

# SIAMO SOLI ~~NELL'UNIVERSO?~~ NEL SISTEMA SOLARE?



Con Filippo Bonaventura,  
Lorenzo Colombo, e Matteo Miluzio

Astrofisici e comunicatori della scienza

Chi ha paura del buio?

27 Novembre 2020 - ore 10.00

[www.nottedeiricercatori.it](http://www.nottedeiricercatori.it)



# Pianeti solari...

Moto retrogrado di Marte

# Pianeti solari...

Jupiter



Mars



Saturn



Venus



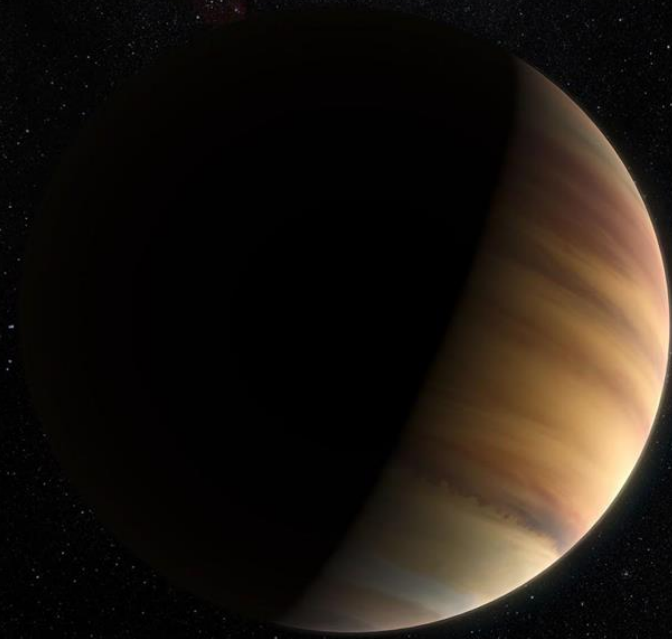
Mercury



...ed extrasolari: PSR B1257+12

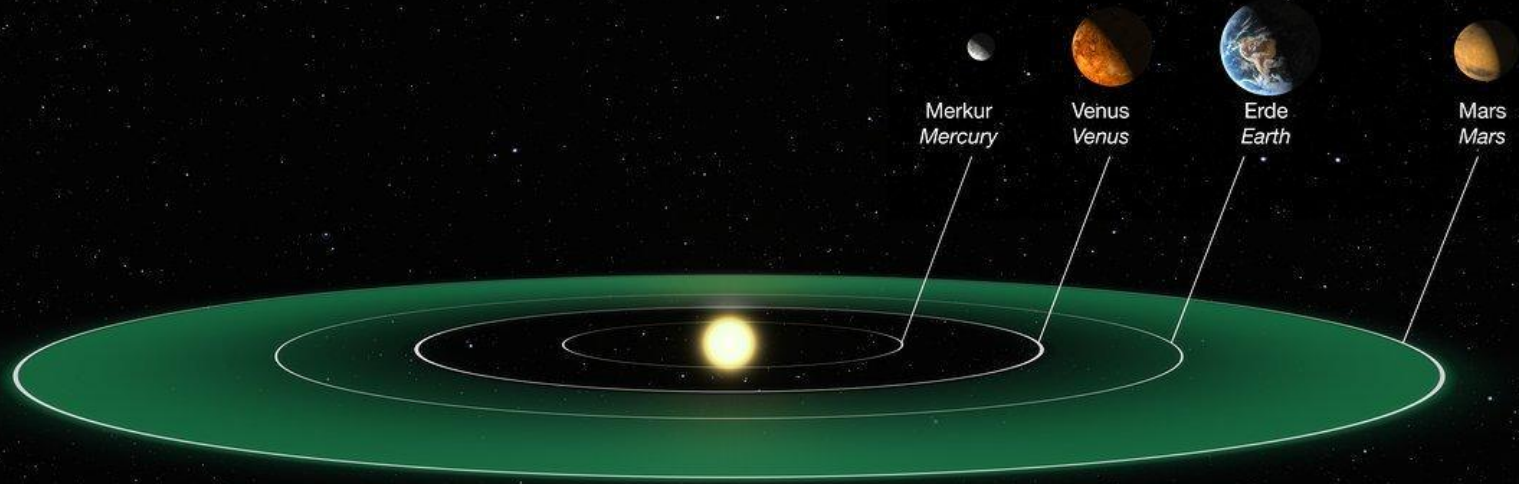


...ed extrasolari: 51 Pegasi B



Object <span>↕</span>	Star <span>↕</span>	Star type <span>↕</span>	Mass ( $M_{\oplus}$ ) <span>↕</span>	Radius ( $R_{\oplus}$ ) <span>↕</span>	Flux ( $F_{\oplus}$ ) <span>↕</span>	$T_{\text{eq}}$ (K) <span>↕</span>	Period (days) <span>↕</span>	Distance (ly) <span>↕</span>	Ref <span>↕</span>
Earth	Sun (Sol)	G2V	1.00	1.00	1.00	255	365.24	-	
Proxima Centauri b	Proxima Centauri	M6Ve	$\geq 1.3$	0.8 – 1.1 – 1.4	0.65	234	11.186	4.22	[10]
Gliese 667 Cc	Gliese 667 C	M3V	$\geq 3.8$	1.1 – 1.5 – 2.0	0.88	277	$28.143 \pm 0.029$	23.62	[11][12]
Kepler-442b	Kepler-442	K?V	8.2 – 2.3 – 1.0	1.34	0.70	233	112.3053	1291.6	[12]
Kepler-452b	Kepler-452	G2V	19.8 – 4.7 – 1.9	1.50, 1.63	1.11	$265^{+15}_{-13}$	384.8	1402	[12][13]
Wolf 1061c	Wolf 1061	M3V	$\geq 4.3$	1.1 – 1.6 – 2.0	1.36	275	17.9	13.8	[12]
Kepler-1229b	Kepler-1229	M?V	9.8 – 2.7 – 1.2	1.4	0.49	213	86.8	769	[12]
Kapteyn b	Kapteyn	sdM1	$\geq 4.8$	1.2 - 1.6 - 2.1	0.43	205	48.6	13	[12]
Kepler-62f	Kepler-62	K2V	10.2 – 2.8 – 1.2	1.41	0.39	244	267.291	1200	[12][14]
Kepler-186f	Kepler-186	M1V	4.7 – 1.5 – 0.6	1.17	0.29	188	129.9459	561	[12]
Luyten b	Luyten's Star	M3.5V	3.15 - 2.89 - 2.63		1.06	206-293	18.650	12.36	[15]
TRAPPIST-1d	TRAPPIST-1	M8V	0.30	0.78	1.04	258	4.05	39	[16][17]
TRAPPIST-1e	TRAPPIST-1	M8V	0.77	0.91	0.67	230	6.1	39	[16][17]
TRAPPIST-1f	TRAPPIST-1	M8V	0.93	1.046	0.38	200	9.2	39	[16][17]
TRAPPIST-1g	TRAPPIST-1	M8V	1.15	1.15	0.26	182	12.4	39	[16][17]
LHS 1140 b	LHS 1140	M?V	6.6	1.43	0.46	230	25	40	[18]
Kepler-1638b	Kepler-1638	G4V	45 – 6 – 1	1.60	1.17	304	259.365	2491.83	[19]
Teegarden c*	Teegarden's Star	M7V	1.11		0.37		11.4	12.58	[20]

# Abitabilità



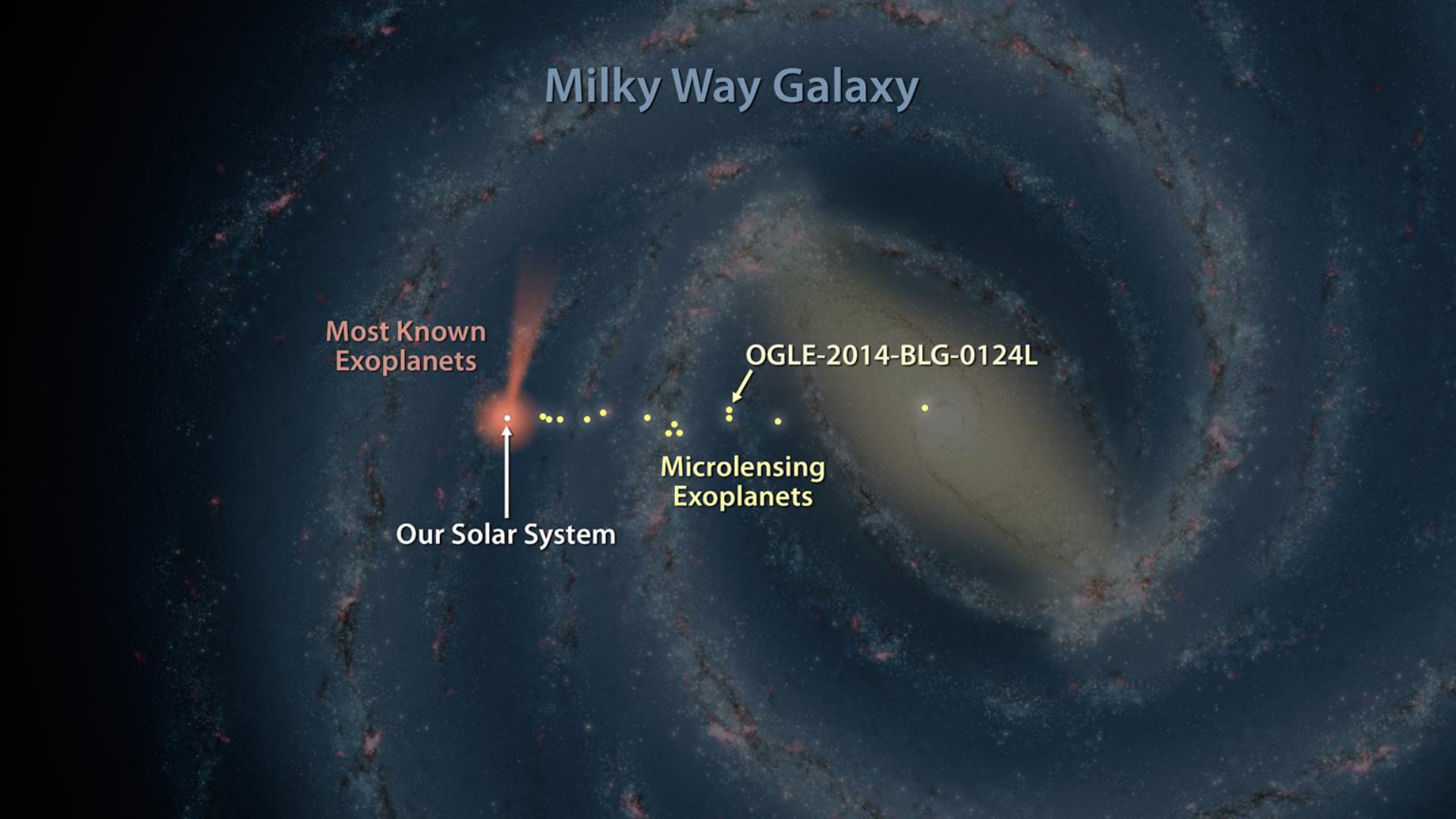
# Milky Way Galaxy

Most Known  
Exoplanets

OGLE-2014-BLG-0124L

Microlensing  
Exoplanets

Our Solar System

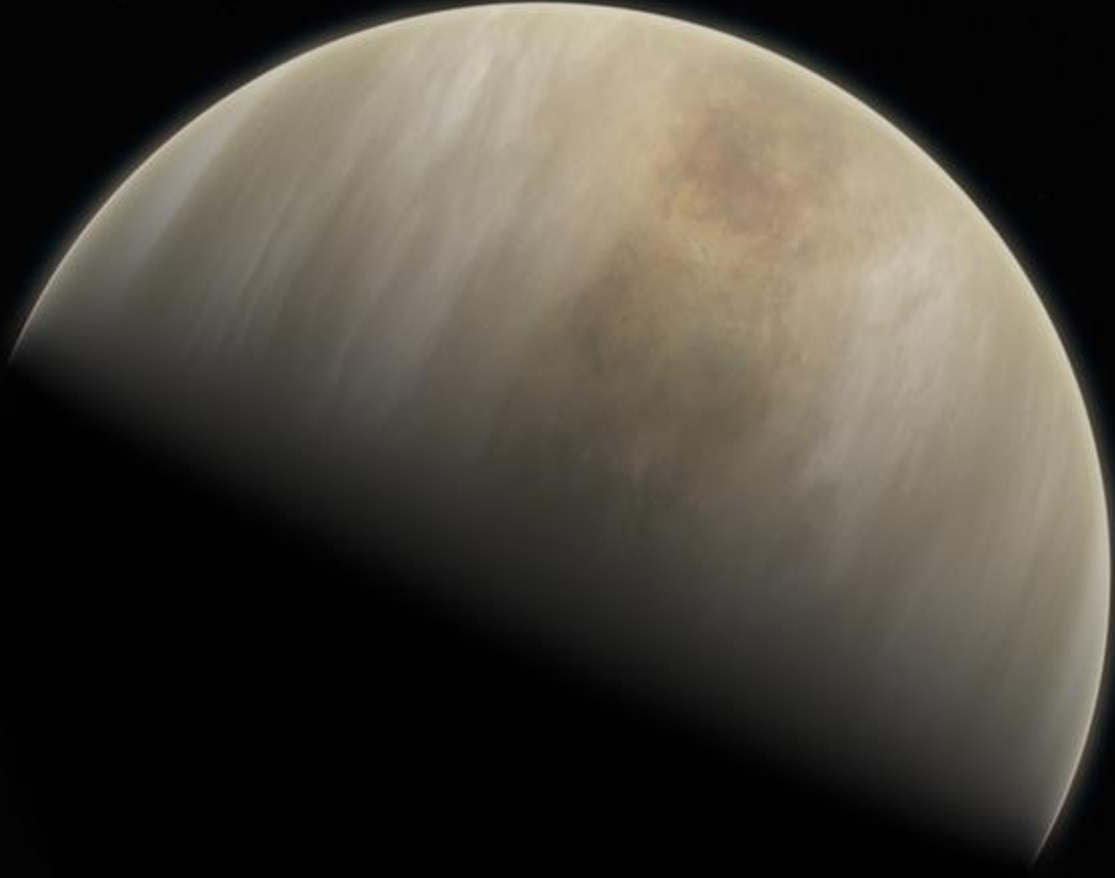




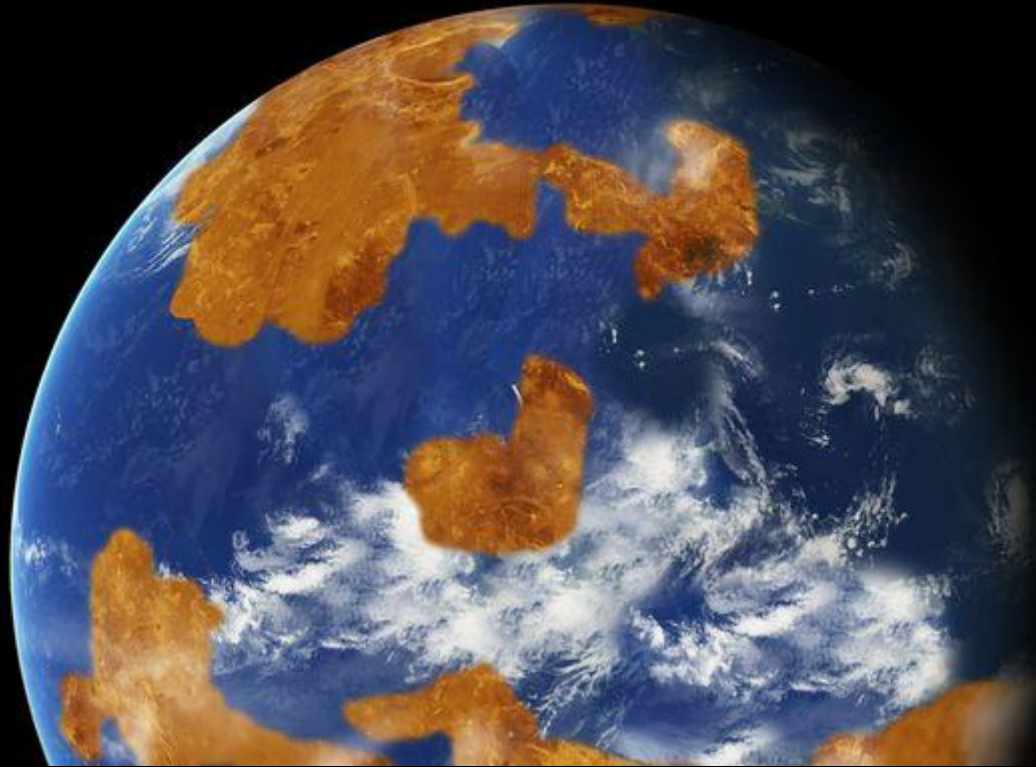
# Vita nel sistema solare



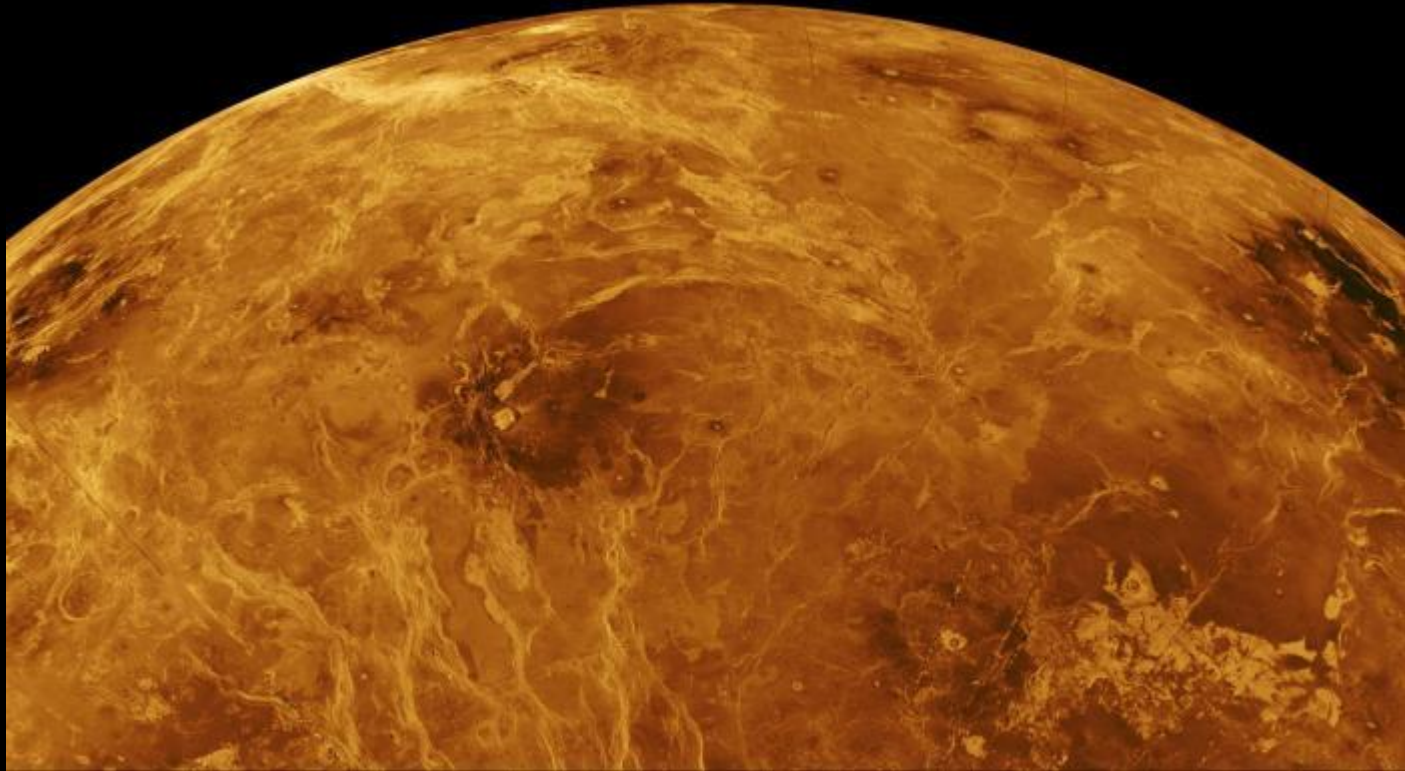
# Venere

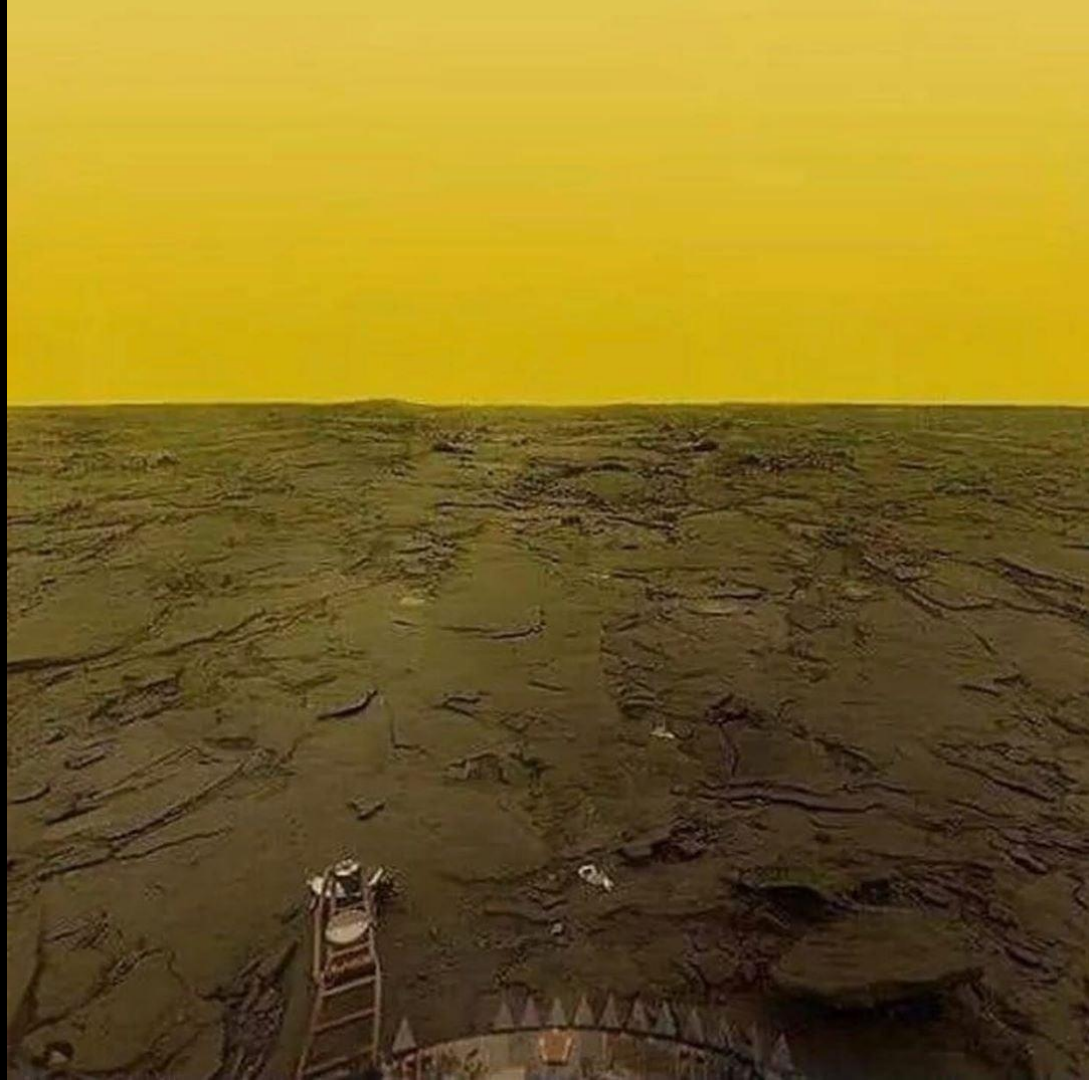


**3 miliardi di anni fa**



...e oggi



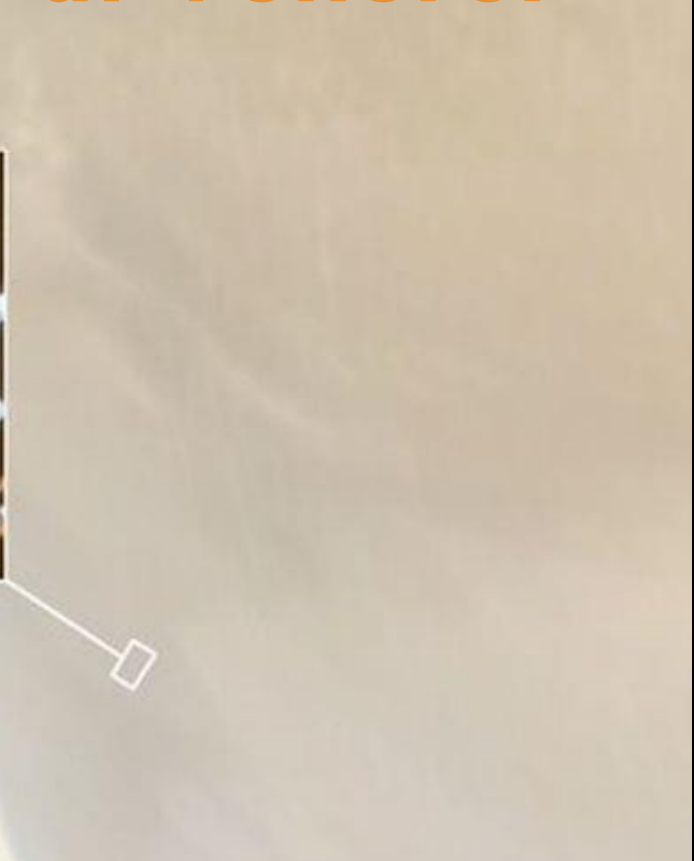
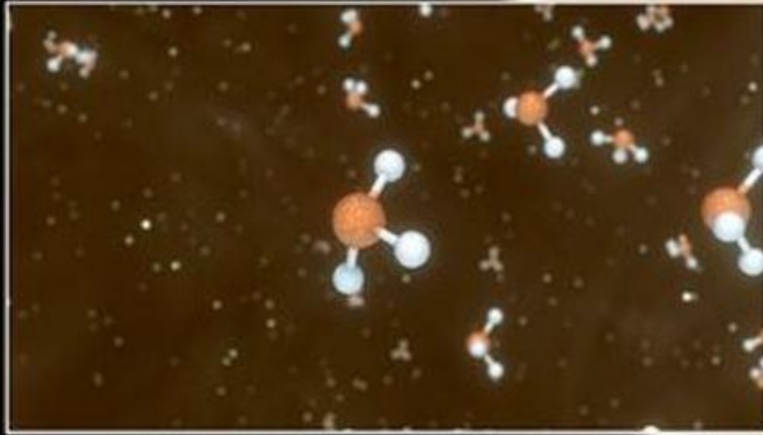


# Le nubi di Venere

© JAXA/ISAS/DARTS/Damia Bouic



# Fosfina nelle nubi di Venere!

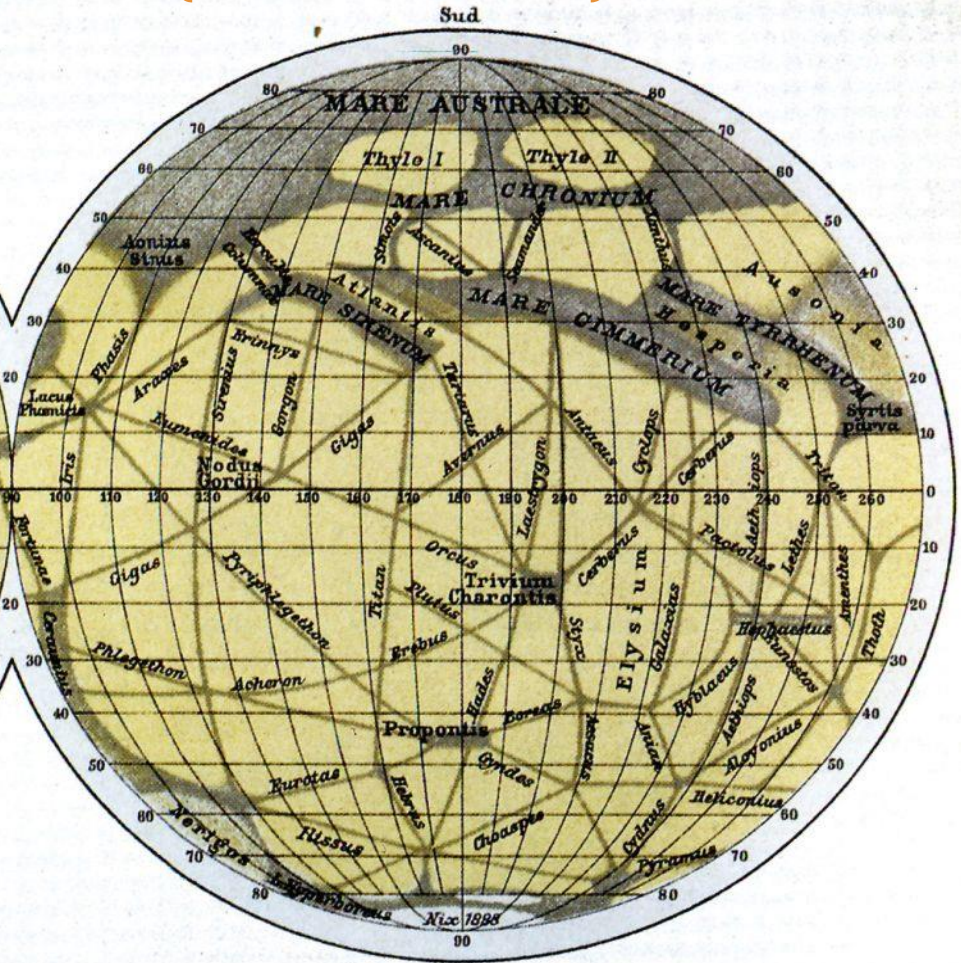
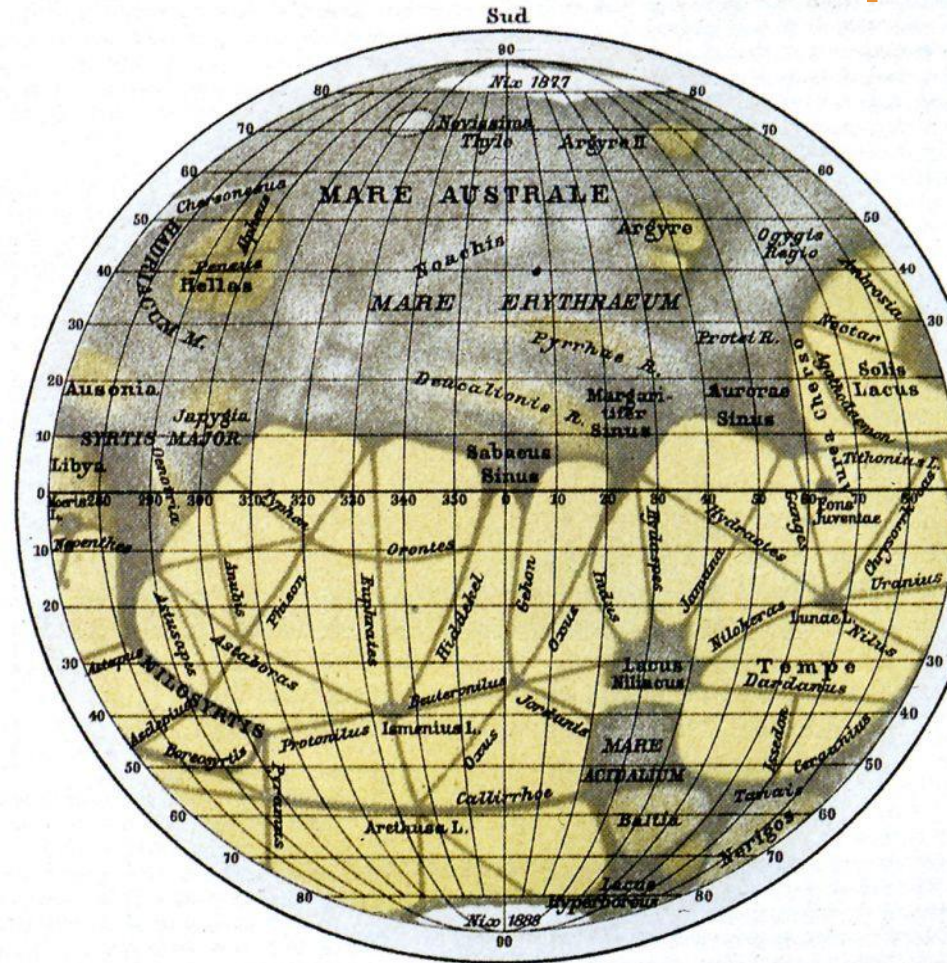


# Marte





# Giovanni Schiaparelli (1835-1910)



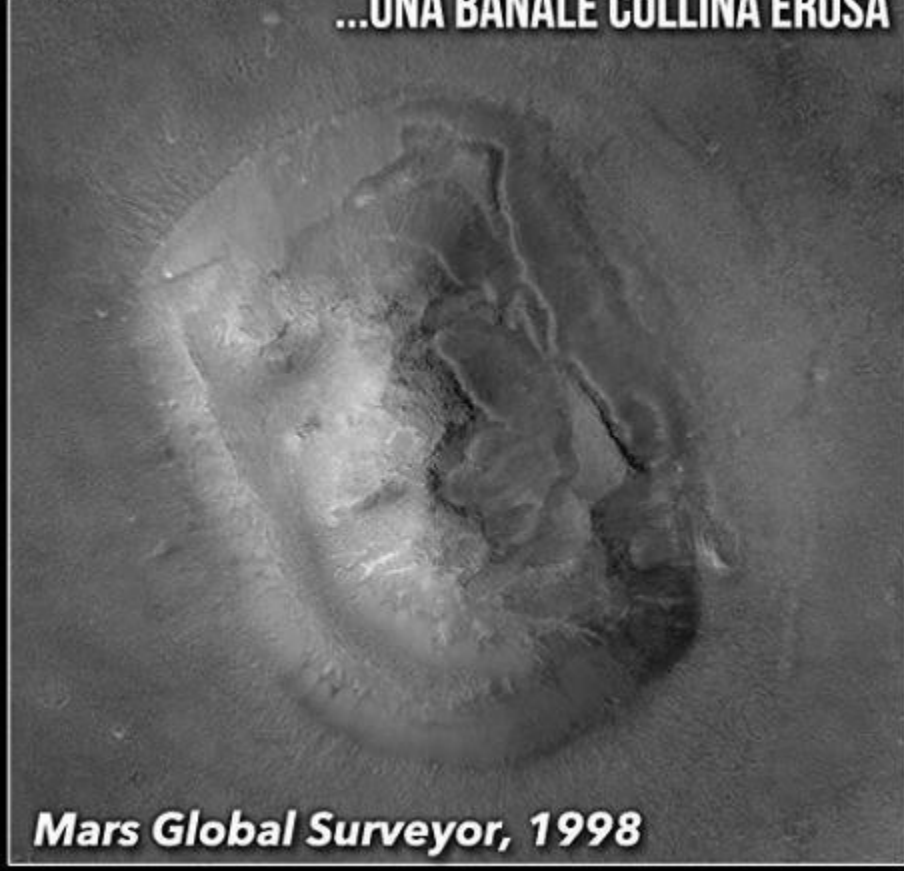
**IL VOLTO DI CYDONIA...**

*Facebook.com/NextSolarStorm*



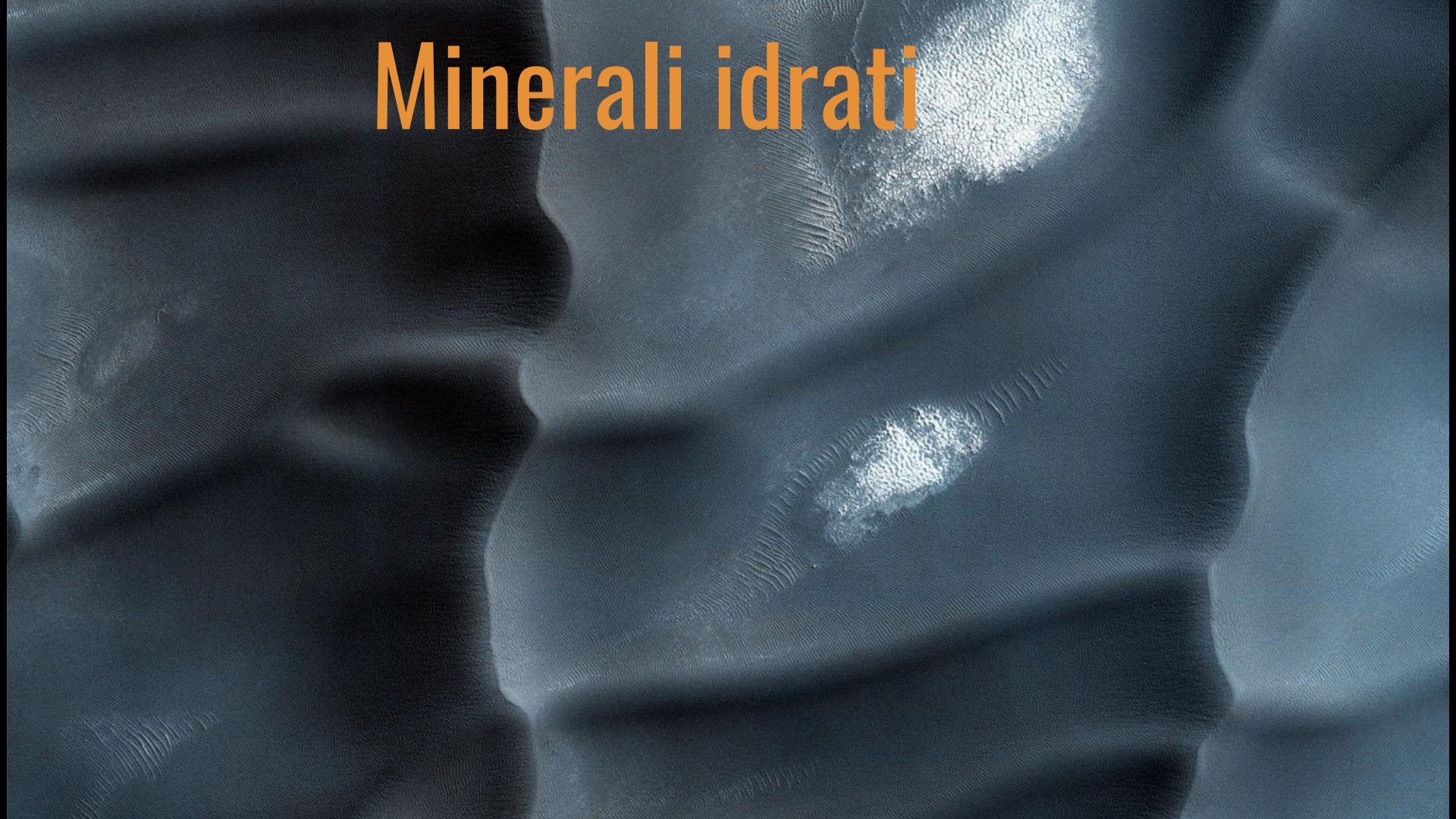
**Viking, 1976**

**...UNA BANALE COLLINA EROSA**

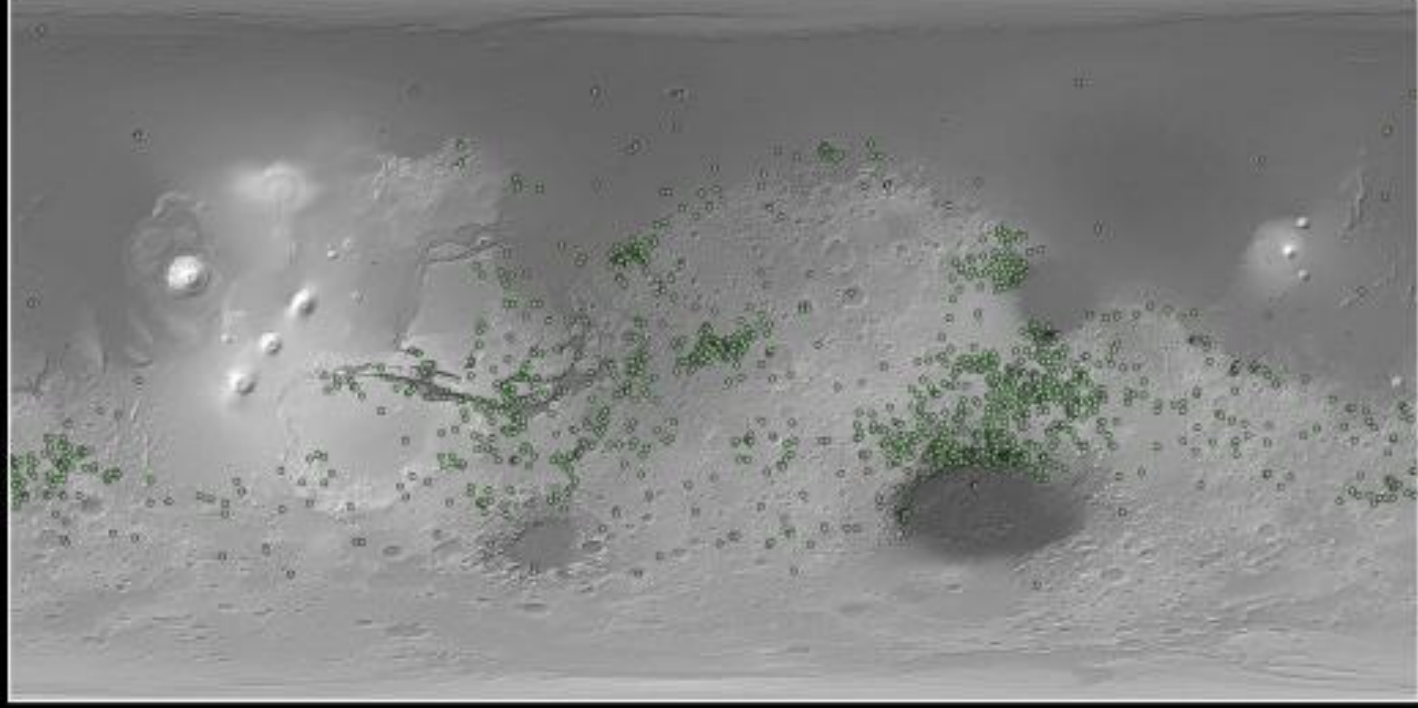


**Mars Global Surveyor, 1998**

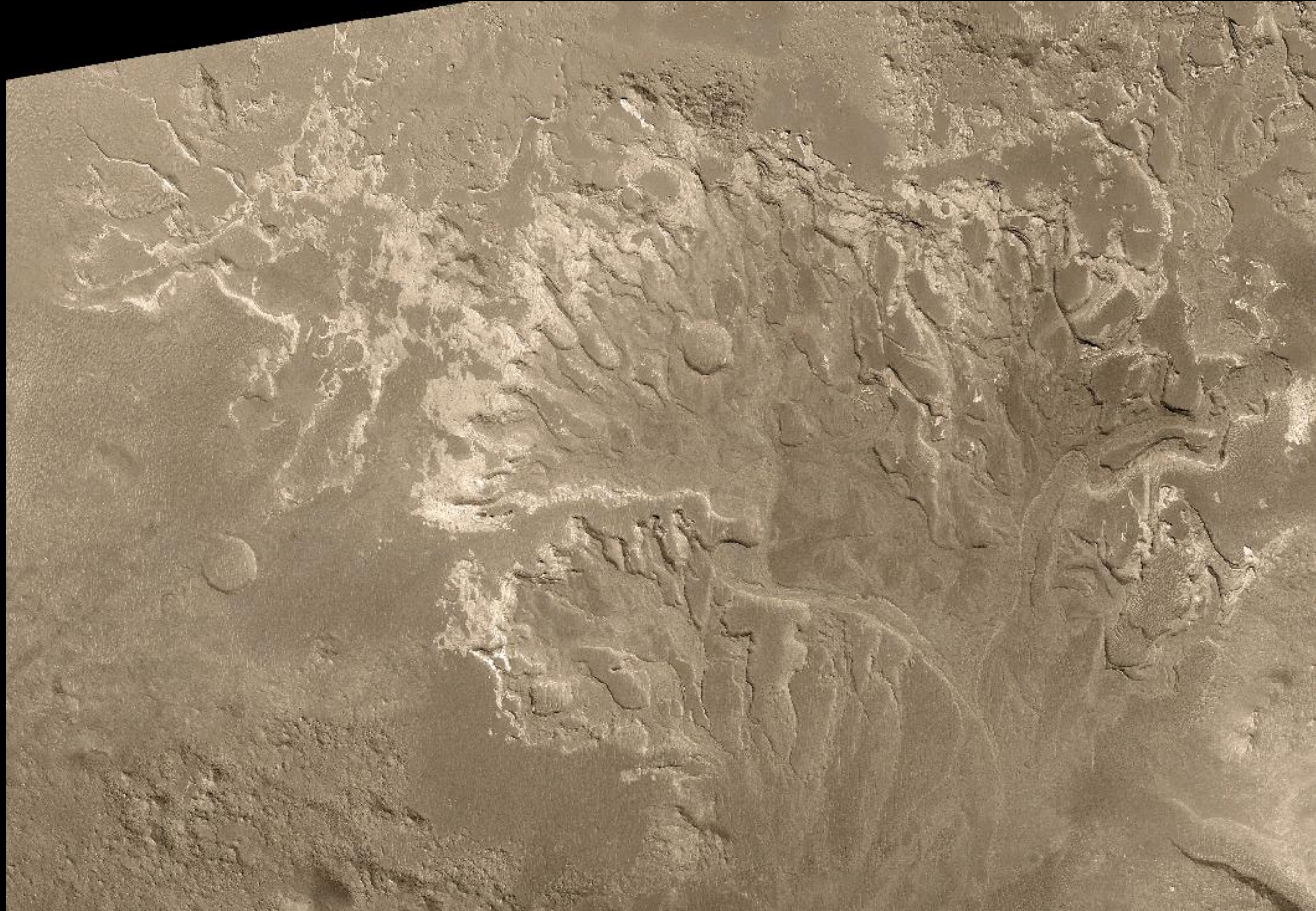
# Minerali idrati



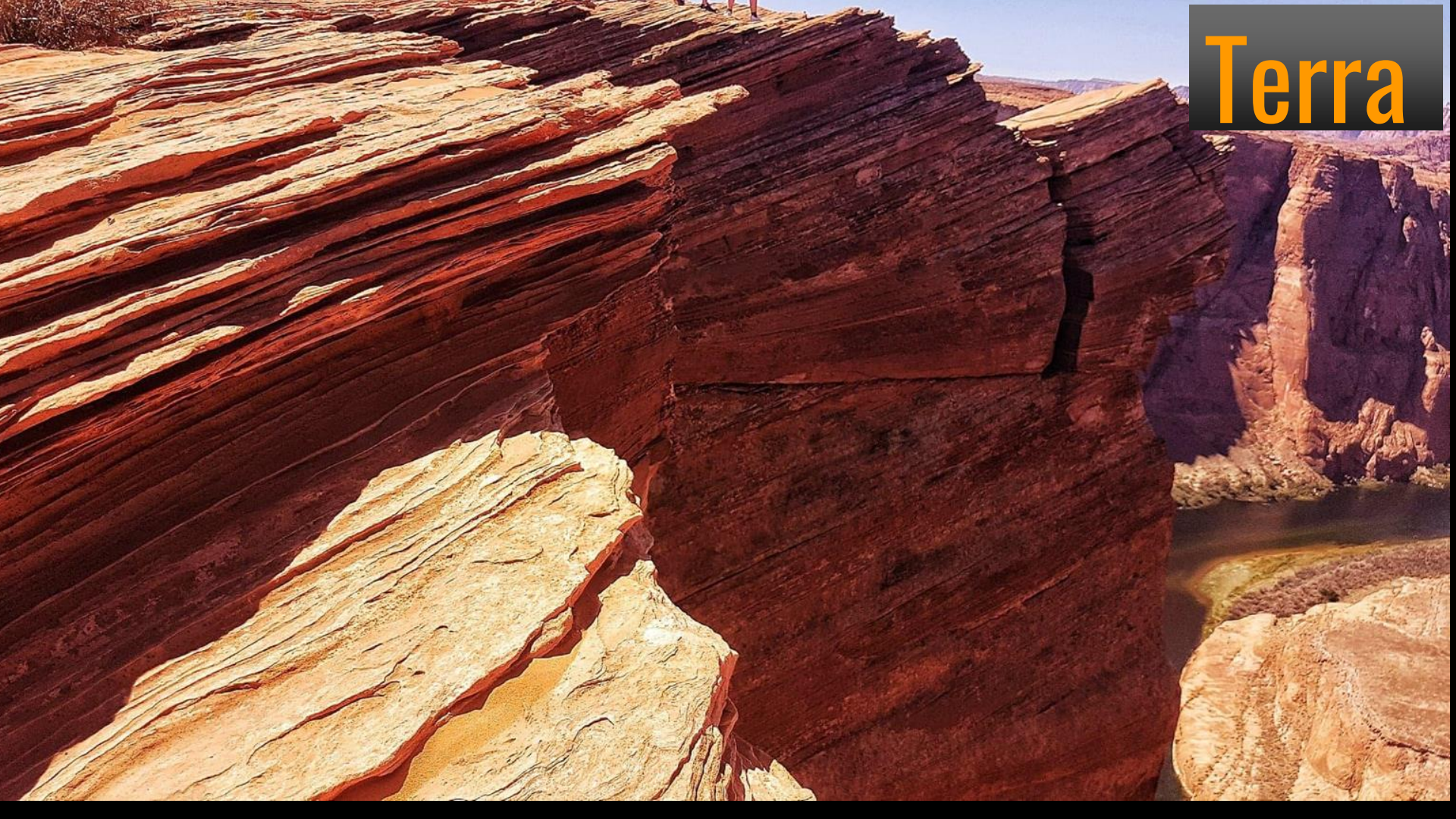
Hydrated mineral sites



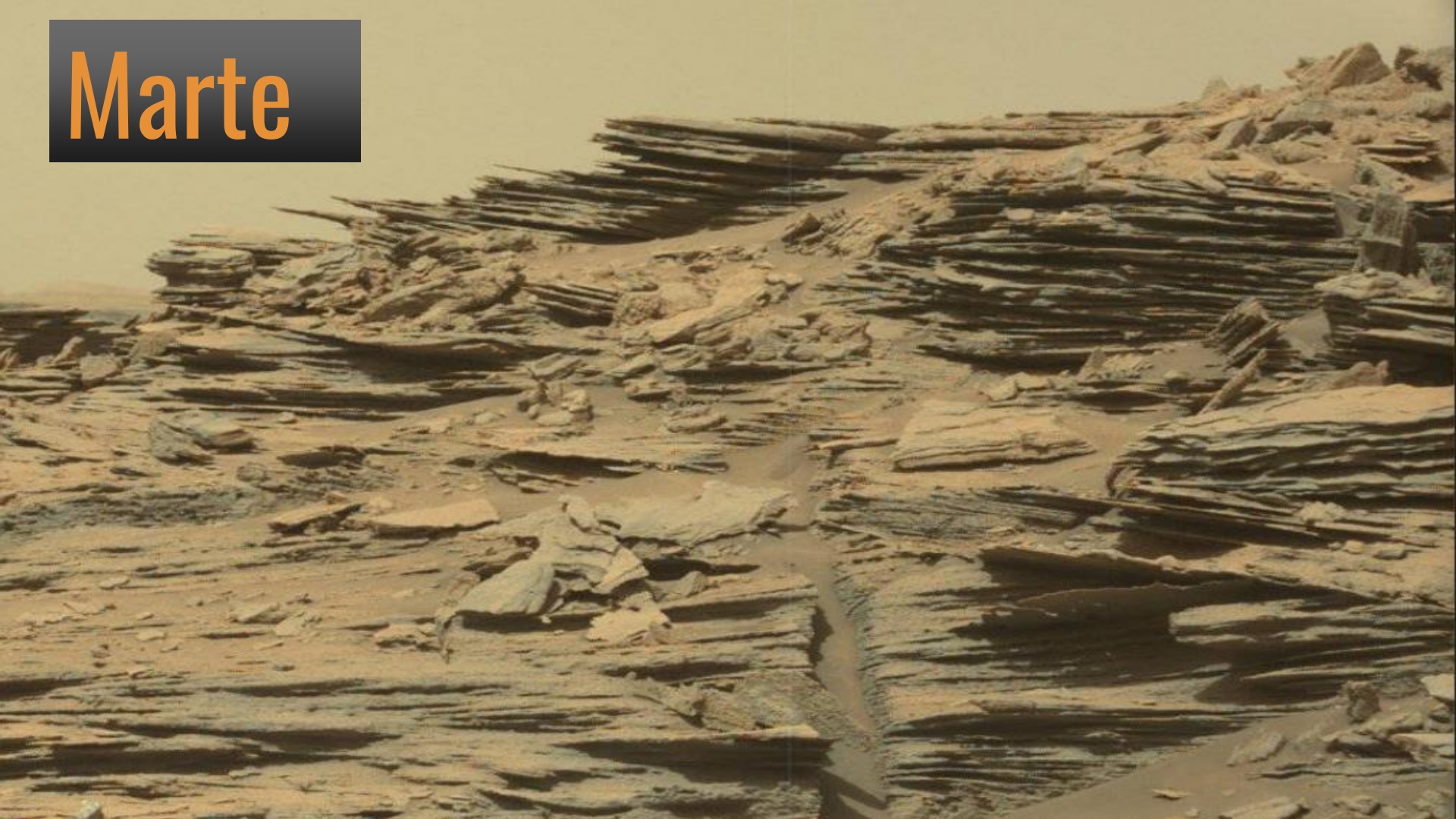
# Strutture di erosione



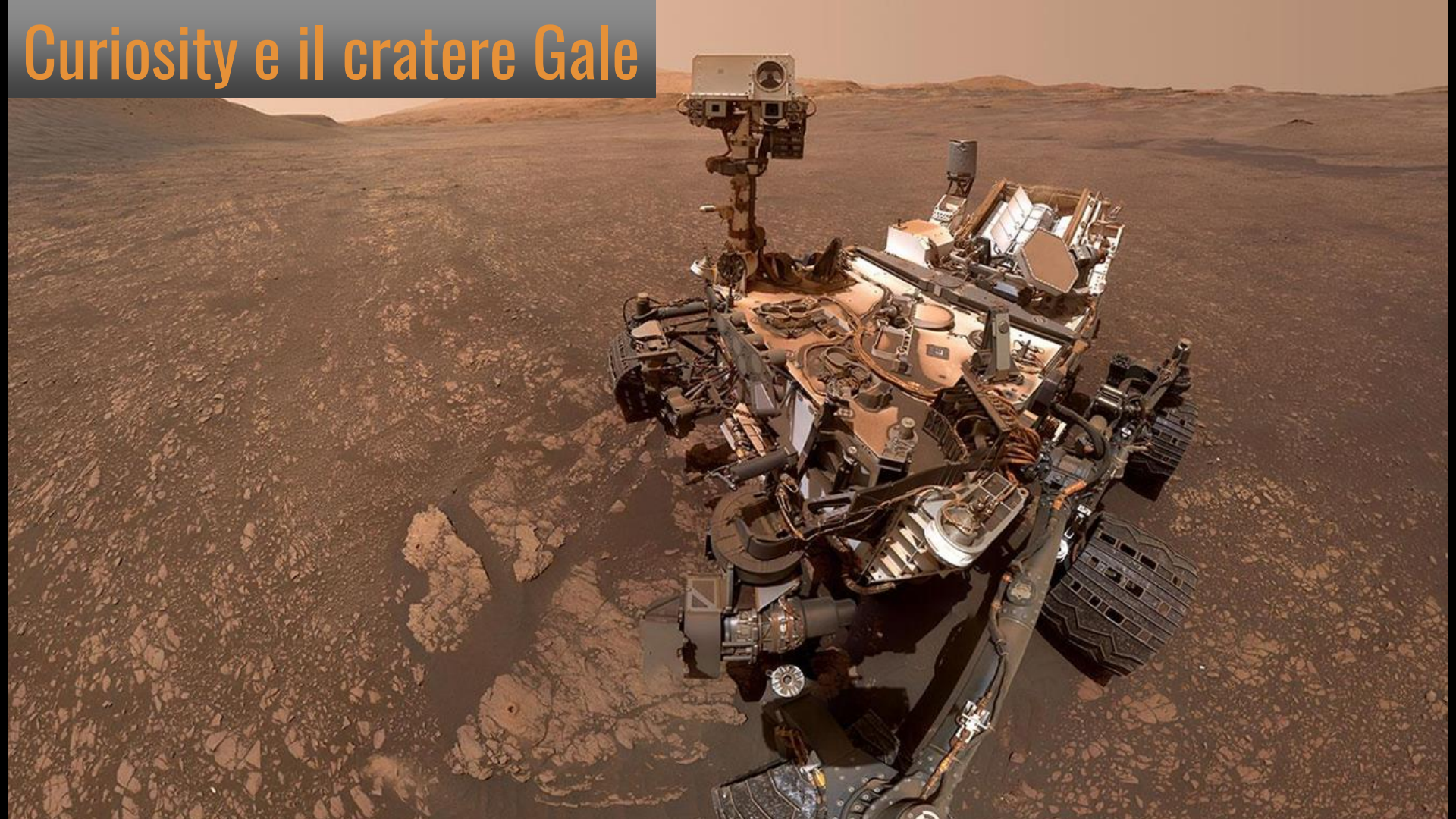
# Terra



# Marte



# Curiosity e il cratere Gale



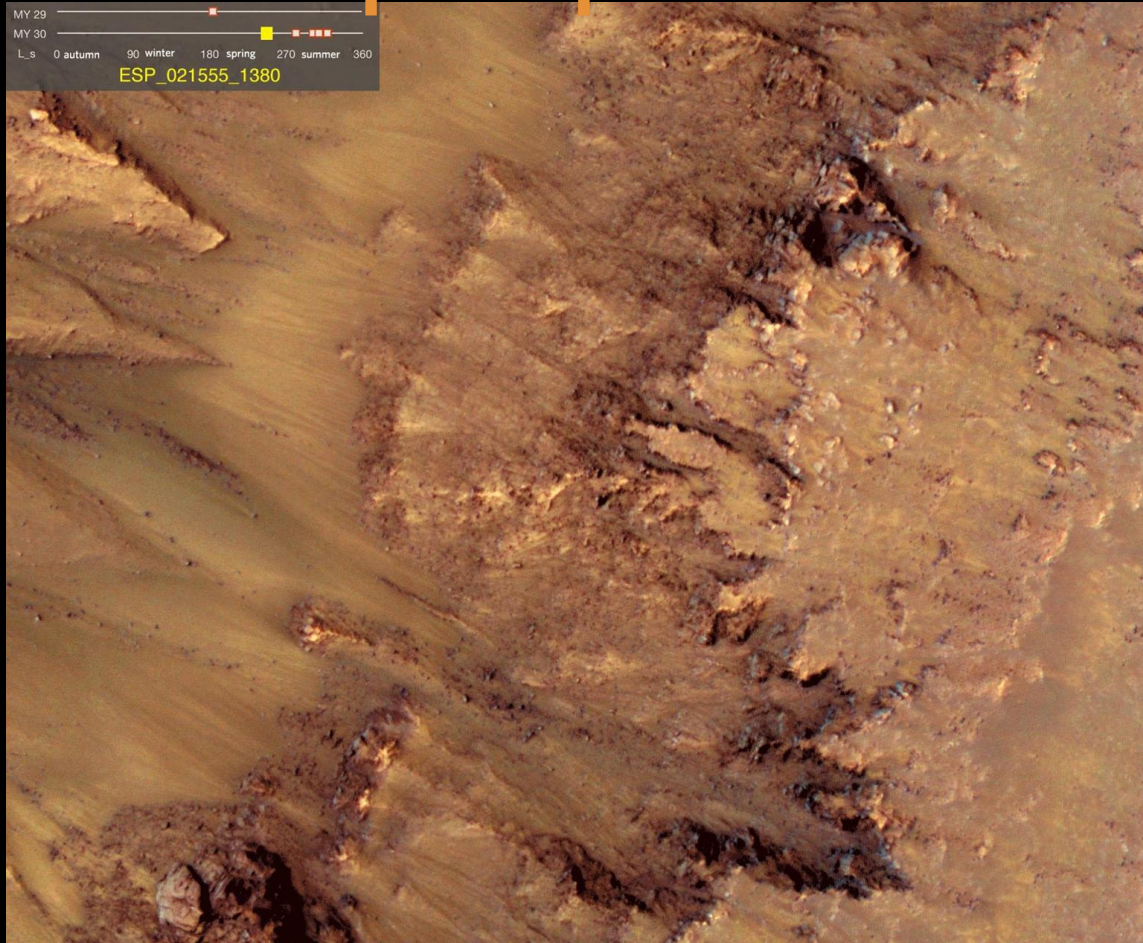




# Acqua liquida?



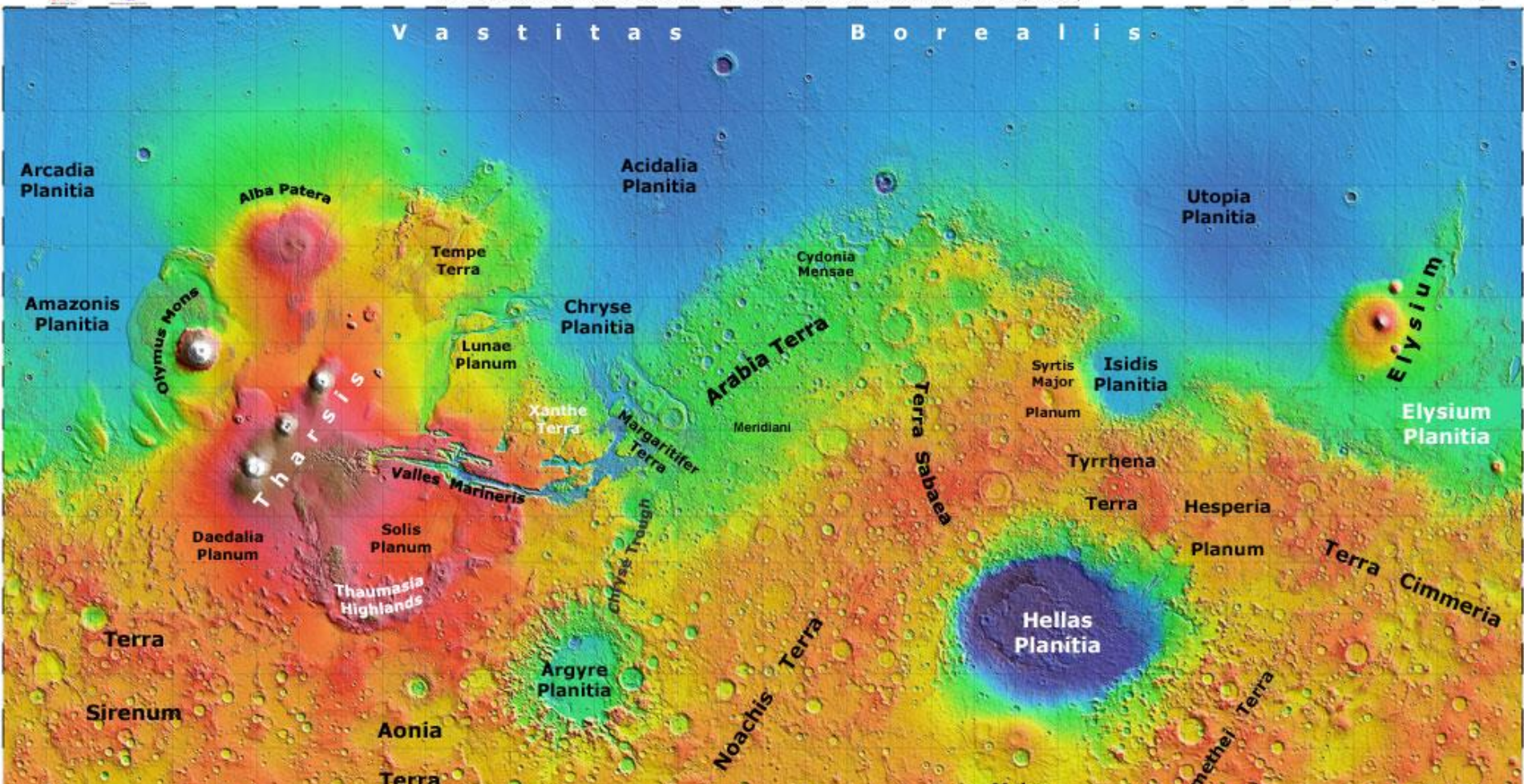
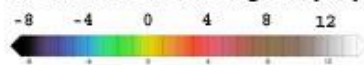
# Acqua liquida?





THE TOPOGRAPHY OF MARS BY THE MARS ORBITER LASER ALTIMETER (MOLA)

Elevation above mean geoid (km)



Vastitas Borealis

Arcadia Planitia

Amazonis Planitia

Alba Patera

Tempe Terra

Acidalia Planitia

Cydonia Mensae

Utopia Planitia

Olympus Mons

THE BLSIS

Lunae Planum

Chryse Planitia

Arabia Terra

Syrtis Major Planum

Isidis Planitia

Elysium

Elysium Planitia

Xanthe Terra

Margaritifer Terra

Meridiani

Valles Marineris

Chryse Trough

Terra Sabaea

Tyrrhena

Terra

Hesperia

Terra Cimmeria

Daedalia Planum

Solis Planum

Theumasia Highlands

Terra

Hellas Planitia

Argyra Planitia

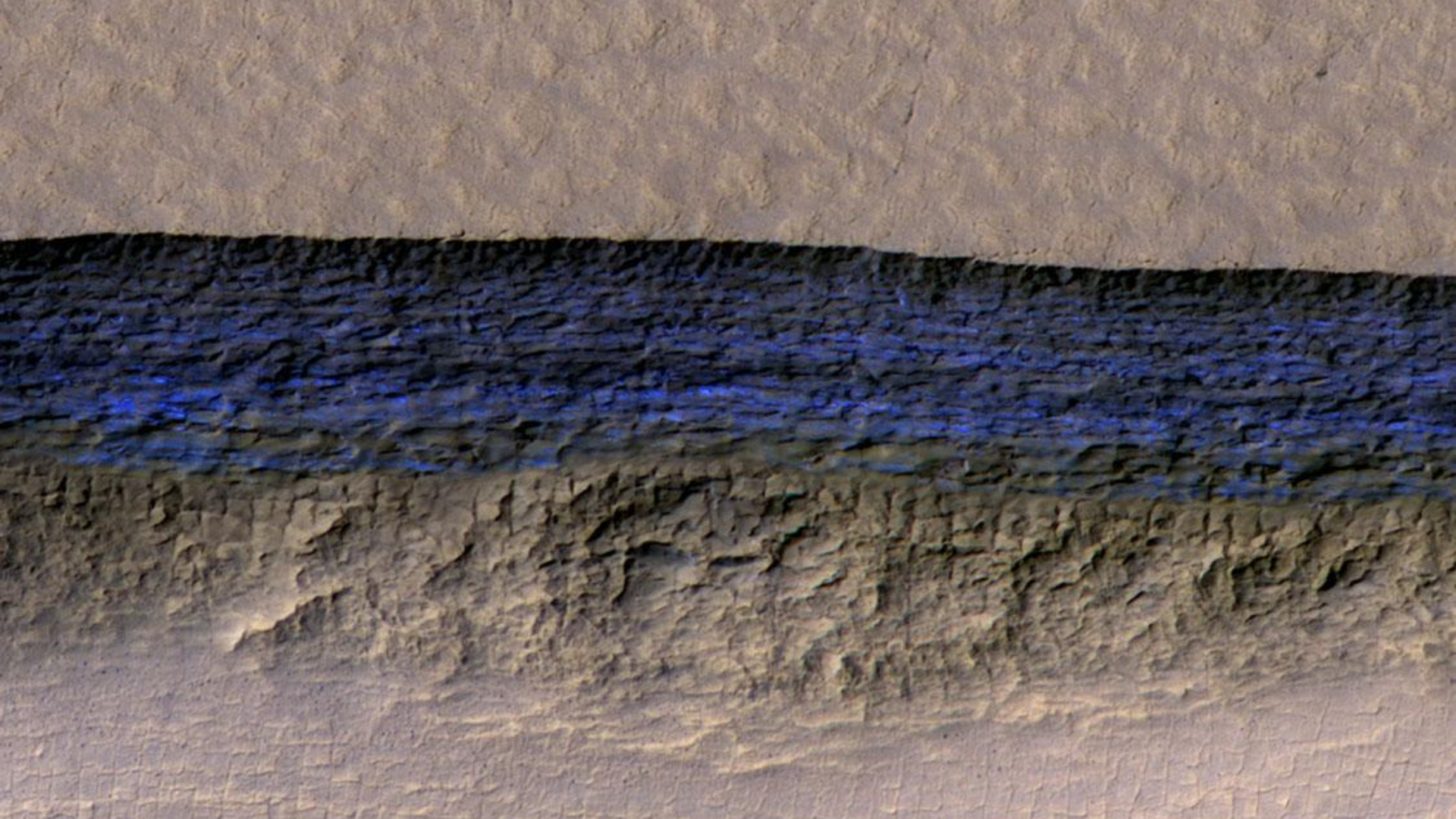
Sirenum

Aonia

Noachis Terra

metheji Terra

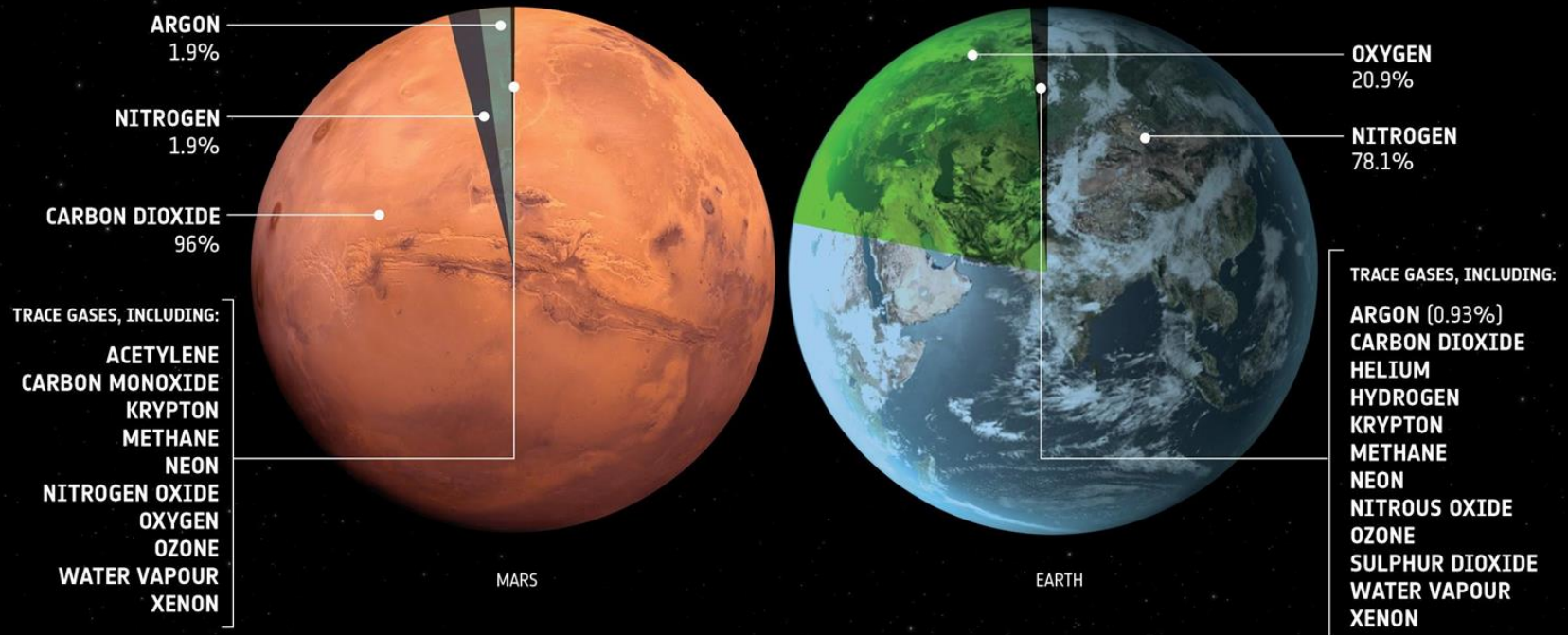




# Cratere Korolev



## → COMPARING THE ATMOSPHERES OF MARS AND EARTH



Atmospheric composition by volume | Planets not to scale | Atmosphere of Mars is less than 1% of Earth's | Trace gases listed alphabetically



# Il mistero del metano marziano



# ExoMars



## EXOMARS TIMELINE



14 March 2016  
ExoMars 2016  
Launch



19 October 2016  
Arrival at Mars



April 2018  
Trace Gas Orbiter  
starts science mission



August-October 2022  
ExoMars 2022  
Launch

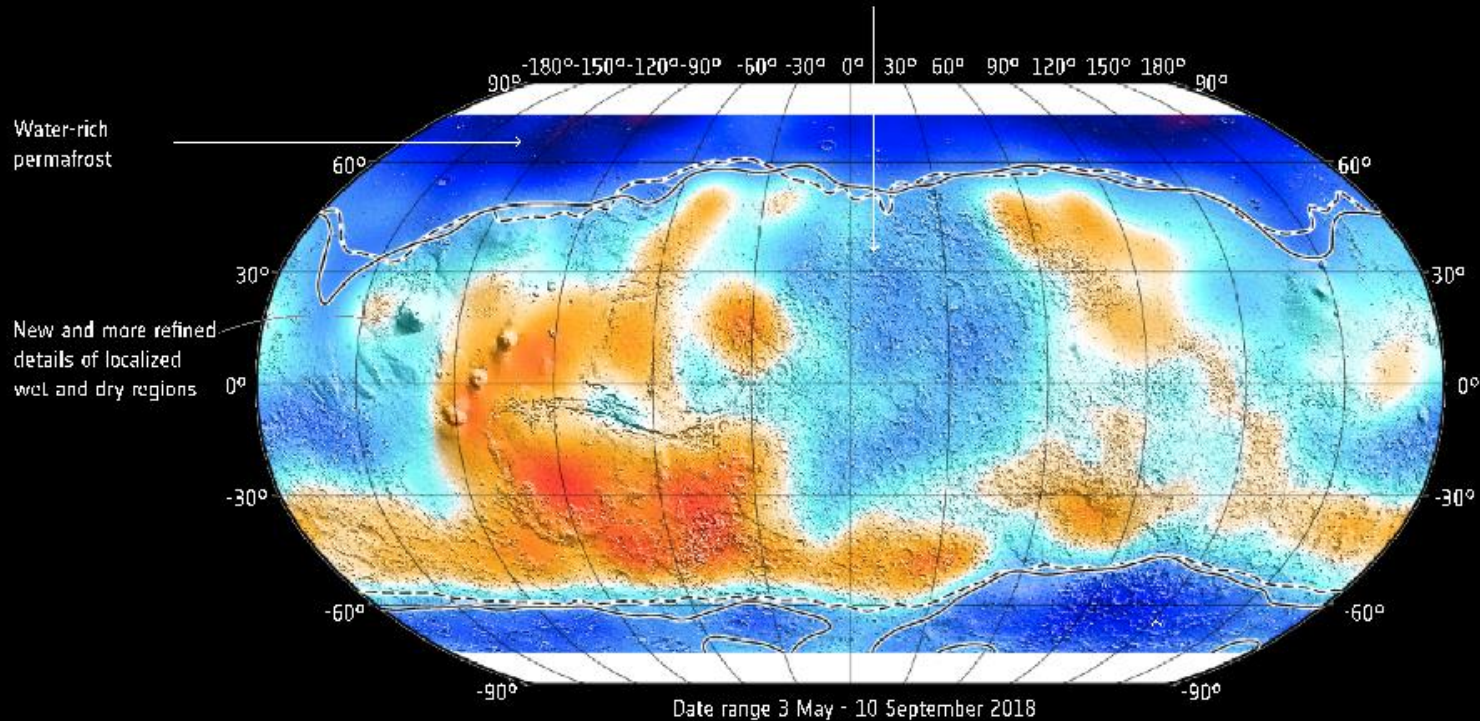


April/July 2023  
Rover and surface  
platform arrival at Mars

#ExoMars



Water signature in equatorial regions may signify shallow permafrost, hydrated minerals, or the former locations of the planet's poles in ancient times



Spatial resolution already supersedes all previous data

Water-rich permafrost

# Schiaparelli

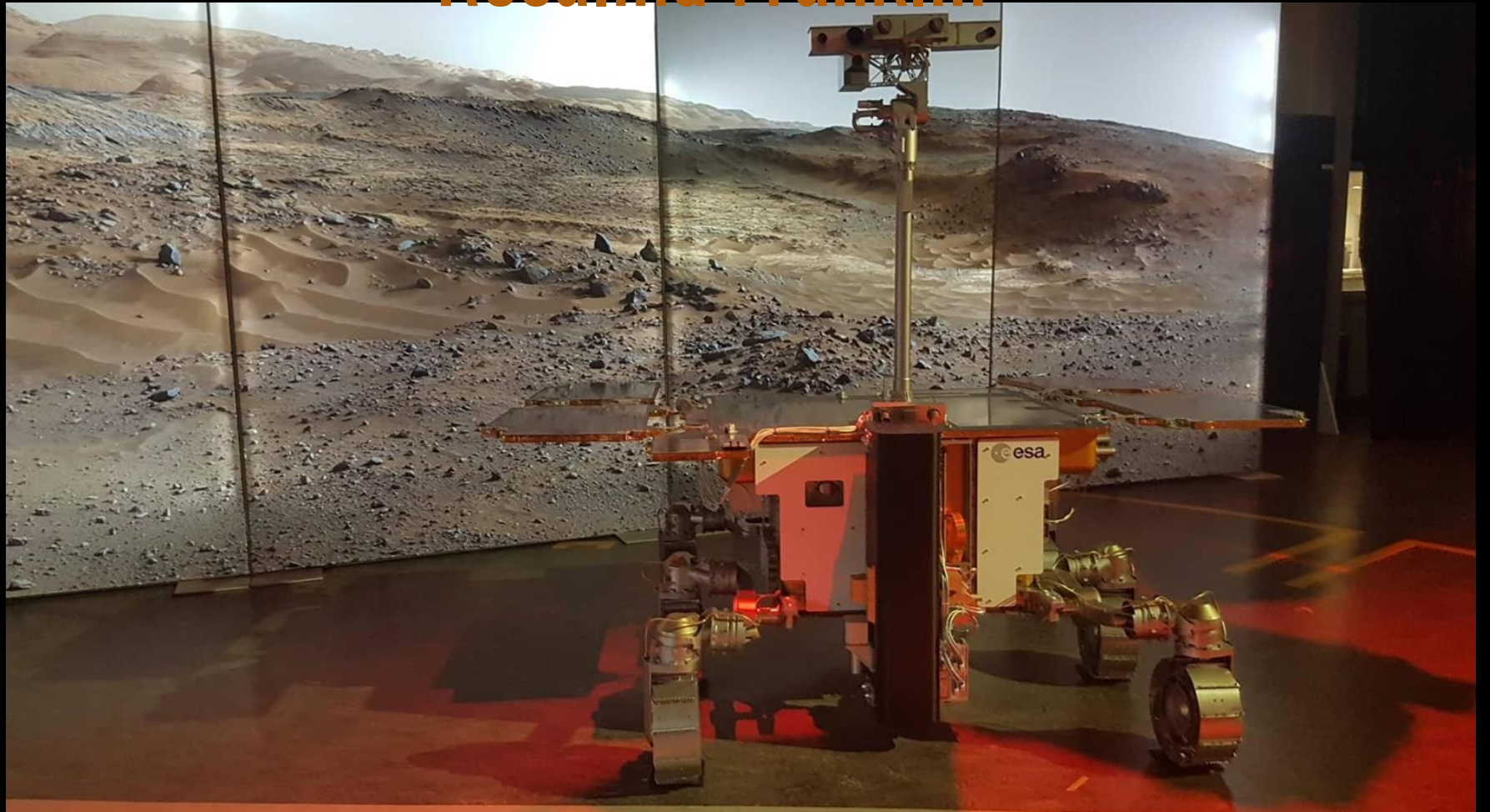




10 m

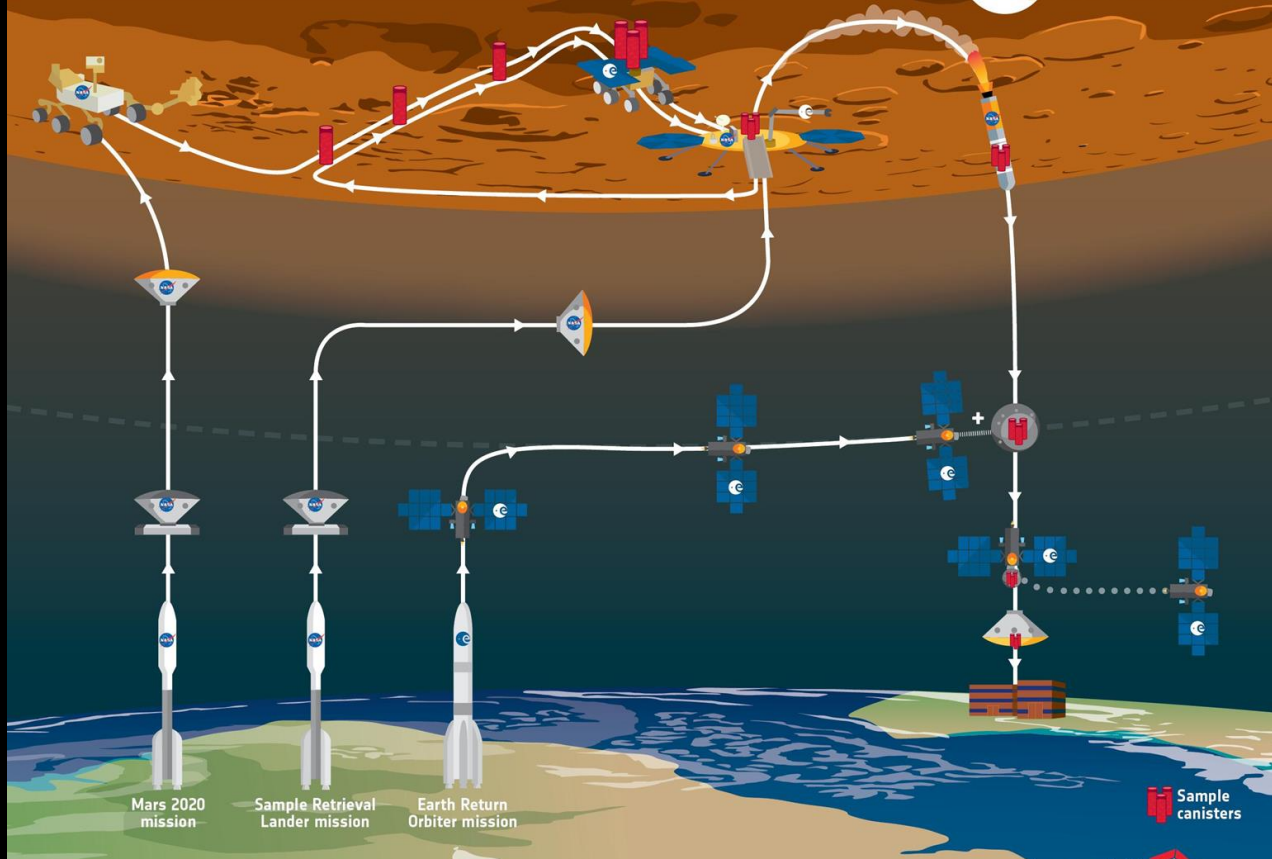


# Rosalind Franklin





# → MARS SAMPLE RETURN



Mars 2020 mission

Sample Retrieval Lander mission

Earth Return Orbiter mission

Sample canisters

#Space19plus #ToMarsAndBack #ExploreFarther

Space19



# Mars 2020: il rover Perseverance



# Buon viaggio Perseverance!

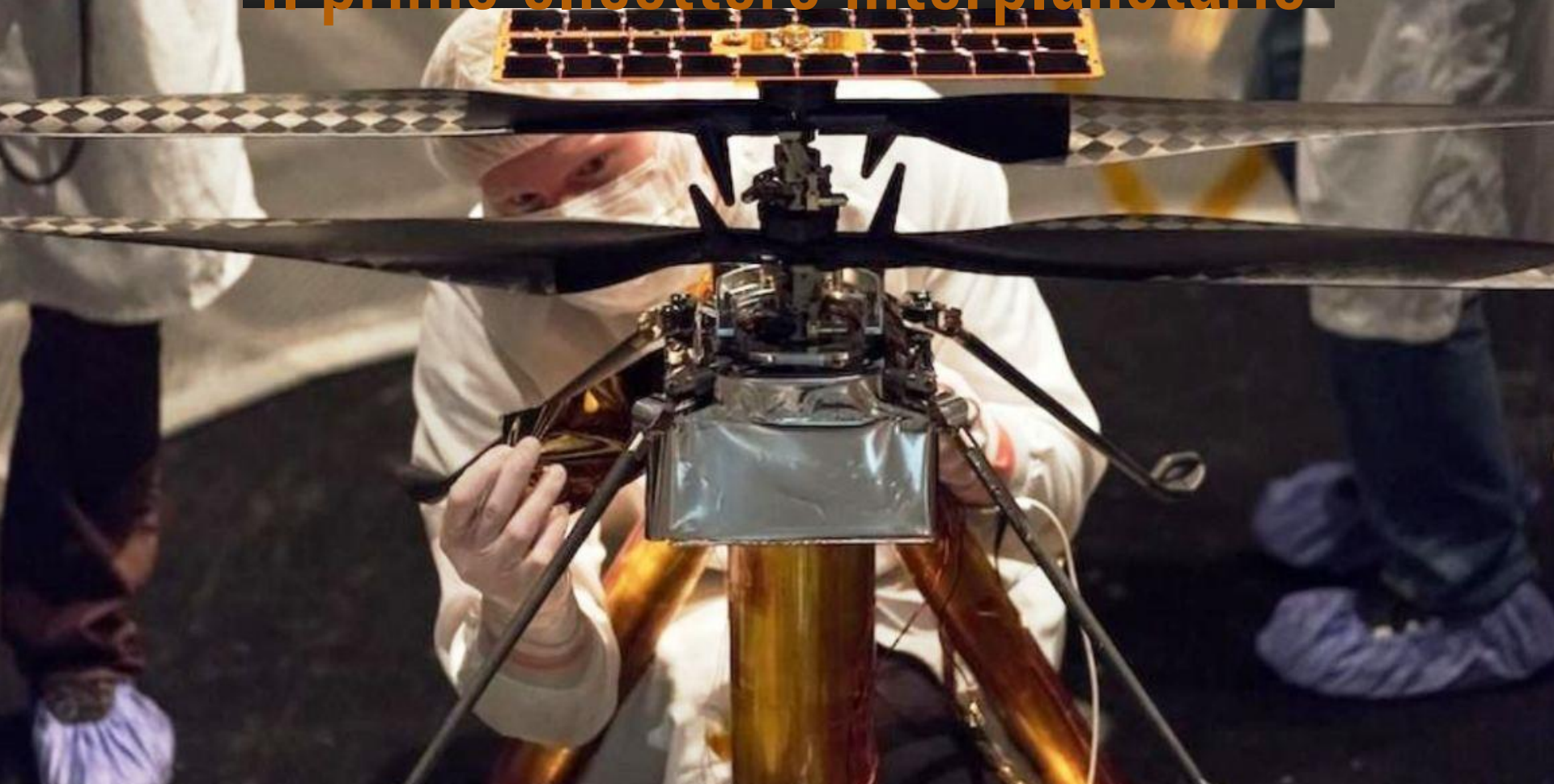


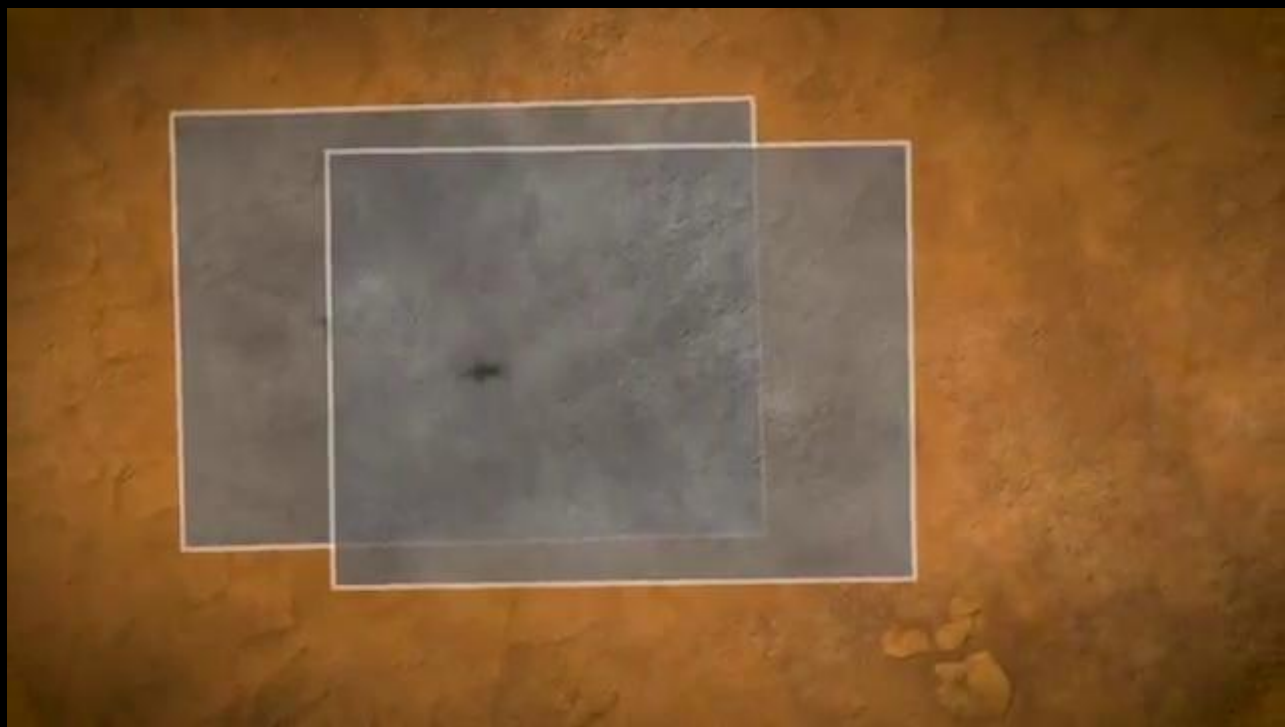
LAUNCH TIME  
00:03:09

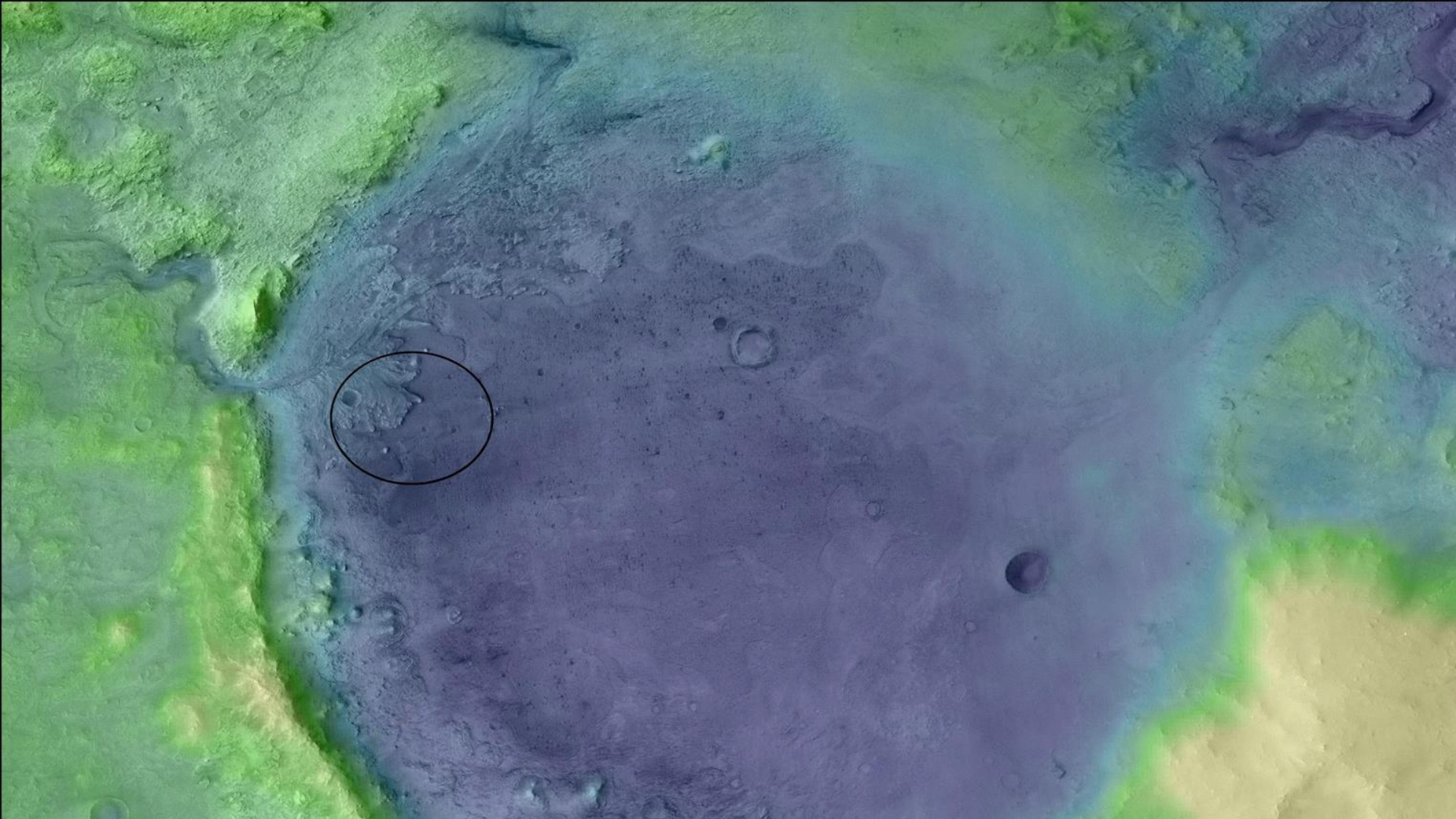


DOWNRANGE DISTANCE 119

# Il primo elicottero interplanetario







# Stromatoliti





# FLIGHT OVER JEZERO CRATER

based on data of the  
High Resolution Stereo Camera (HRSC)  
on ESA's Mars Express

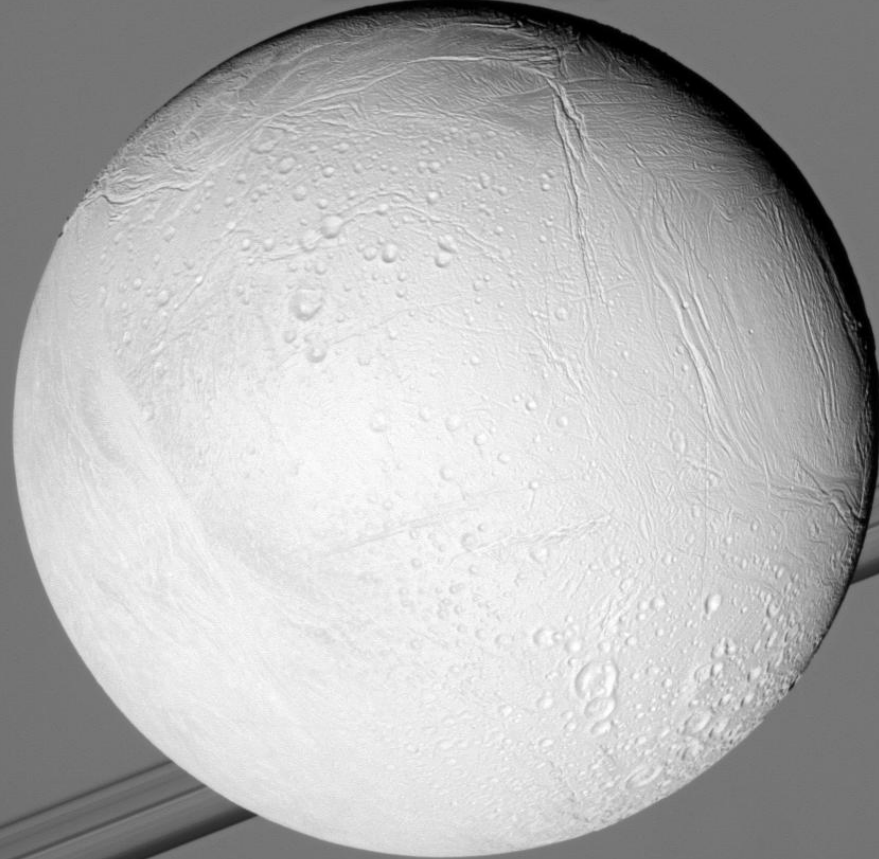
presented by  
Planetary Sciences and Remote Sensing  
Freie Universität Berlin

# I mondi di ghiaccio

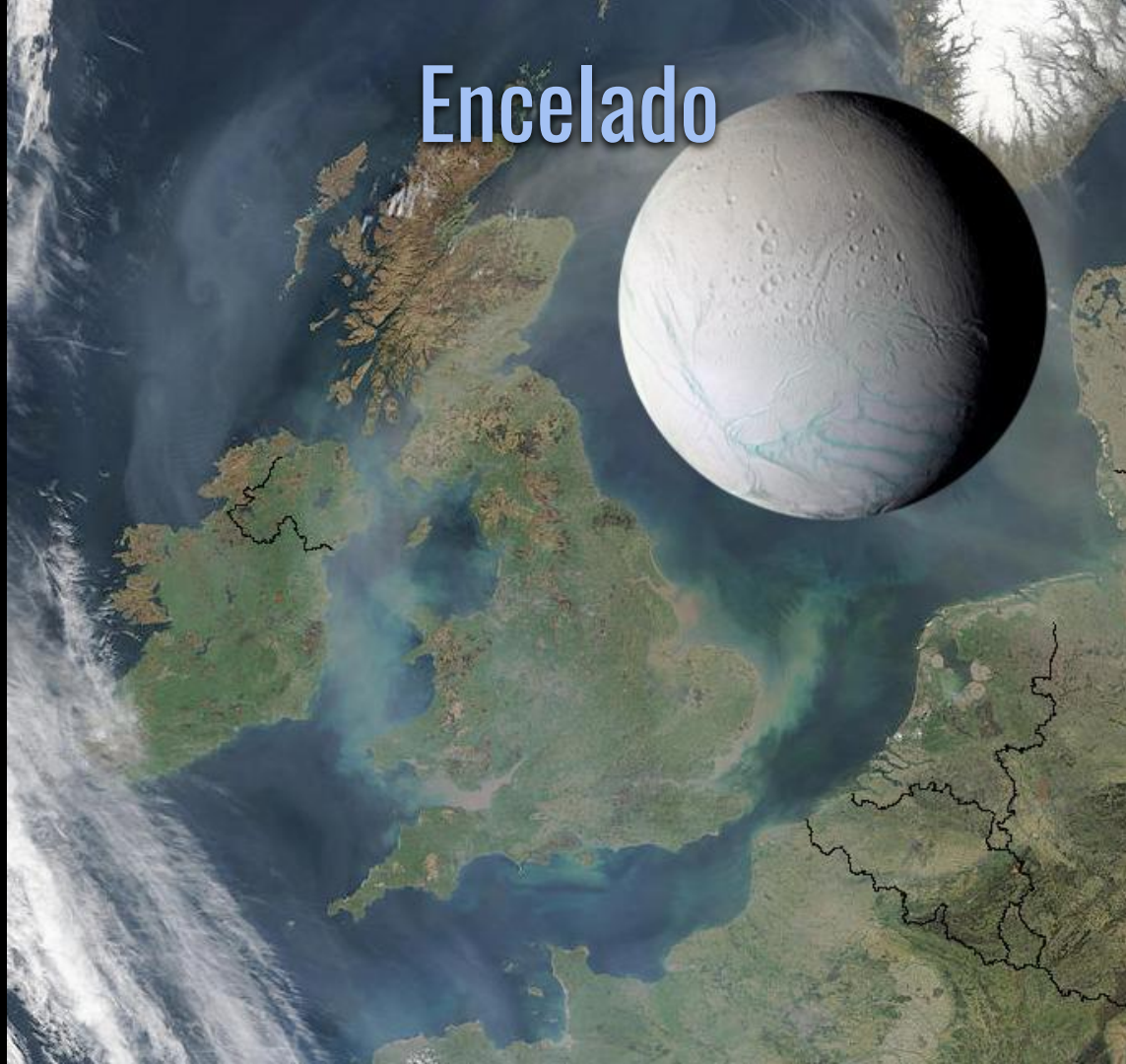




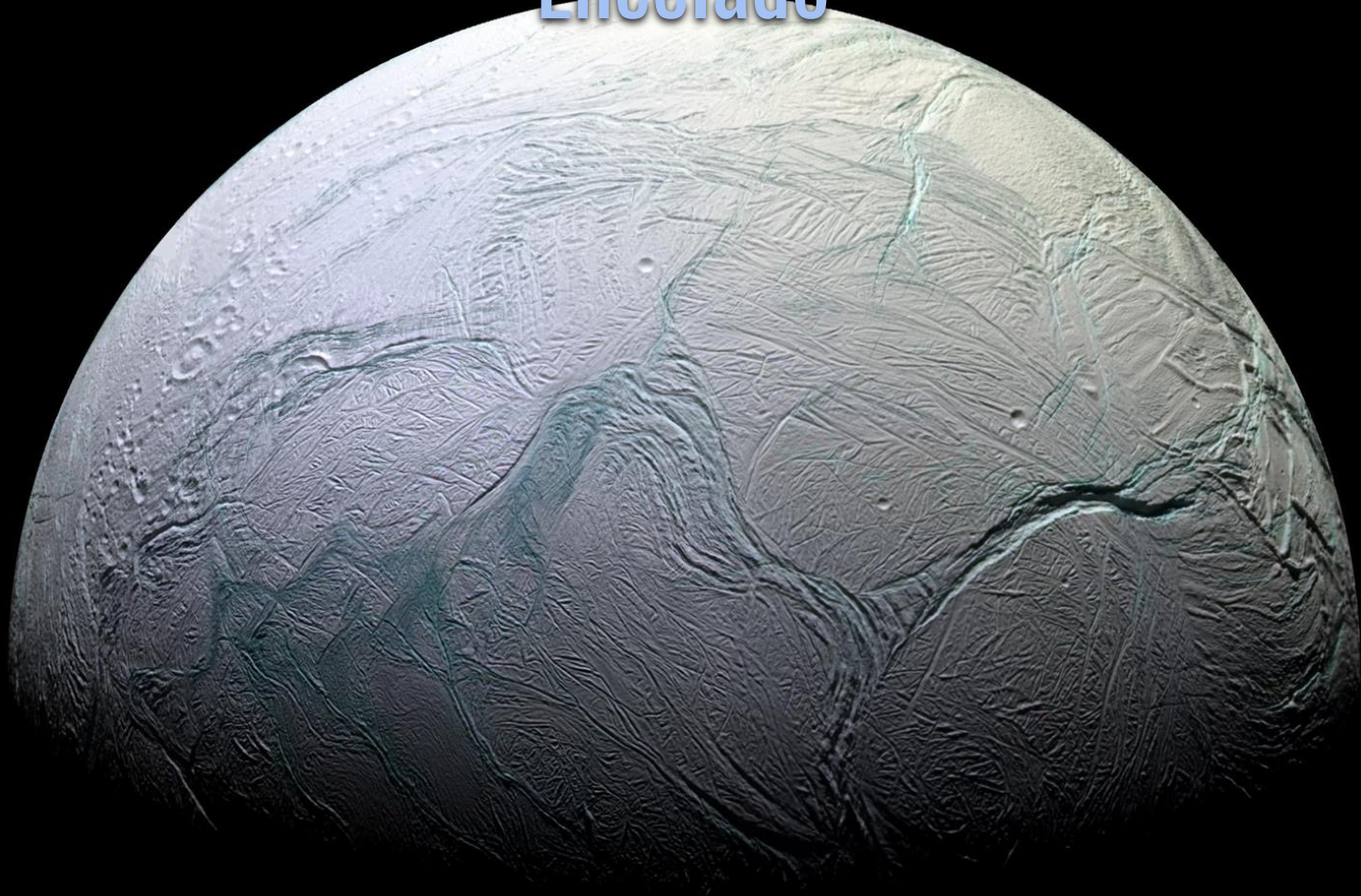
# Encelado



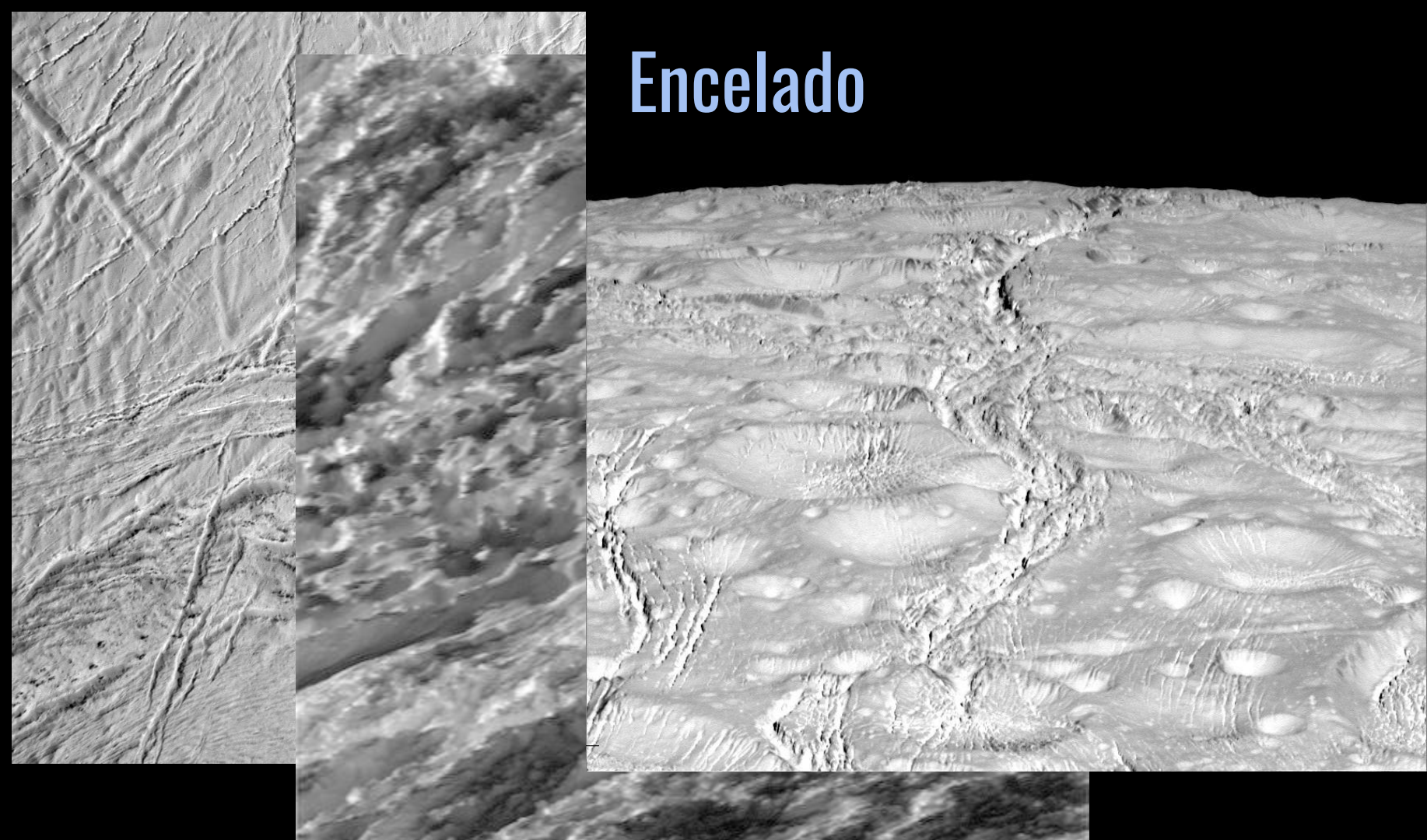
# Encelado



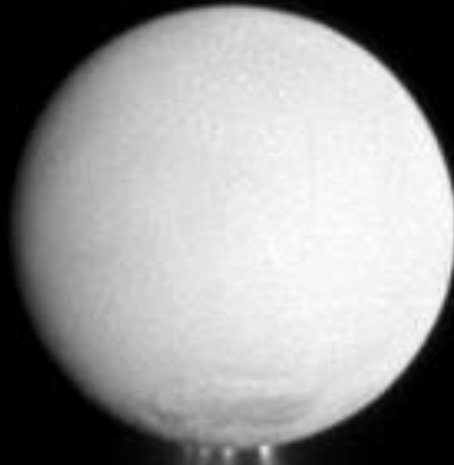
# Encelado



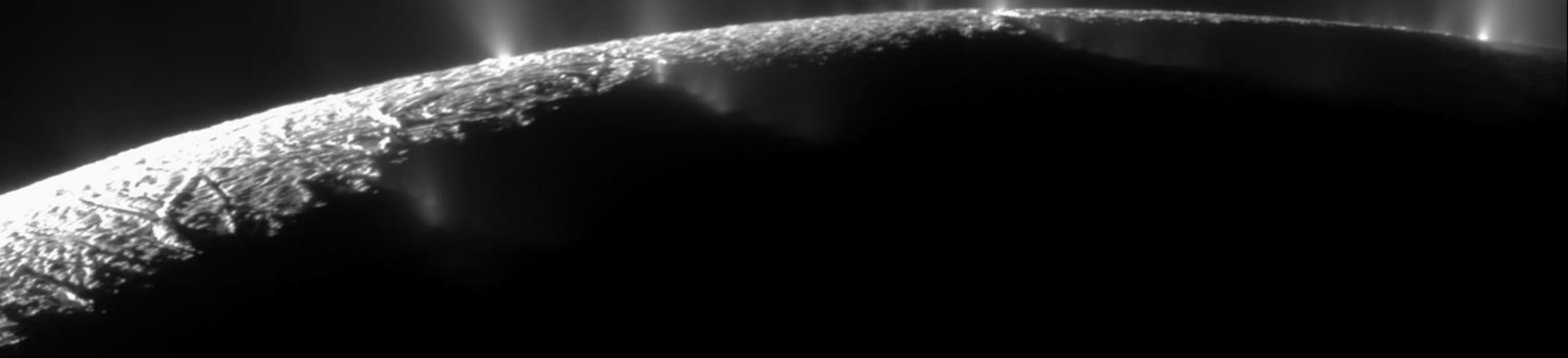
# Encelado



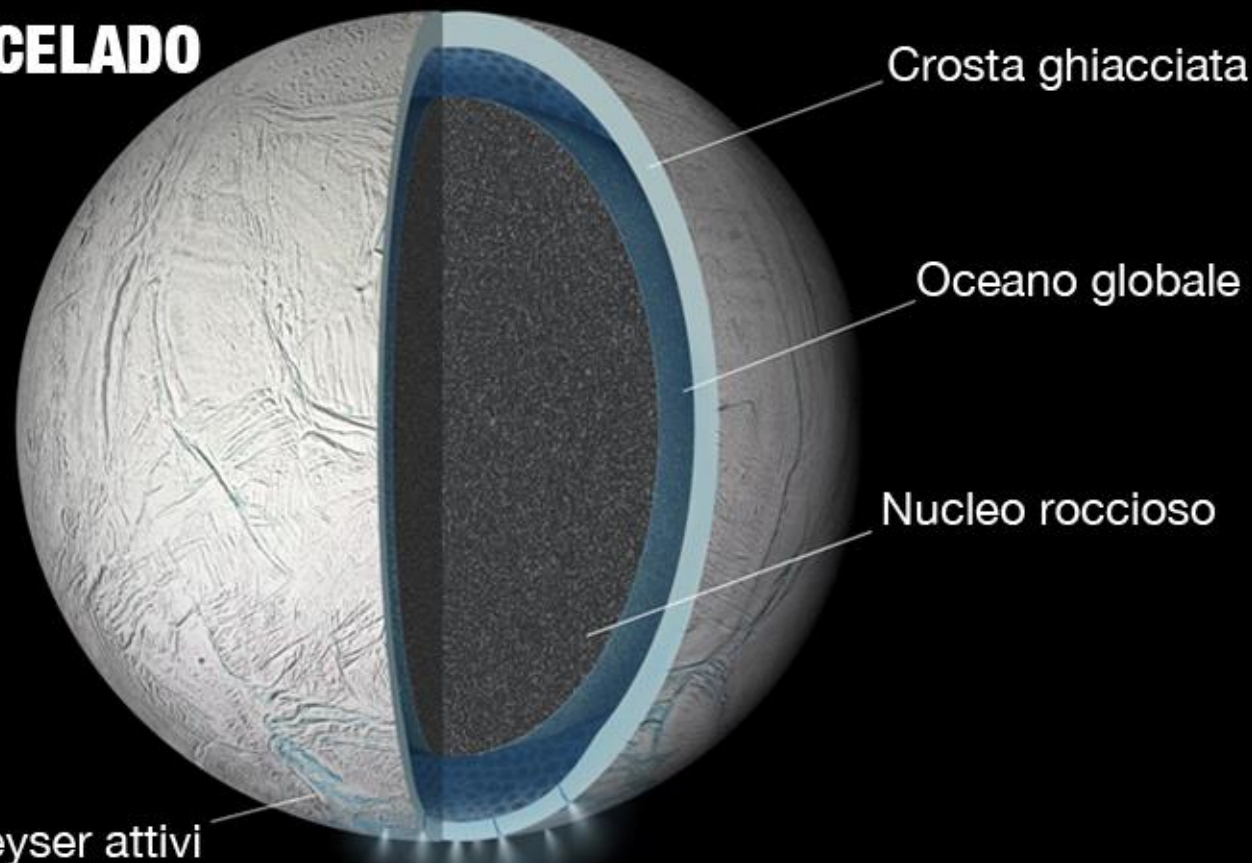
# Encelado: i geyser



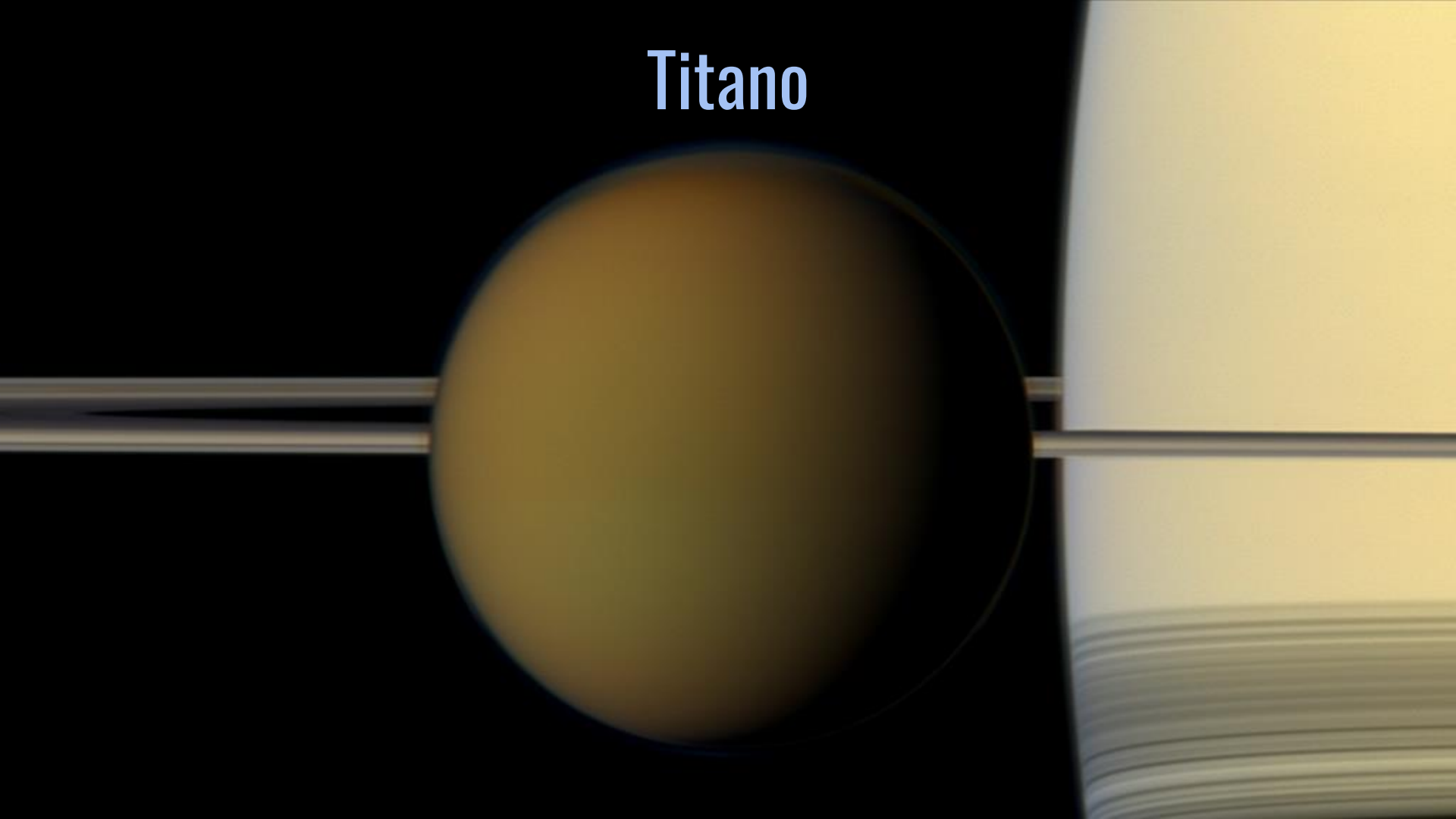
# Encelado: i geyser



# CONFERMATO UN OCEANO GLOBALE PER ENCELADO

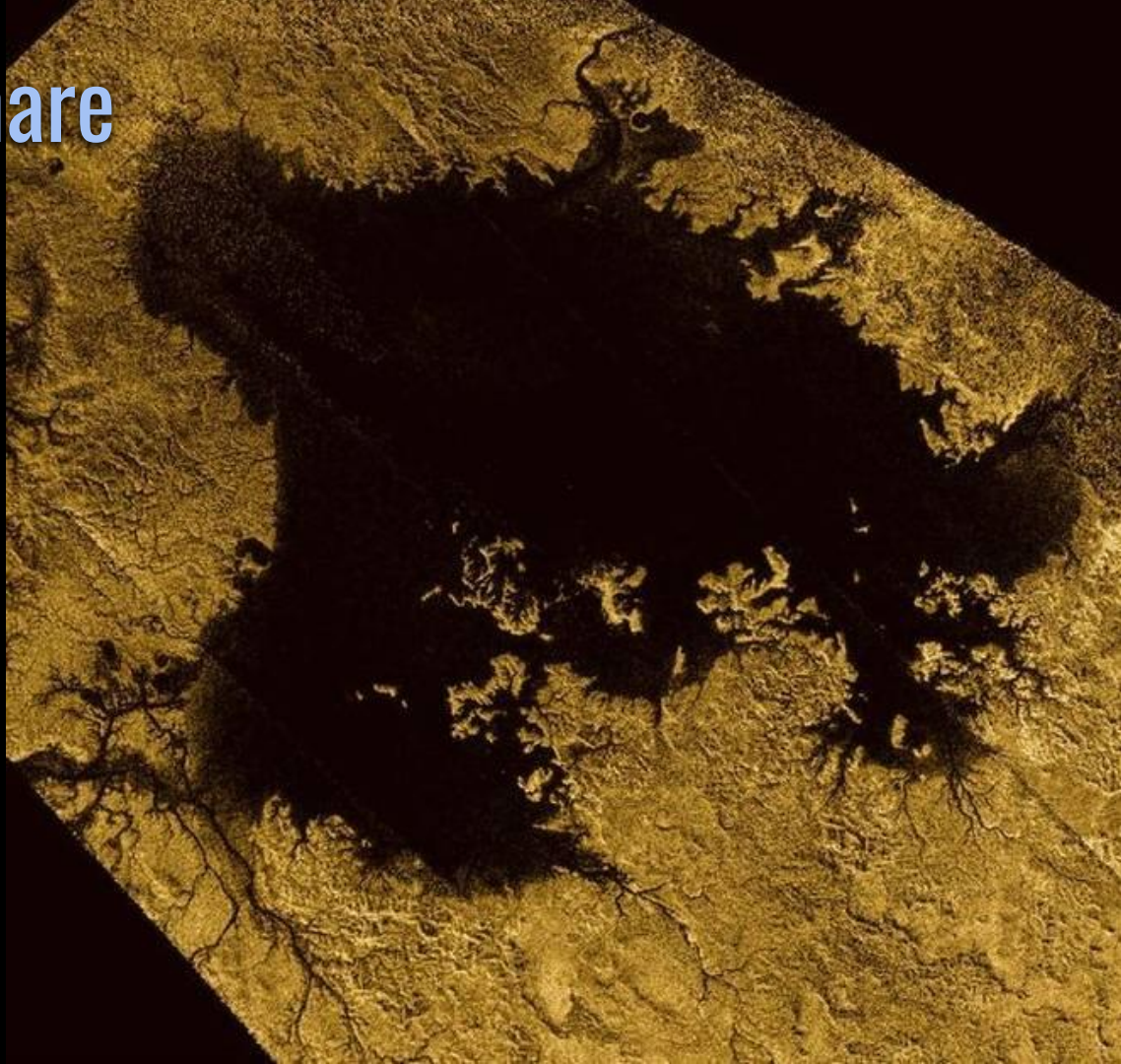


**Titano**





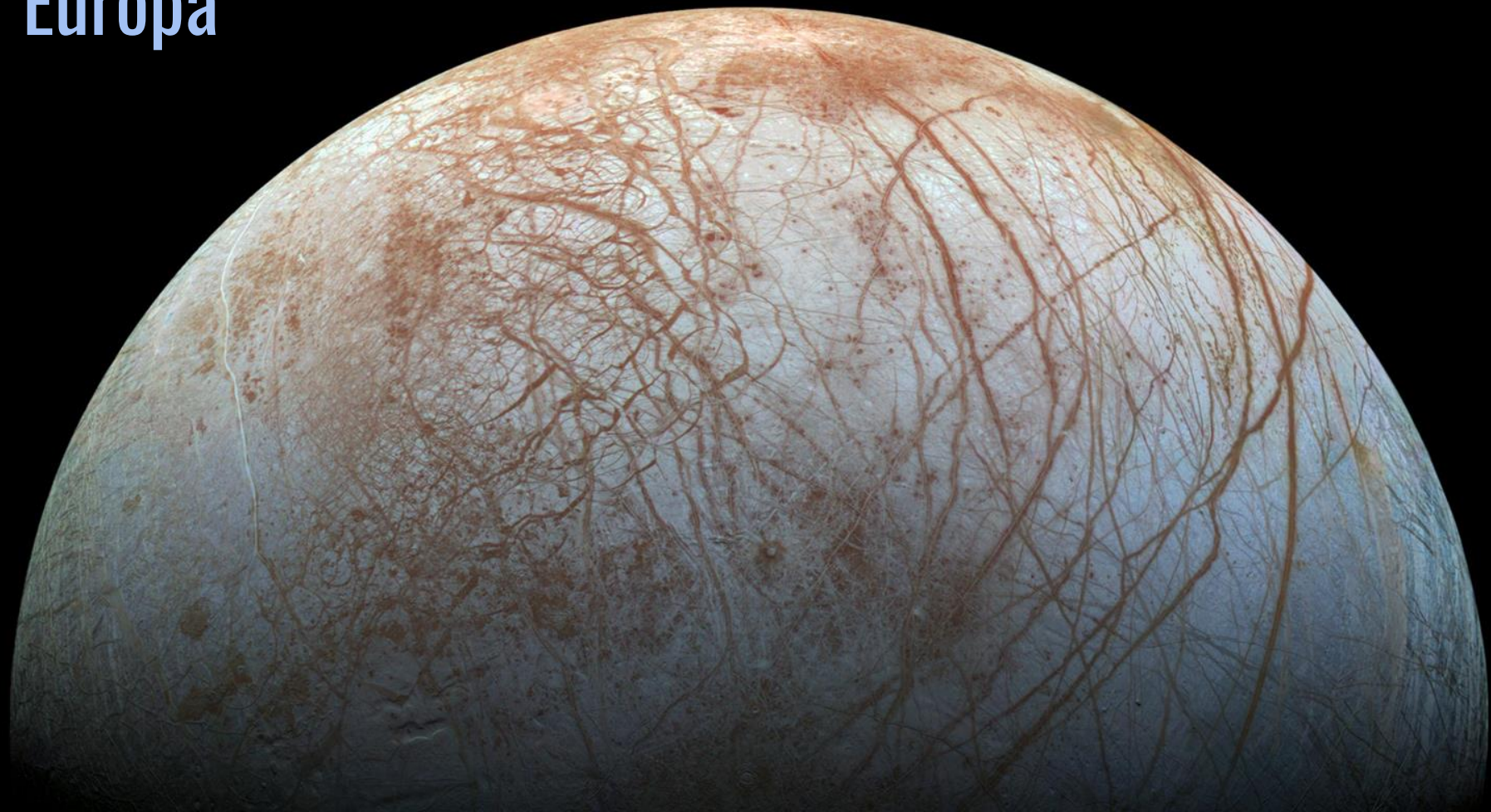
# Lygeia mare



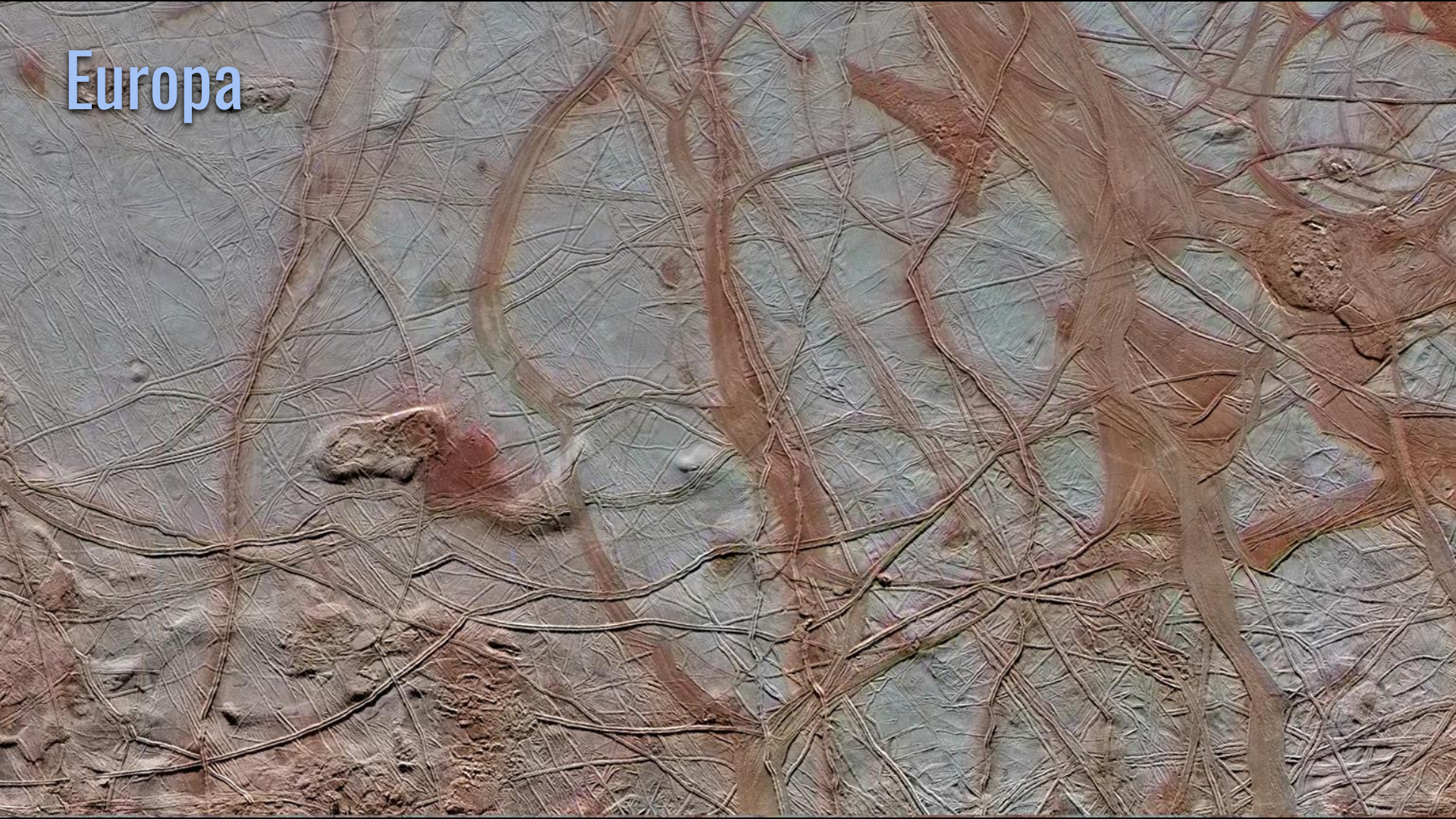


# Dragonfly

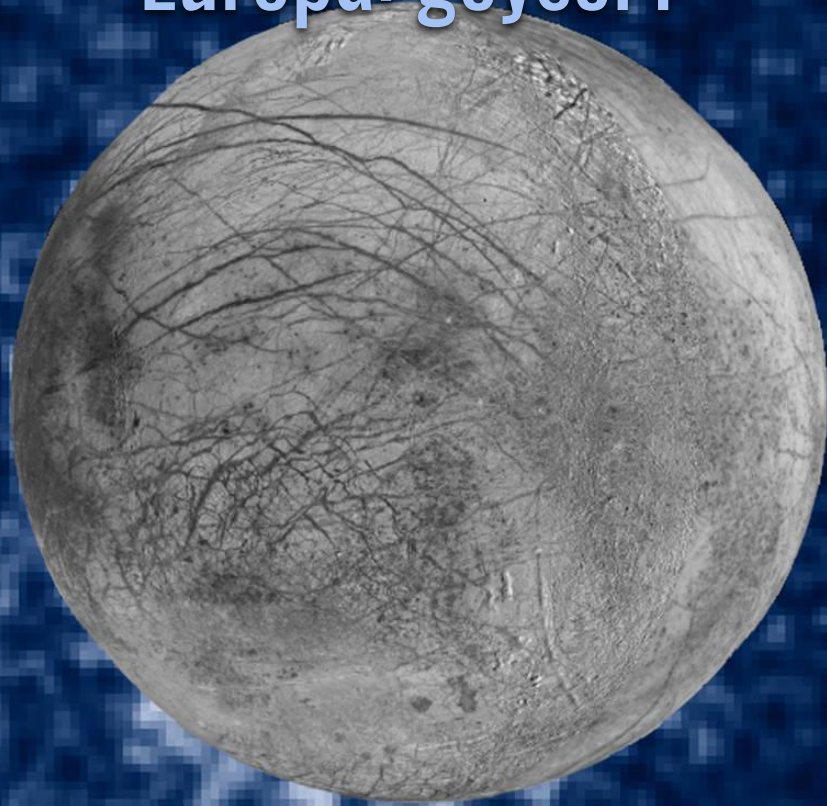
# Europa



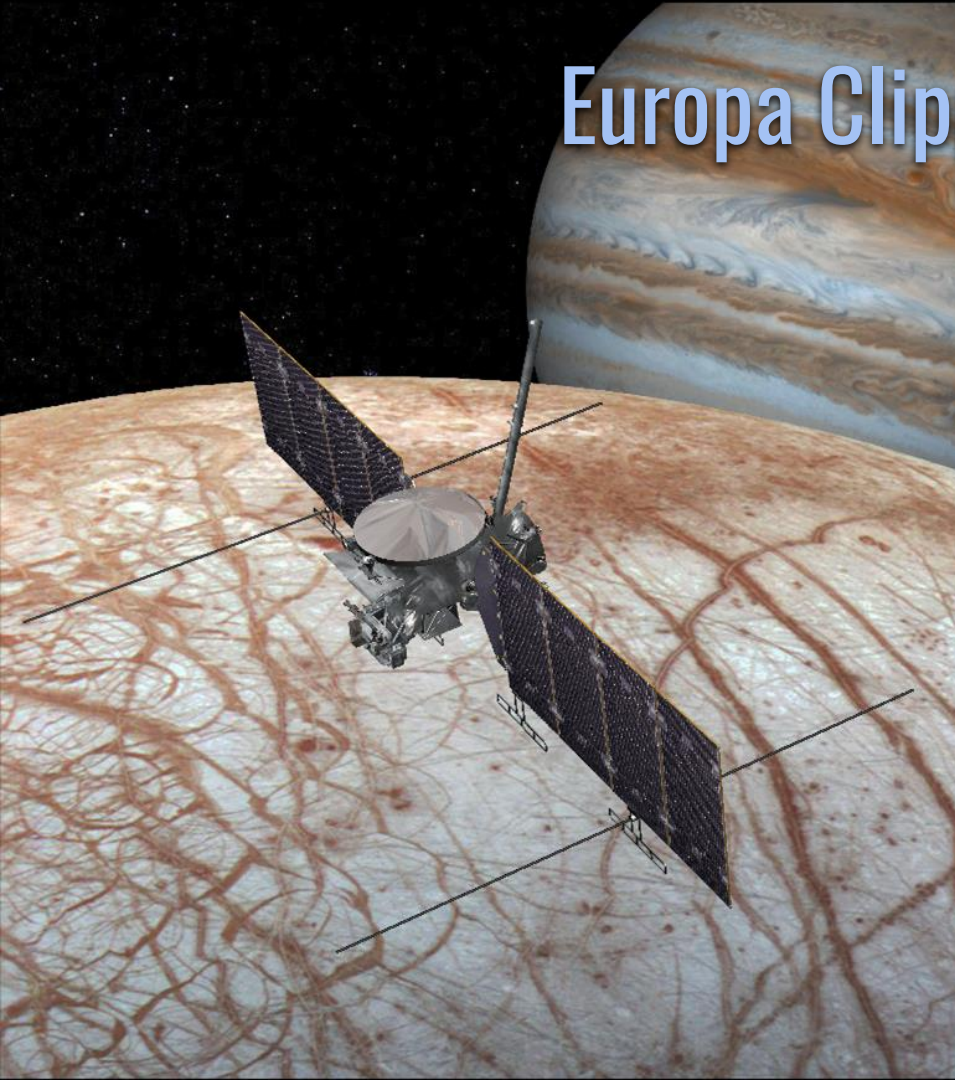
Europa



Europa: geyser?



# Europa Clipper & JUICE







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**IG: @chpdb**

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Edito da Rizzoli

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Filippo Bonaventura - Lorenzo Colombo - Matteo Miluzio

## SE TUTTE LE STELLE VENISSERO GIÙ



**E altre  
domande  
che non ci fanno  
dormire la notte**

Dagli autori della pagina Facebook

### Chi ha paura del buio?

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