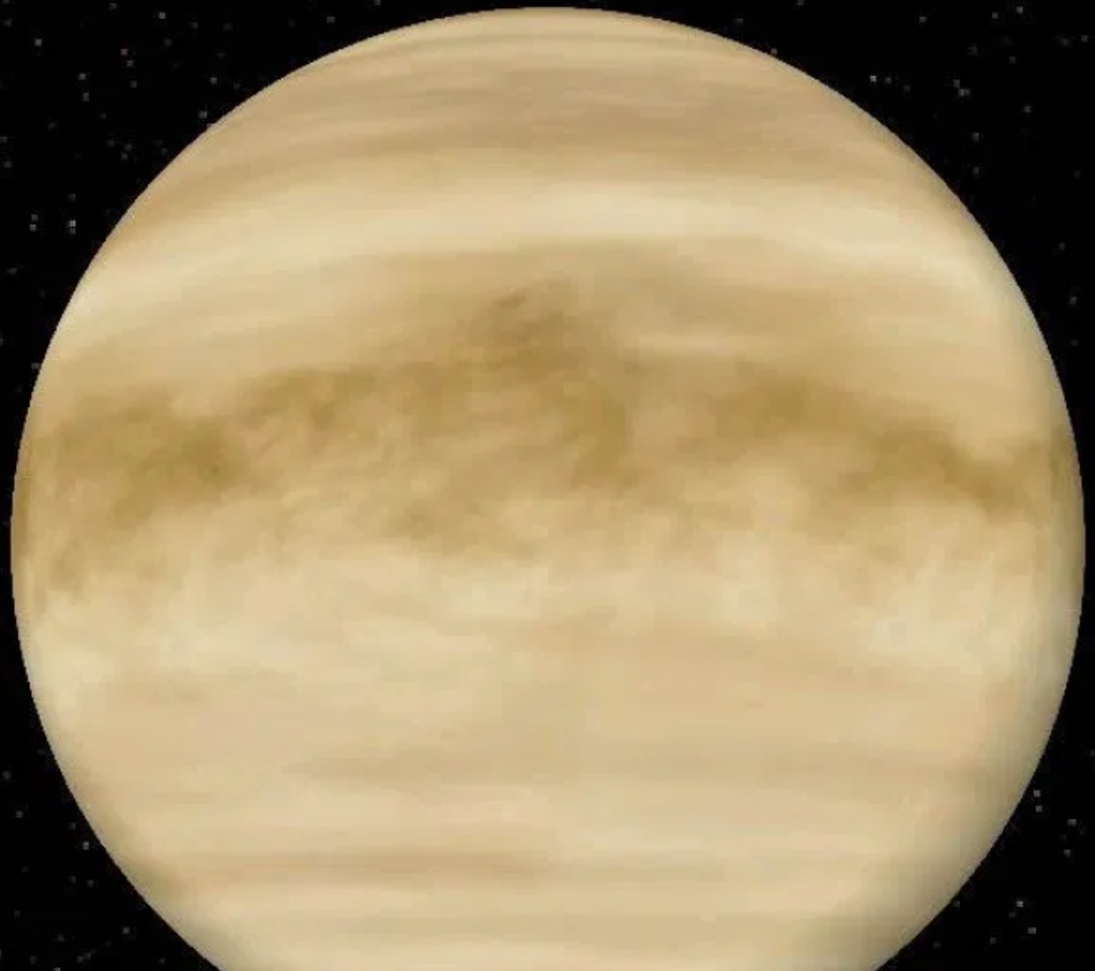
Quelle: NASA / JPL / University of Arizona

Quelle: NASA / JPL / University of Arizona



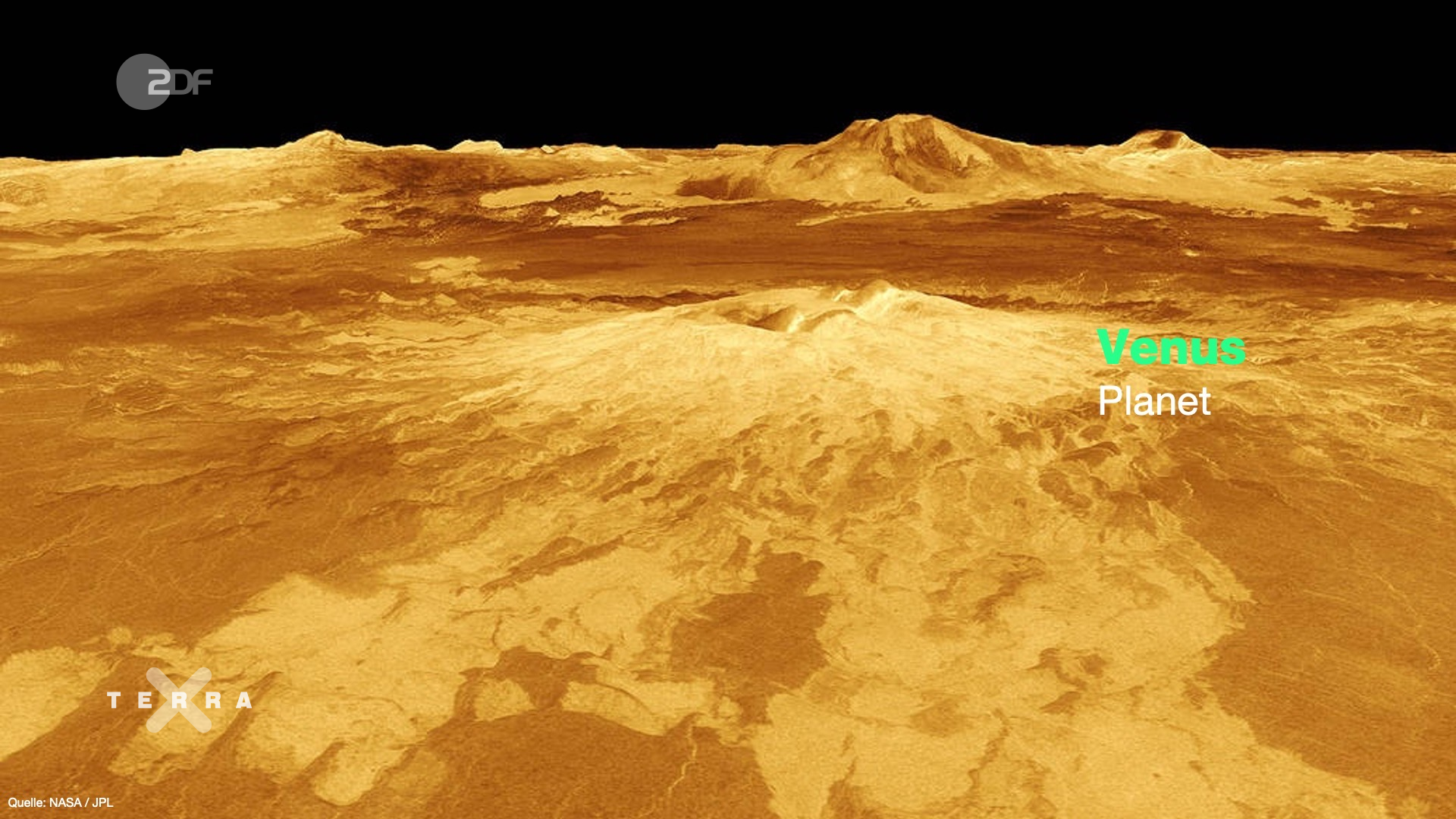
Vesta
Asteroid

Quelle: Image credit: NASA/JPL-Caltech/UCAL/MPS/DLR/IDA



Venus
Planet

Quelle: NASA



Quelle: NASA / JPL

Quelle: https://upload.wikimedia.org/wikipedia/commons/3/3f/Laurisilva_en_el_Cubo_de_la_Galga.jpg

Die Erde: Der perfekte Planet?

Quelle: NASA

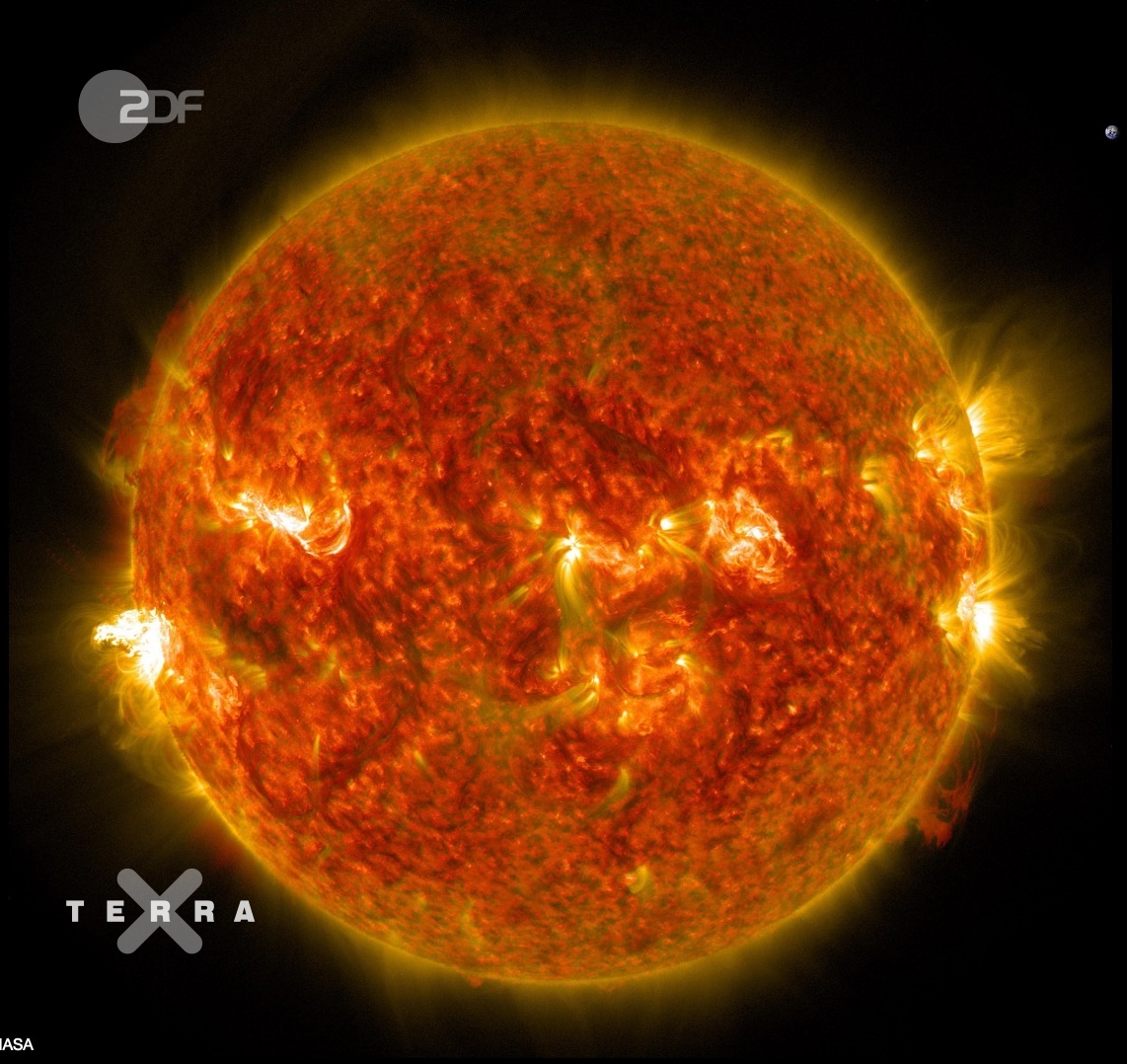
Die Erde liegt in der Lebenszone

Zutaten des Lebens:

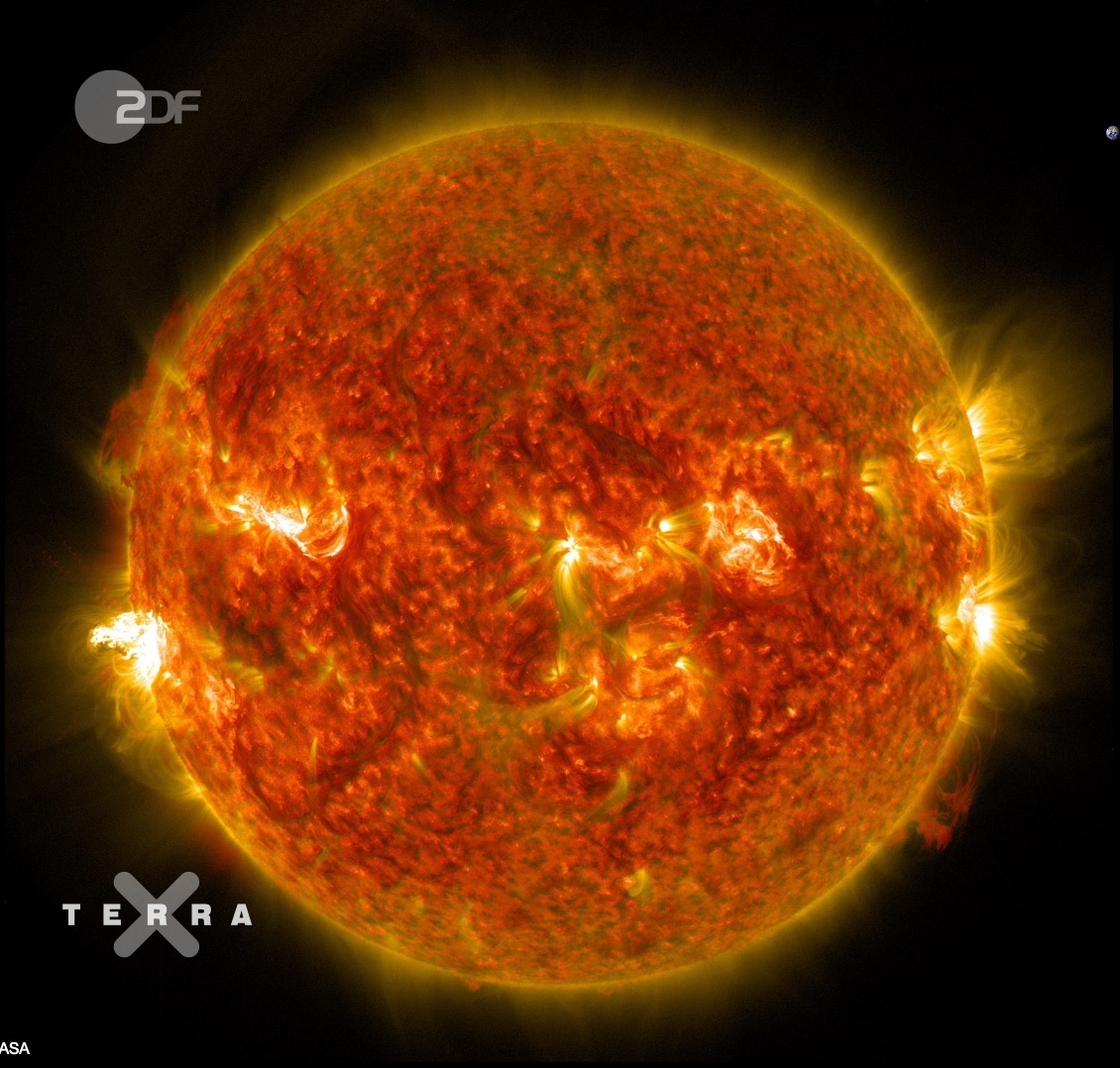
Energiequelle: Die Sonne + Kohlenstoff-(Verbindungen) + Wasser (flüssiger Form)

Quelle: NASA

Quelle: Unsplash



Quelle: NASA



Deshalb leuchten Planeten schwach

Quelle: NASA

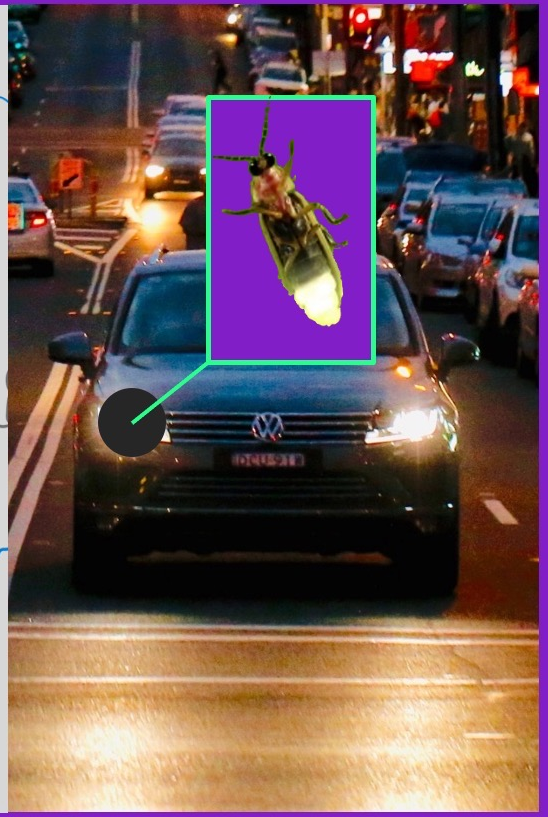
Planeten um andere Sterne zu finden, ist eine sehr schwierige Aufgabe

4,5 Lichtjahre (45 Billionen km)

Astronomen in Alpha-Centauri

Quelle: NASA

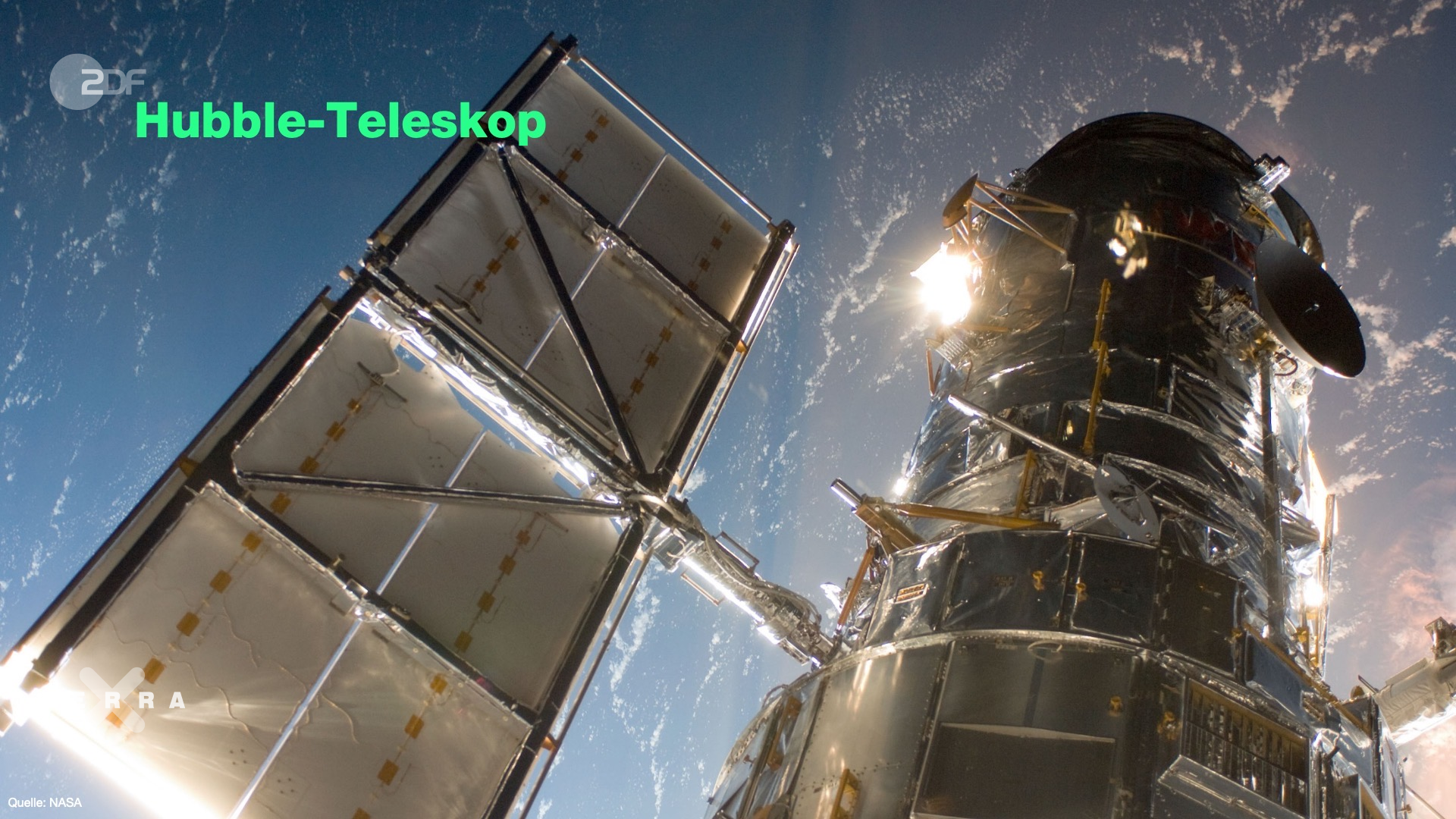
Eine sehr schwierige Aufgabe



Quelle: Unsplash

Quelle: Astelco

Hubble-Teleskop



Quelle: NASA

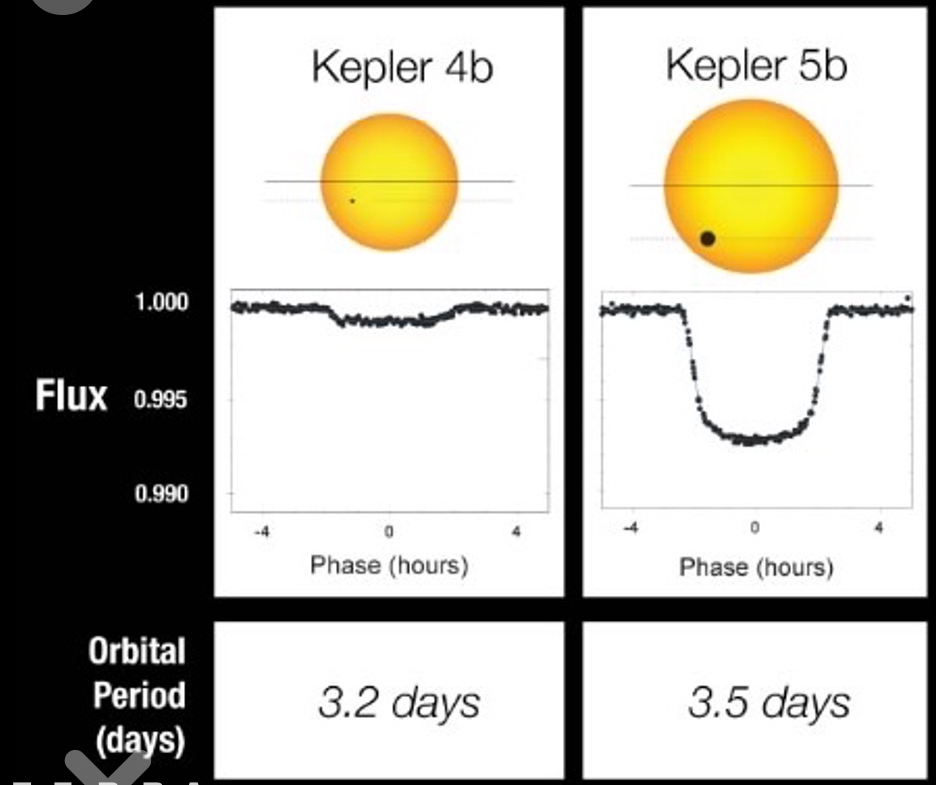
Kepler-Teleskop
Mehr als 4000 Exoplaneten durch die Transitmethode
Quelle: NASA

Transitmethode

Helligkeit

Zeit Stunden

Quelle: NASA



Transitlichtkurven

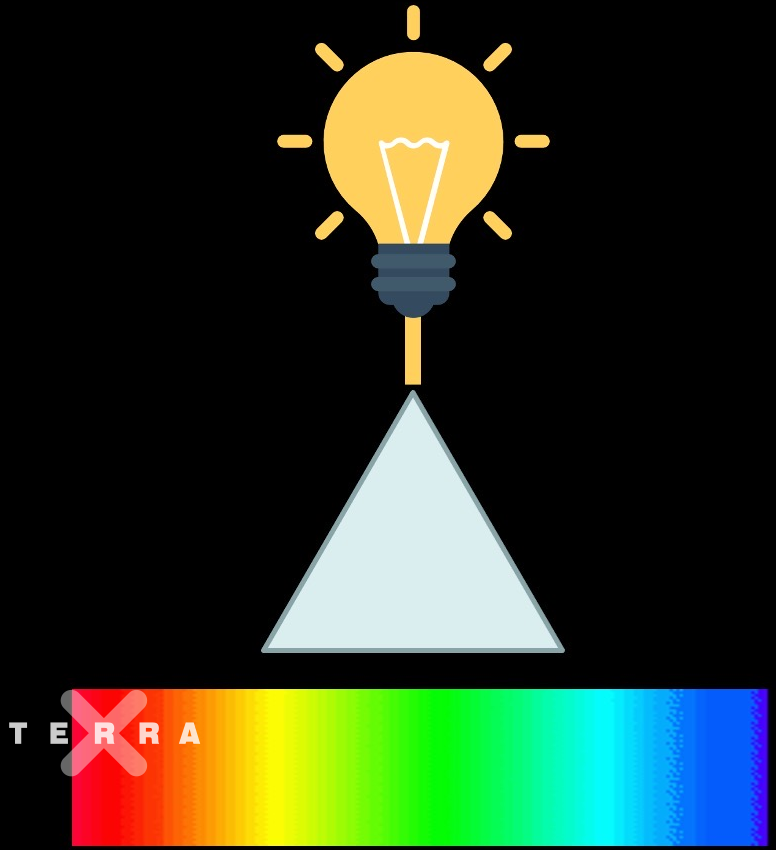
Periode

Radius des Exoplaneten

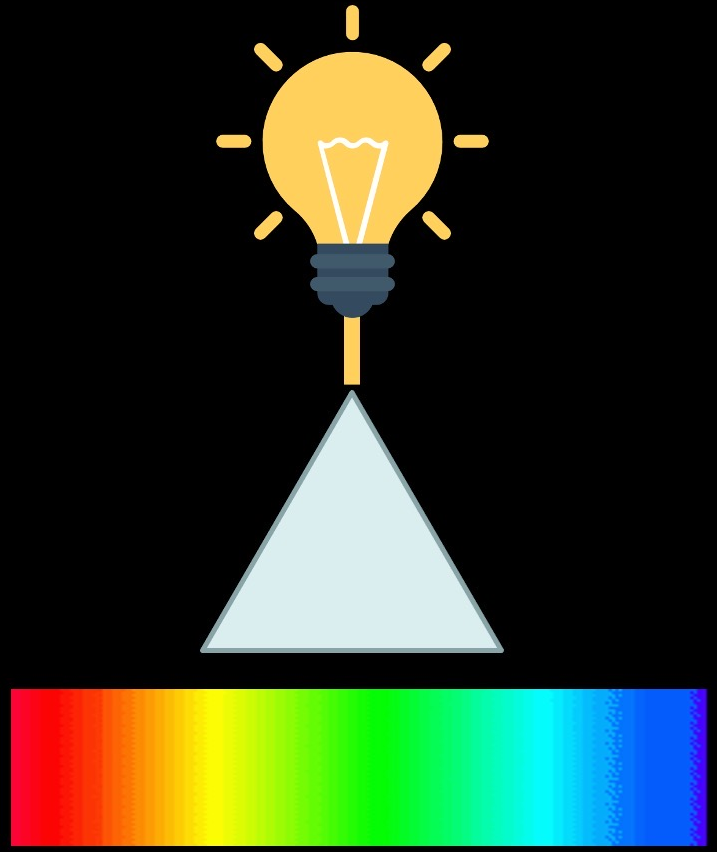
Felsenplanet / Gasplanet?

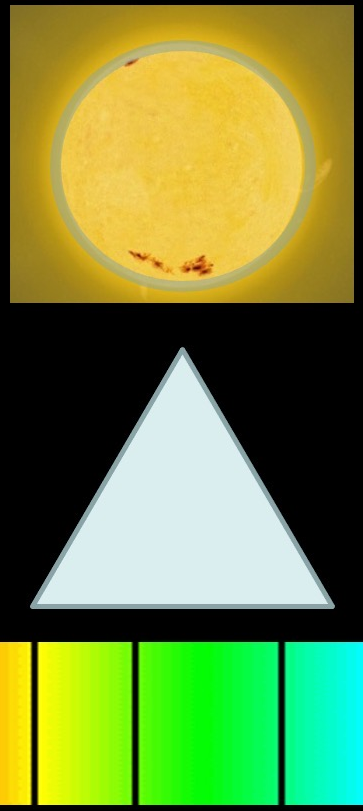
Quelle: NASA

Spektroskopie-Methode



Spektroskopie

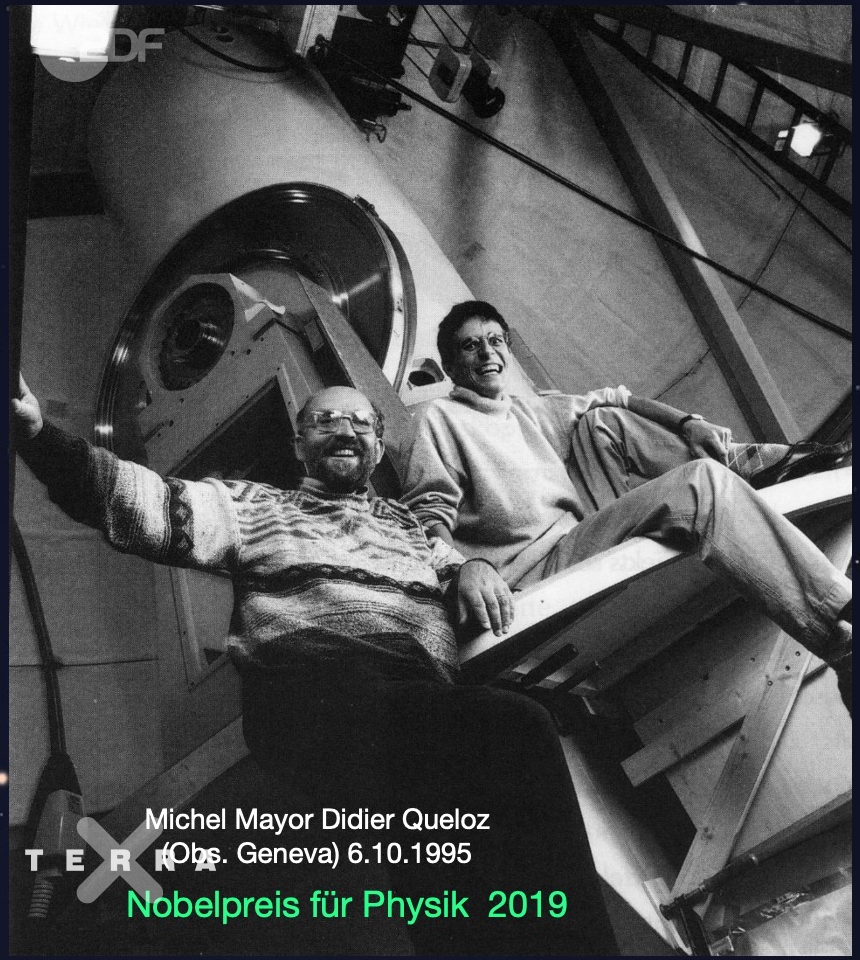




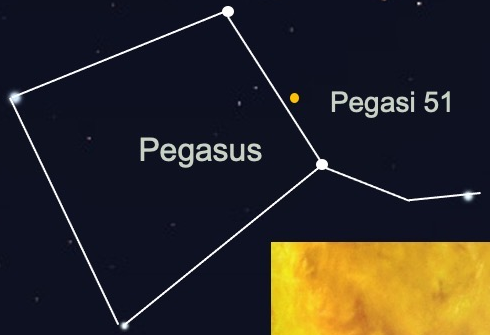
Spektroskopie-Doppler Effekt

Quelle: ESO

Quelle: Unsplash

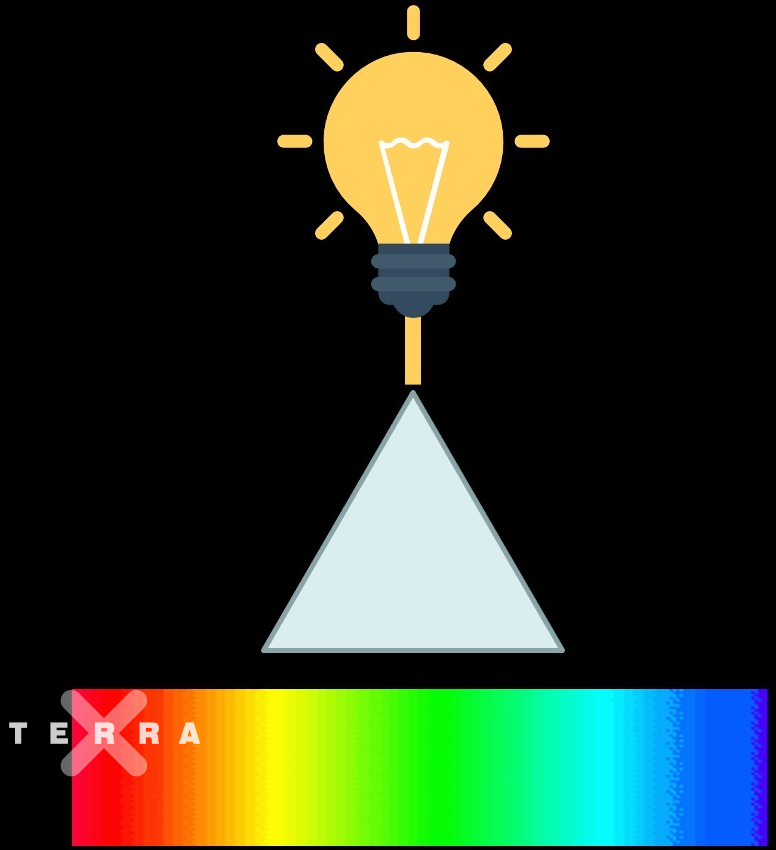


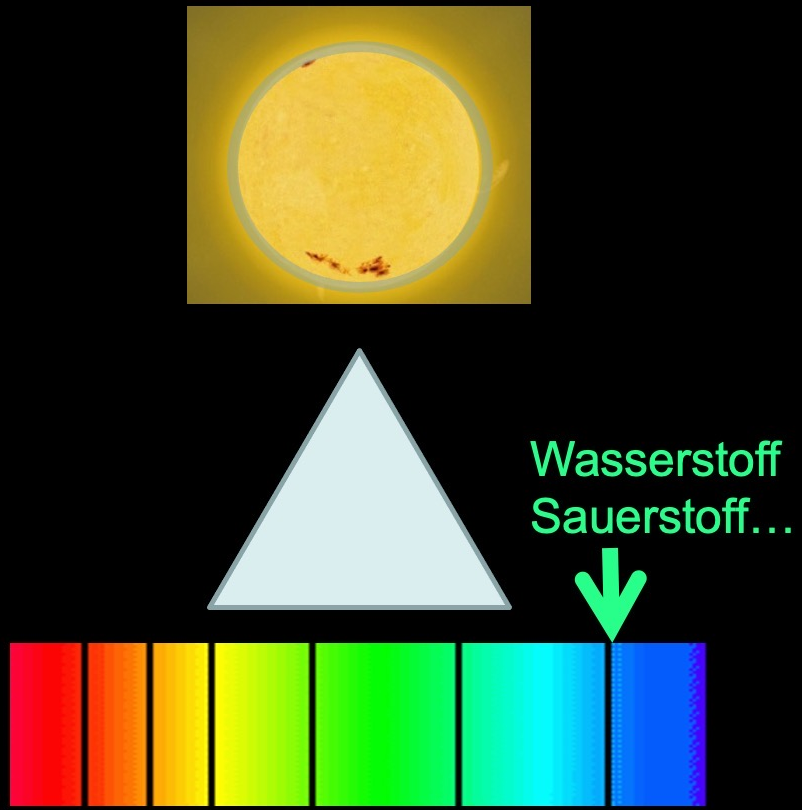
1995: Entdeckung des ersten Exo-Planeten: **51 Pegasi**

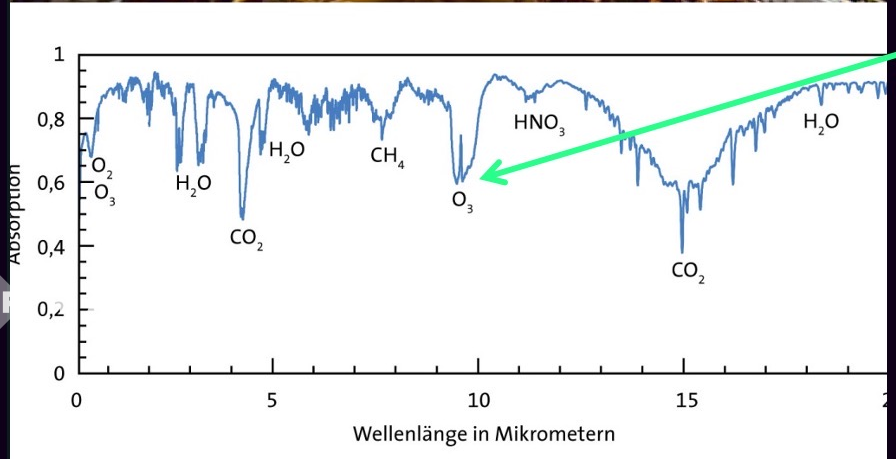


Quelle: ESA / NASA

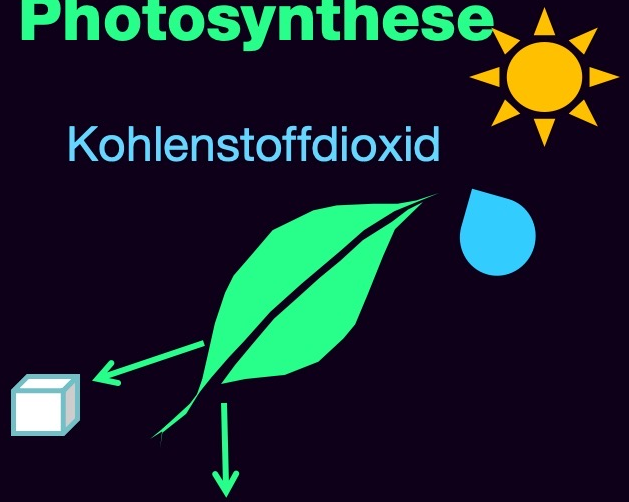
Spektroskopie







Photosynthese

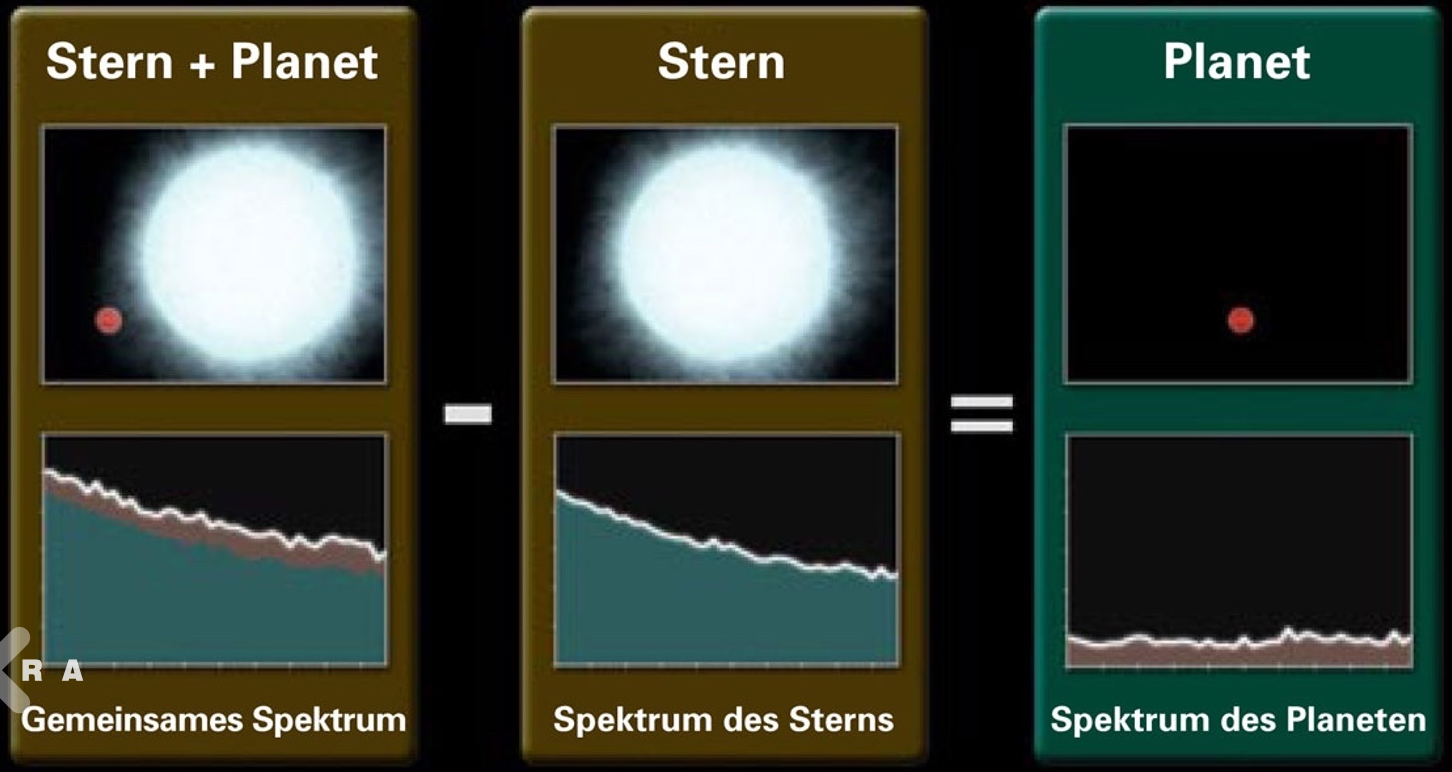


Vergleichsobjekt

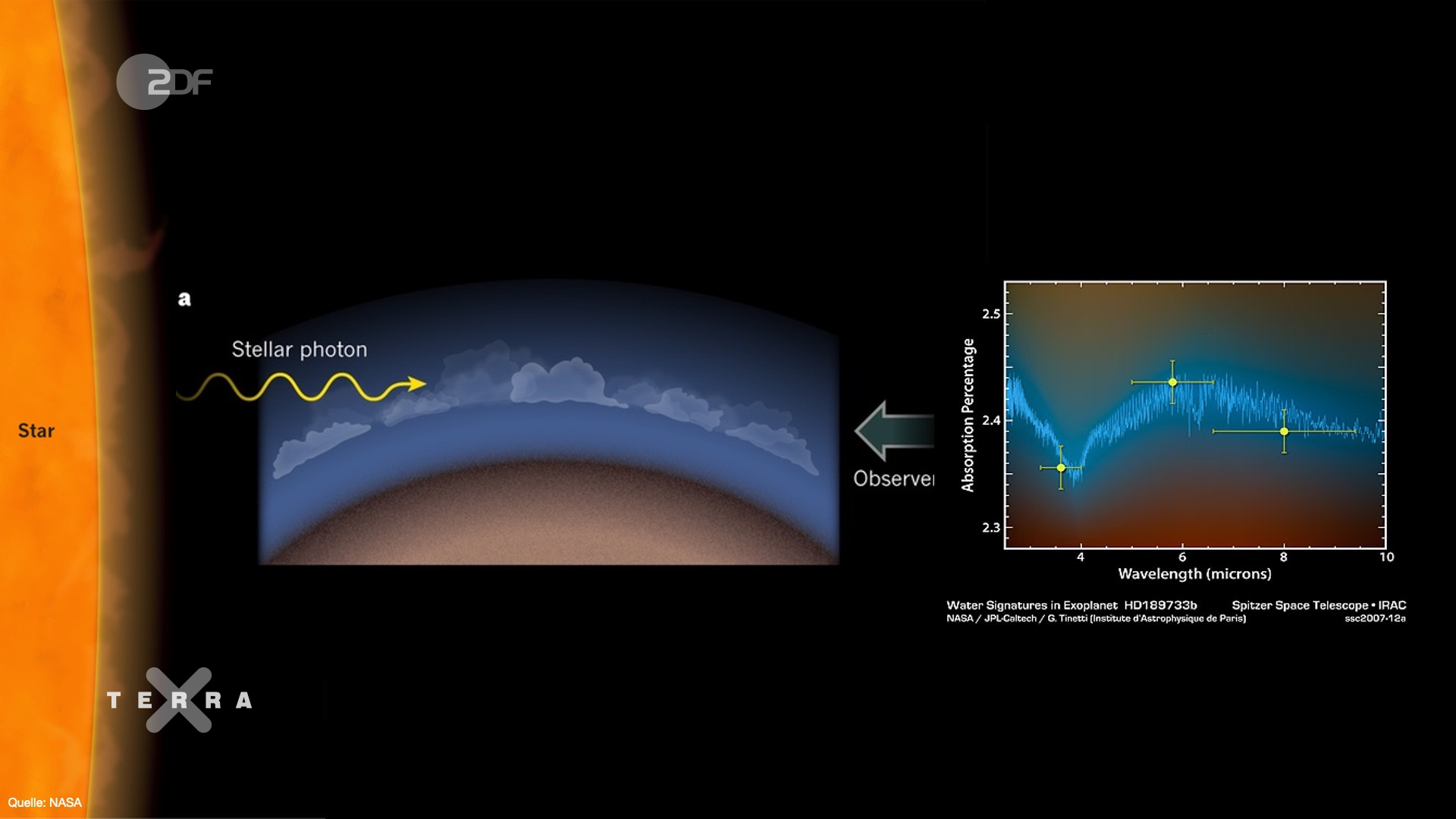
Planet Erde

Quelle: NASA

Spektralanalyse
von Planetenatmosphären



Quelle: NASA

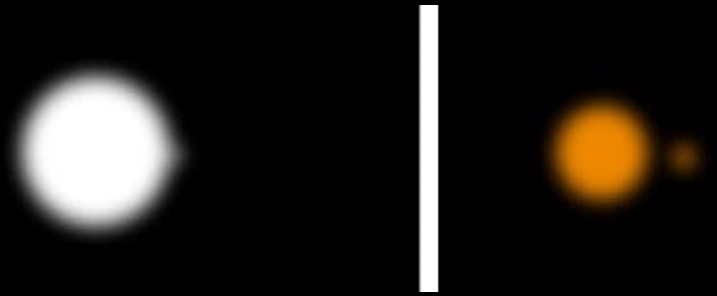

a
Stellar photon
Star
Observer
Absorption Percentage
2.5
2.4
2.3
4
6
8
10
Wavelength (microns)
Water Signatures in Exoplanet HD189733b
Spitzer Space Telescope • IRAC
NASA / JPL-Caltech / G. Tinetti (Institute d'Astrophysique de Paris)
ssc2007-12a
2DF
TERRA

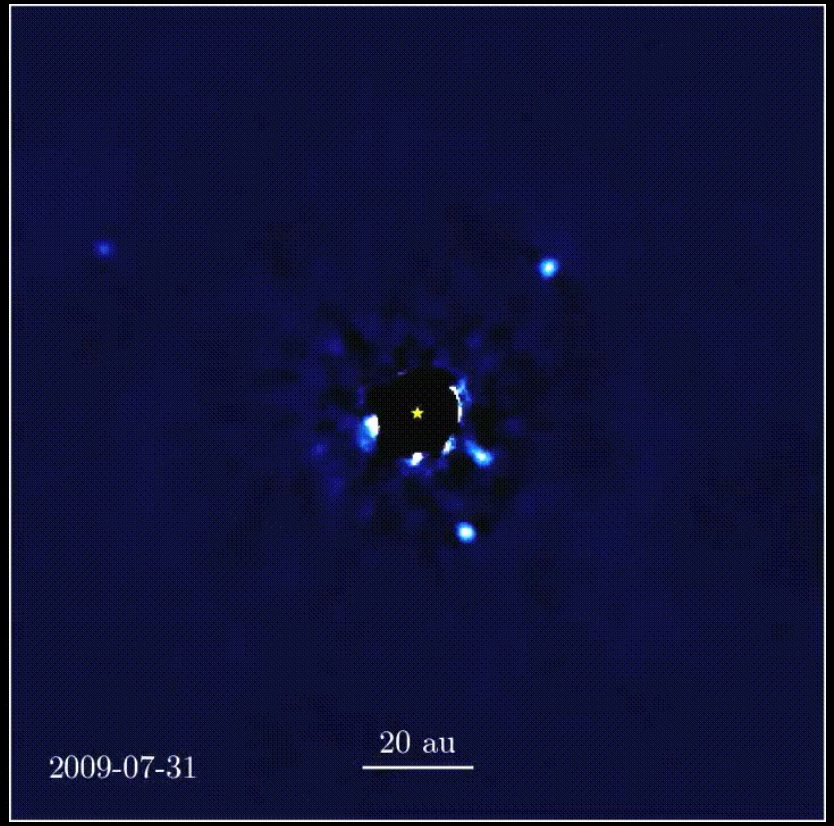
Quelle: NASA

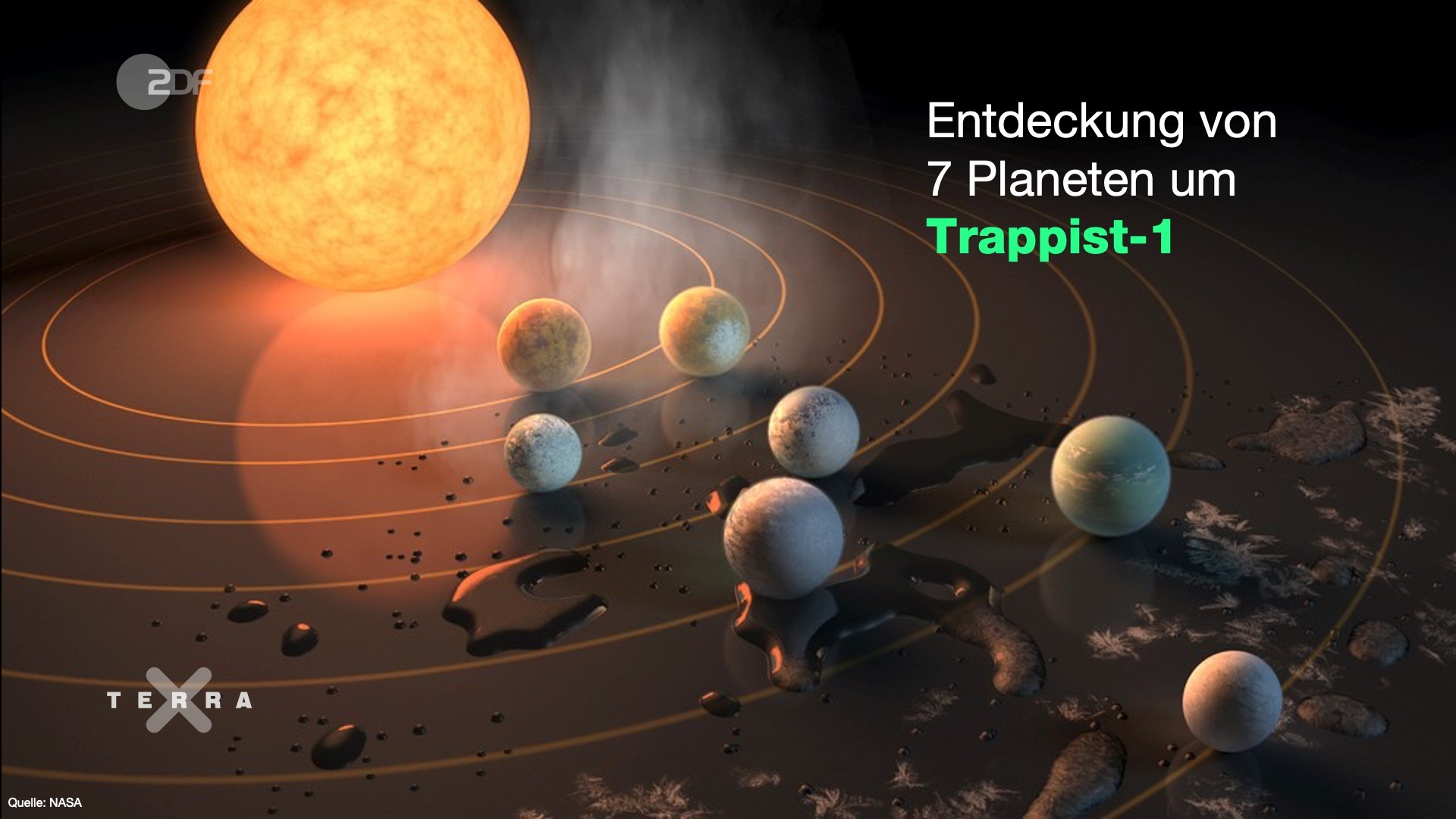
ZDF
Ein Gasplanet
ähnlich wie Jupiter
TERRA X
Quelle: NASA

Direkte Aufnahme - Methode

Planeten werden in Infrarot sichtbar







Quelle: NASA

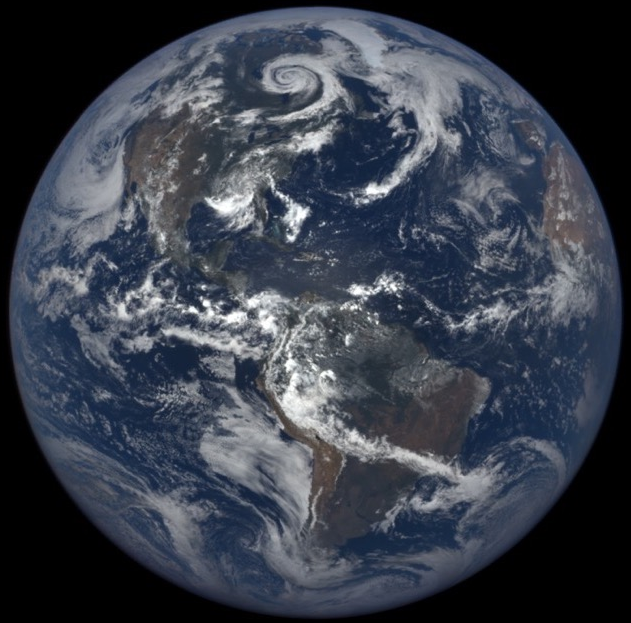
Zwei Planeten in der Lebenszone

Trappist-1

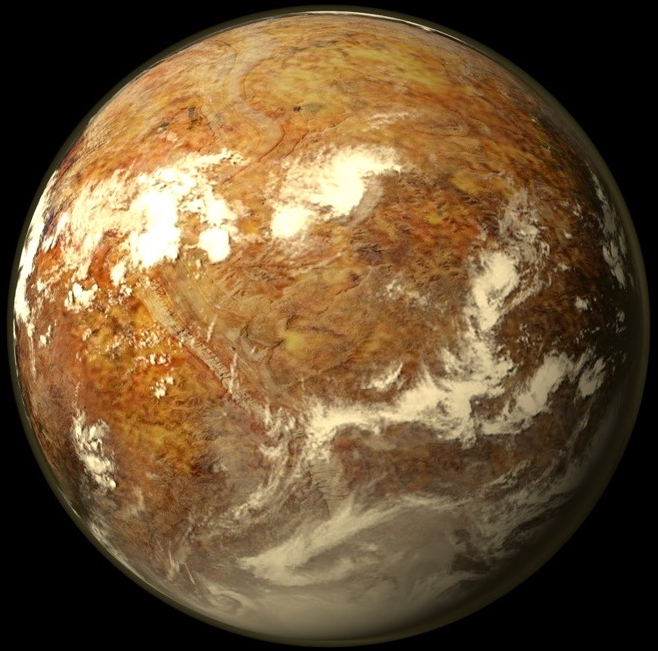
Quelle: NASA

Entdeckung eines nahen Exoplaneten:
Proxima Centauri b

Quelle: ESO/M. Kornmesser



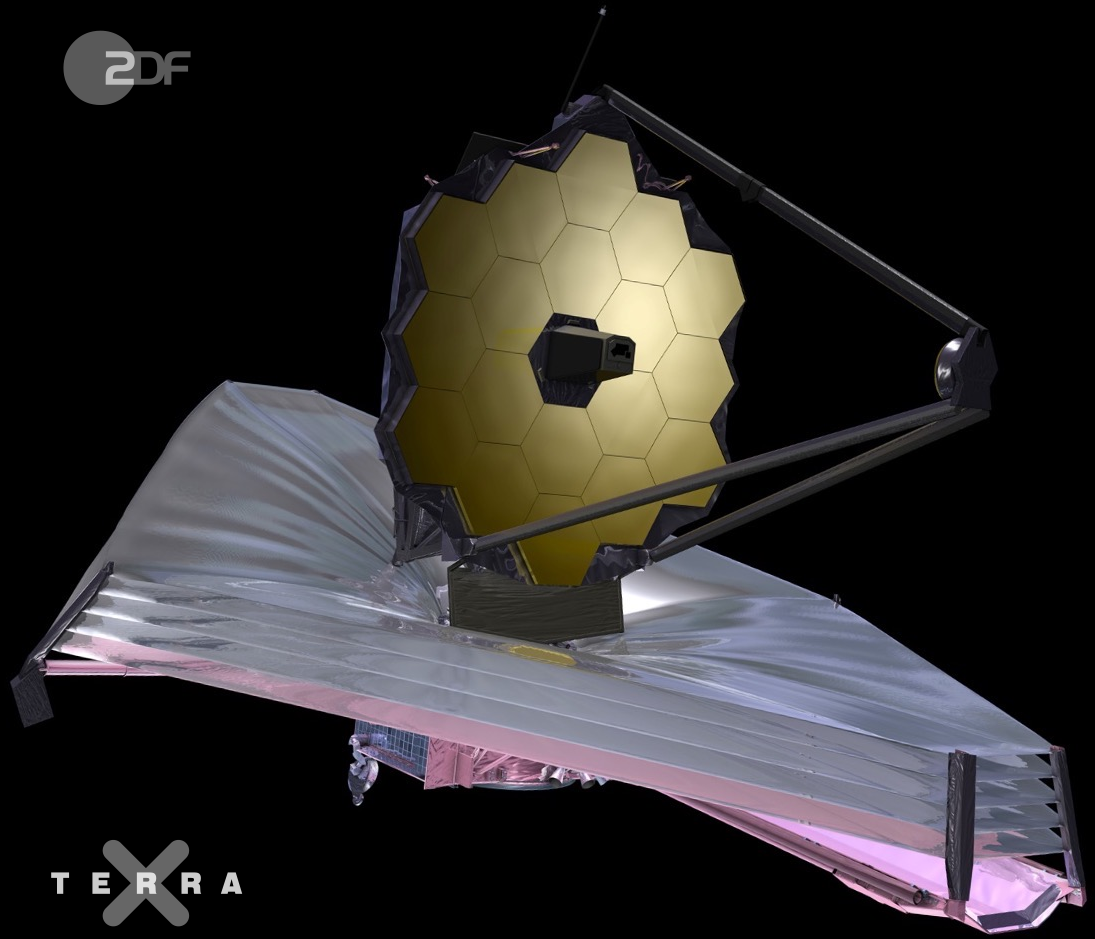
Erde



Proxima Centauri b

Quelle: PHL @ UPR Arecibo, NASA EPIC Team

Quelle: ESO/M. Kornmesser



James Webb Telescope

Oktober 2021

Quelle: NASA

ELT: Extreme
Large Telescope
2025
TERRA
Quelle: ESO

ZDF

TERRA X

LIVE