

Movidos por la Curiosidad

La exploración de Marte a nuestro alcance

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Grupo de Ciencias Planetarias
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Grupo de Ciencias Planetarias
Zientzia Planetarioen Taldea



Pléyades



Marte



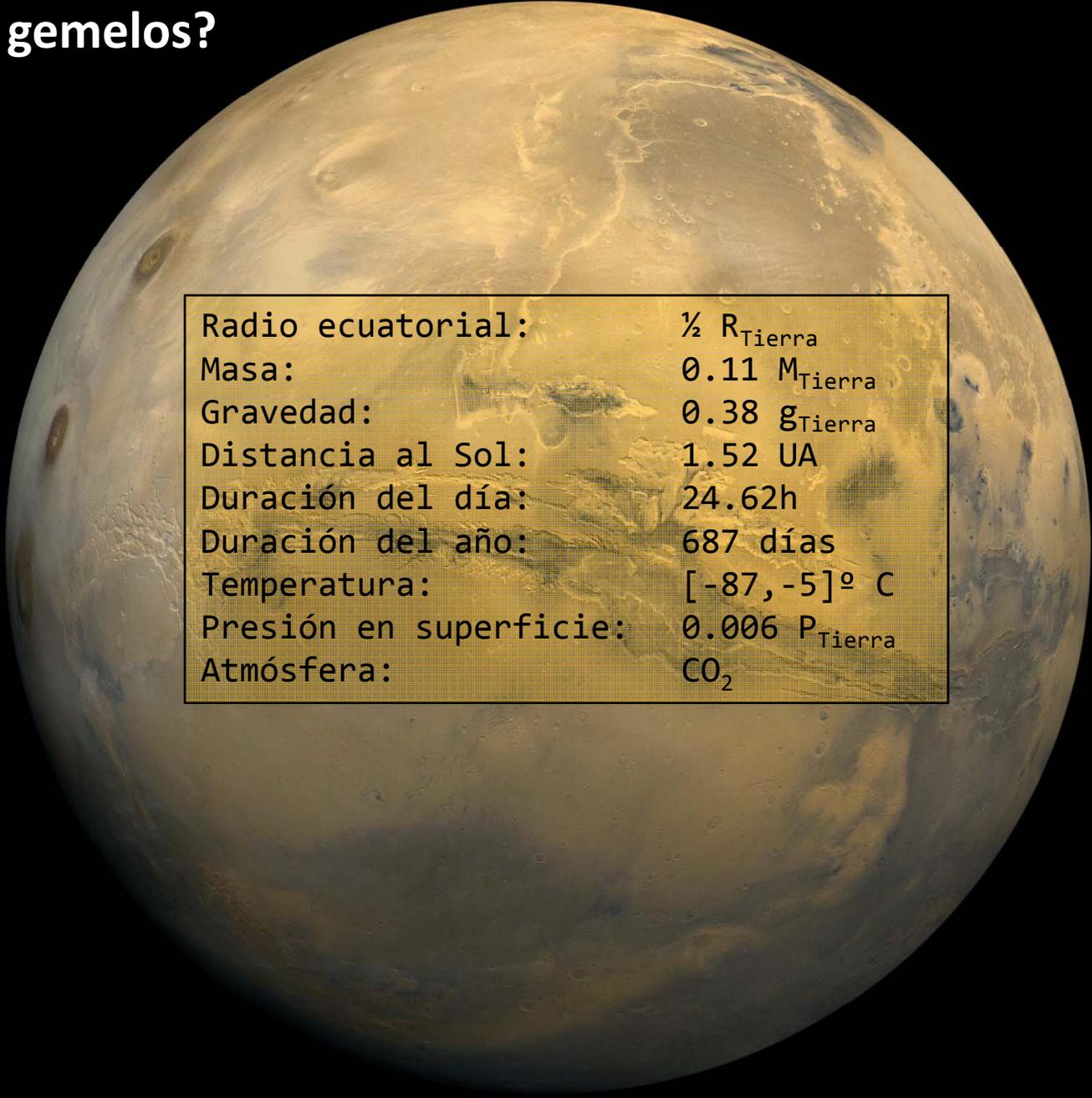
Aldebarán



Perseida

Si se acerca el Invierno, ¿puede la Primavera quedar tan lejos?
Percy B. Shelley

¿Mundos gemelos?

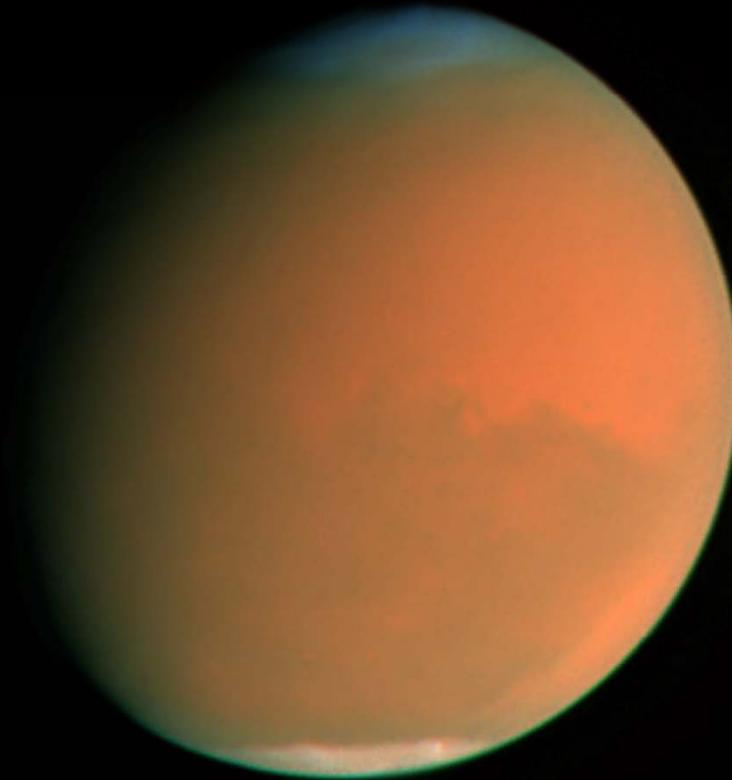


Radio ecuatorial:	$\frac{1}{2} R_{\text{Tierra}}$
Masa:	$0.11 M_{\text{Tierra}}$
Gravedad:	$0.38 g_{\text{Tierra}}$
Distancia al Sol:	1.52 UA
Duración del día:	24.62h
Duración del año:	687 días
Temperatura:	$[-87, -5]^{\circ} \text{C}$
Presión en superficie:	$0.006 P_{\text{Tierra}}$
Atmósfera:	CO_2

Tormentas de polvo



June 26, 2001



September 4, 2001

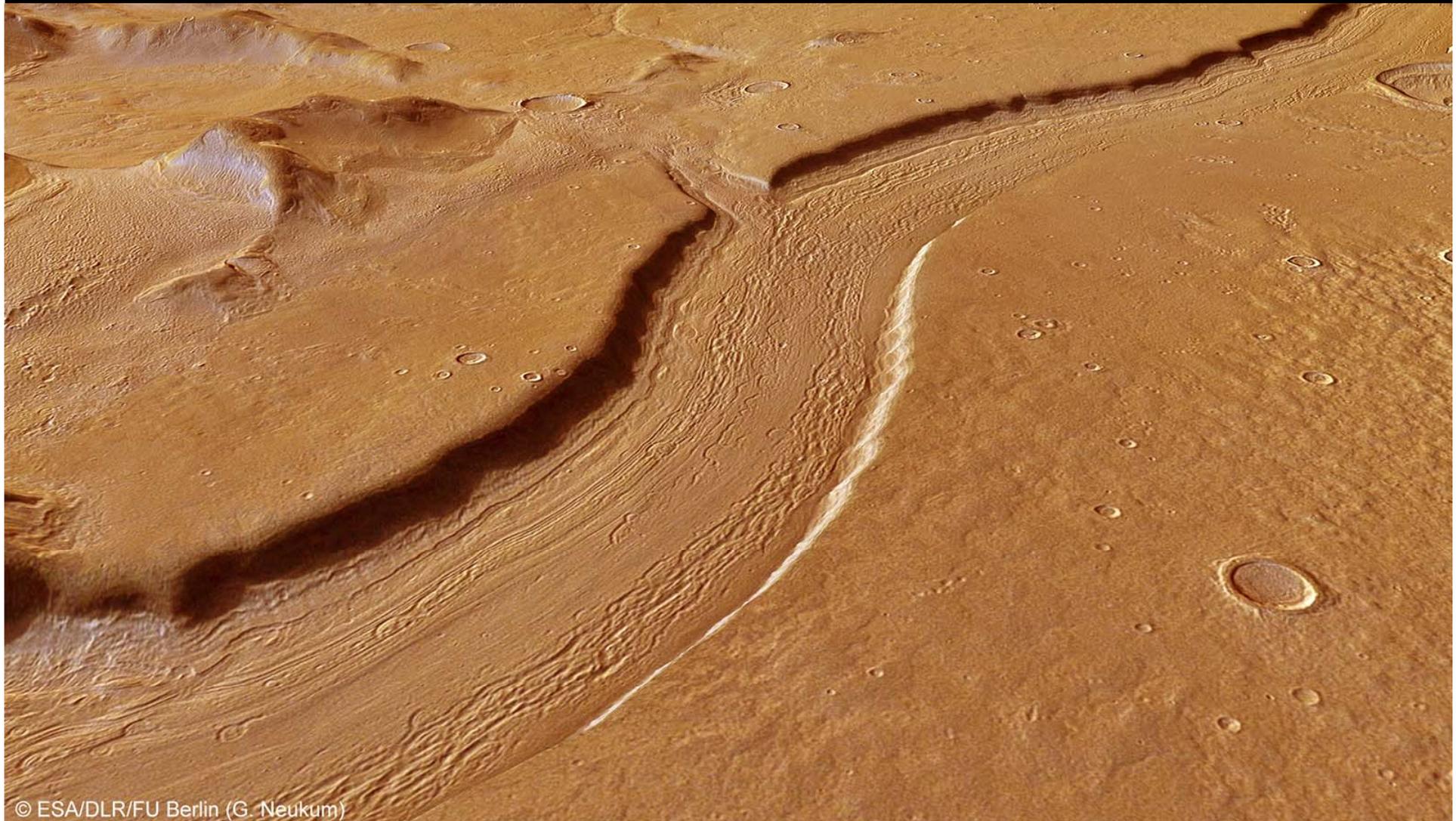
Mars • Global Dust Storm
Hubble Space Telescope • WFPC2

NASA, J. Bell (Cornell University), M. Wolff (SSI), and the Hubble Heritage Team (STScI/AURA) • STScI-PRC01-31

Tormentas de polvo



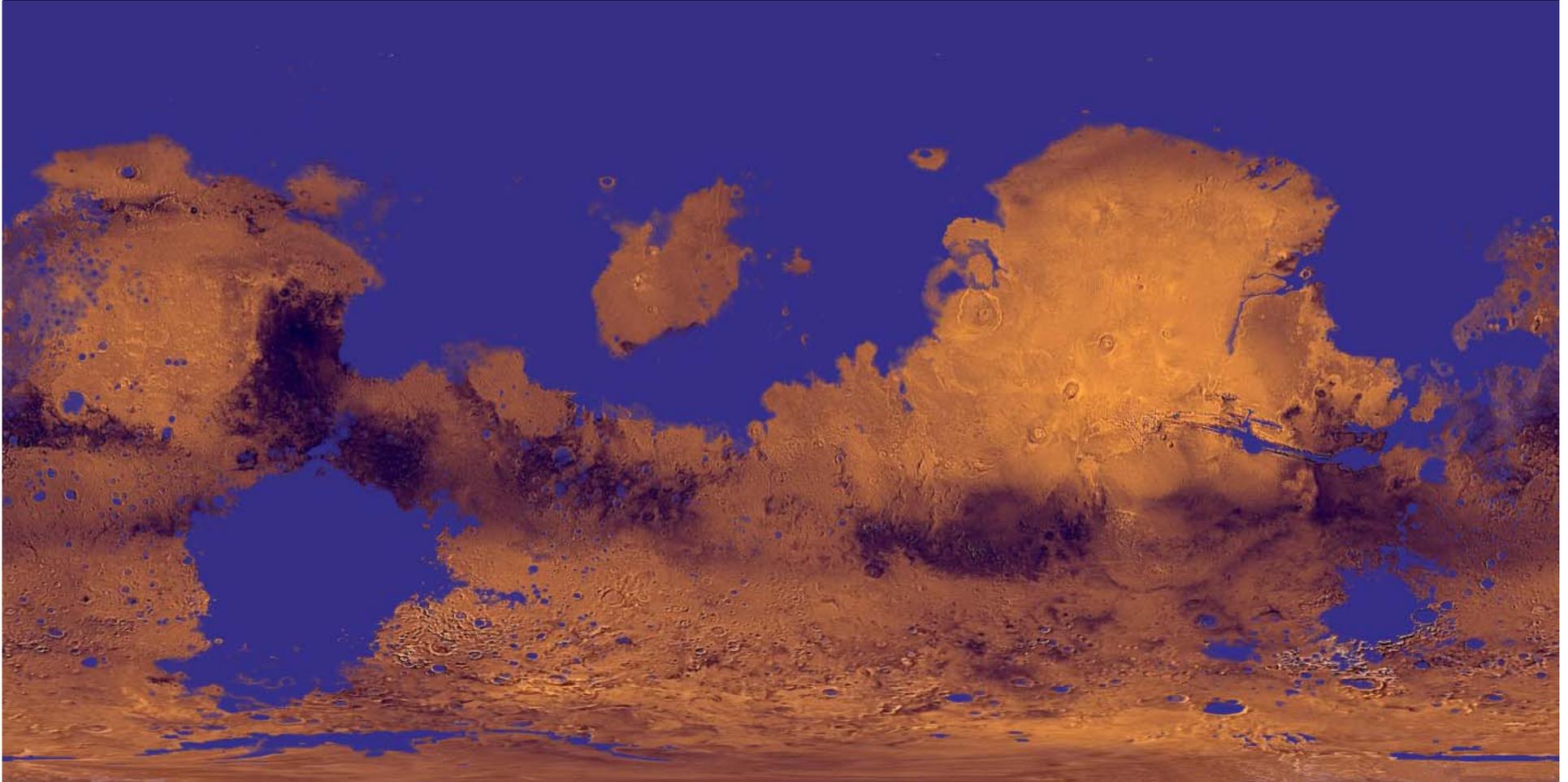
¿Ríos en Marte?



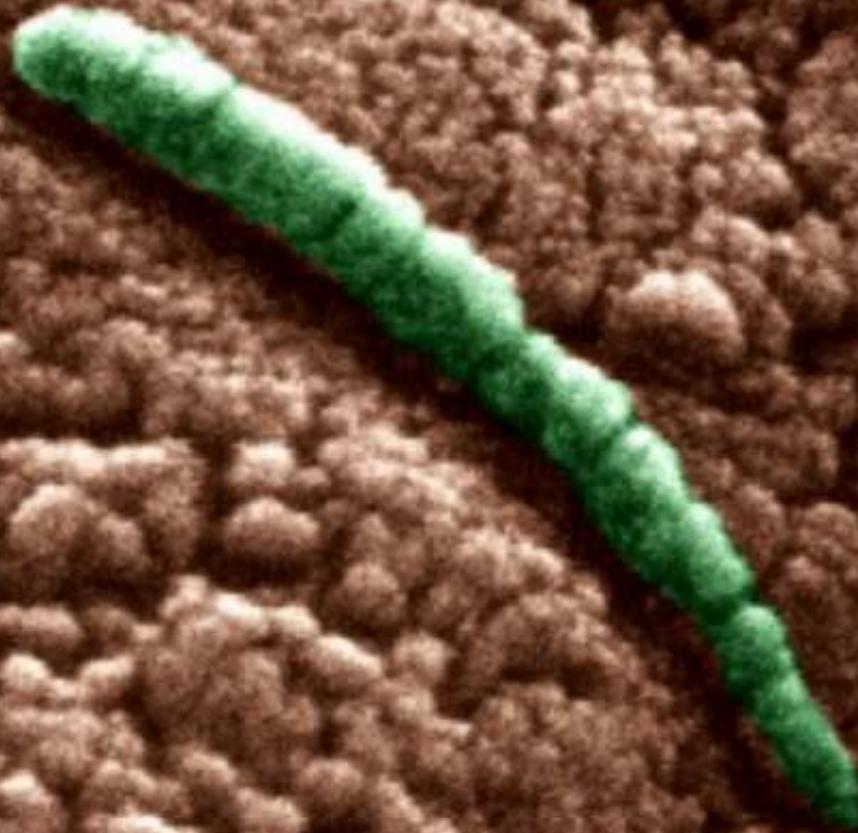
© ESA/DLR/FU Berlin (G. Neukum)

2013 Mars Express (ESA)
Reull Vallis – 1500 km x 7km x 300m

El otro planeta azul

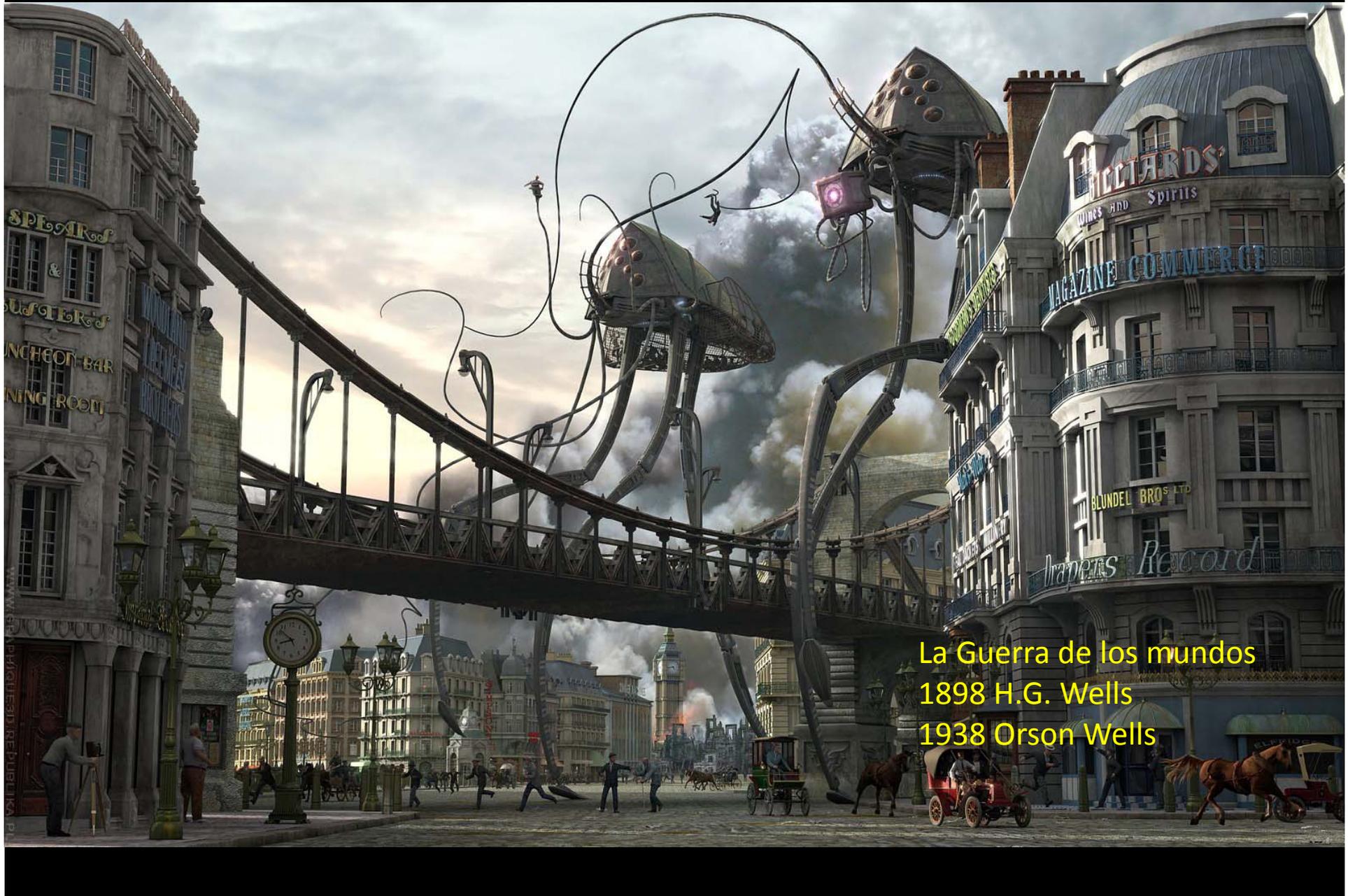


Viajeros del espacio



ALH84001
1996 Mac Kay et al.

Los otros marcianos



La Guerra de los mundos
1898 H.G. Wells
1938 Orson Wells

Retrato de familia de la exploración de Marte

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Lost communication near Mars

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Both flew by, returned pictures

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Payload fairing failed to open / First flyby and picture return

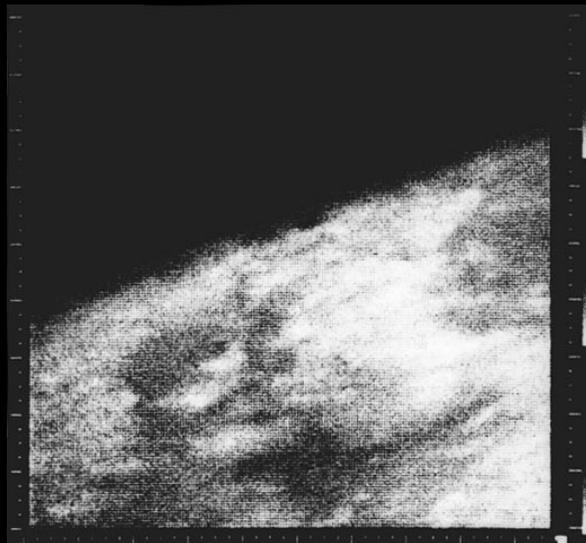
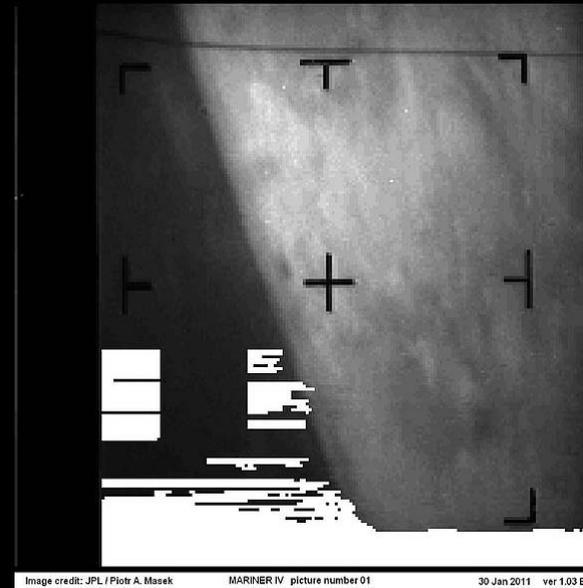
3, 4, 5, 8: MARS 2MV-4 No. 1 / Mars 1 / Mars 2MV-3 No. 1 / Zond 2
October 24 / November 1 / November 4, 1962 / November 30, 1964
Broke up in Earth orbit / Radio failure en route / Stranded in Earth orbit / Radio failure en route

1, 2: MARS 1M No. 1 / MARS 1M No. 2
October 10 / October 14, 1960
Both destroyed during launch

Missions on Mars: Sojourner, Spirit and Opportunity, Phoenix, Curiosity, Viking 1 and 2.

Image credits: NASA, Roscosmos, ESA, JAXA, Lockheed Martin. Additional research sources: space.com, mars.nasa.gov. Dates indicated are for launch, only dedicated Mars missions are listed. Created by Jason B. Davis www.artofspace.com

Grandes exploradores: Mariner



Retrato de familia de la exploración de Marte

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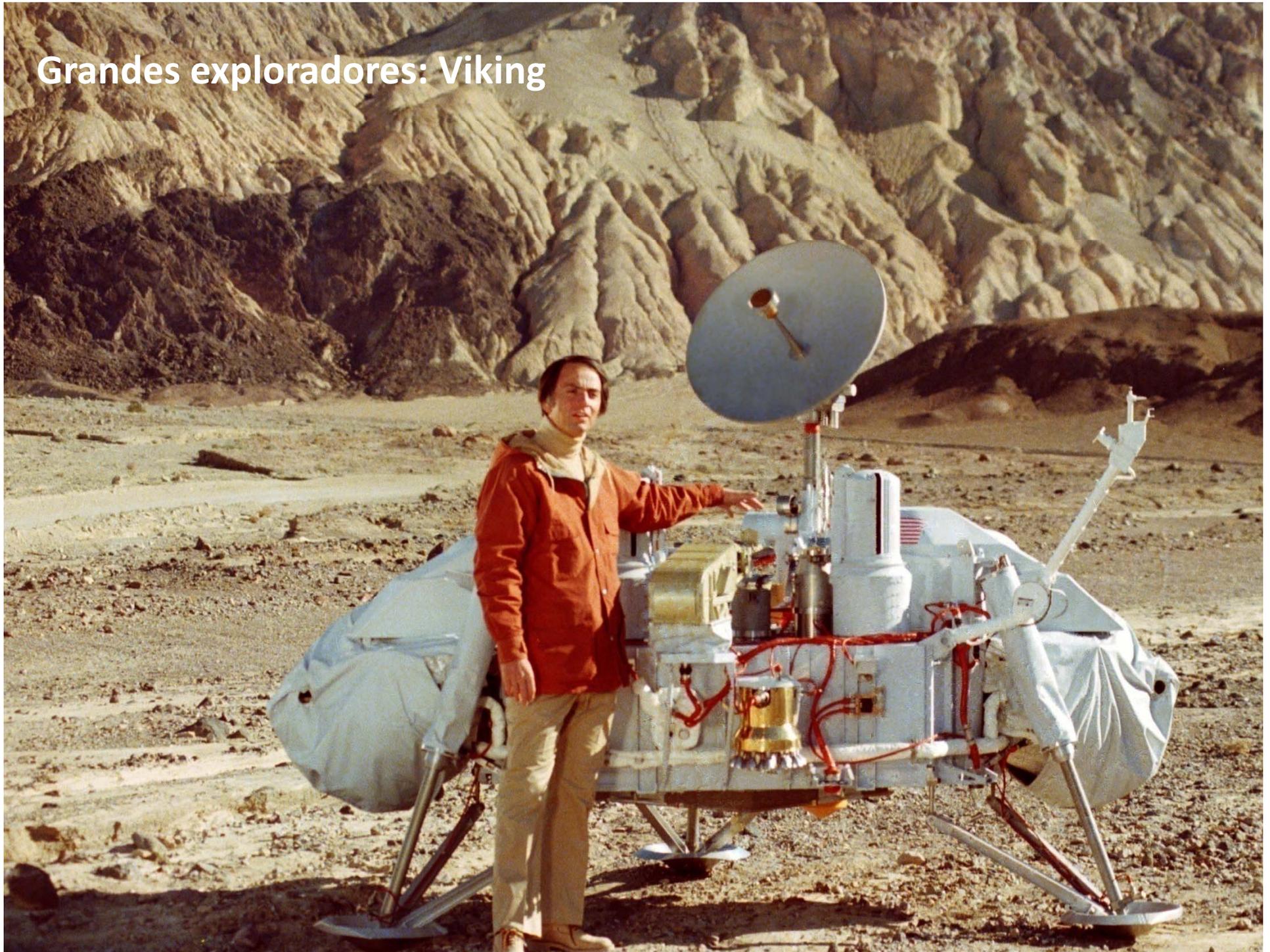
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Lost communication en route / Lost communication near Phobos

26: Mars Observer
September 25, 1992
Lost communication near Mars

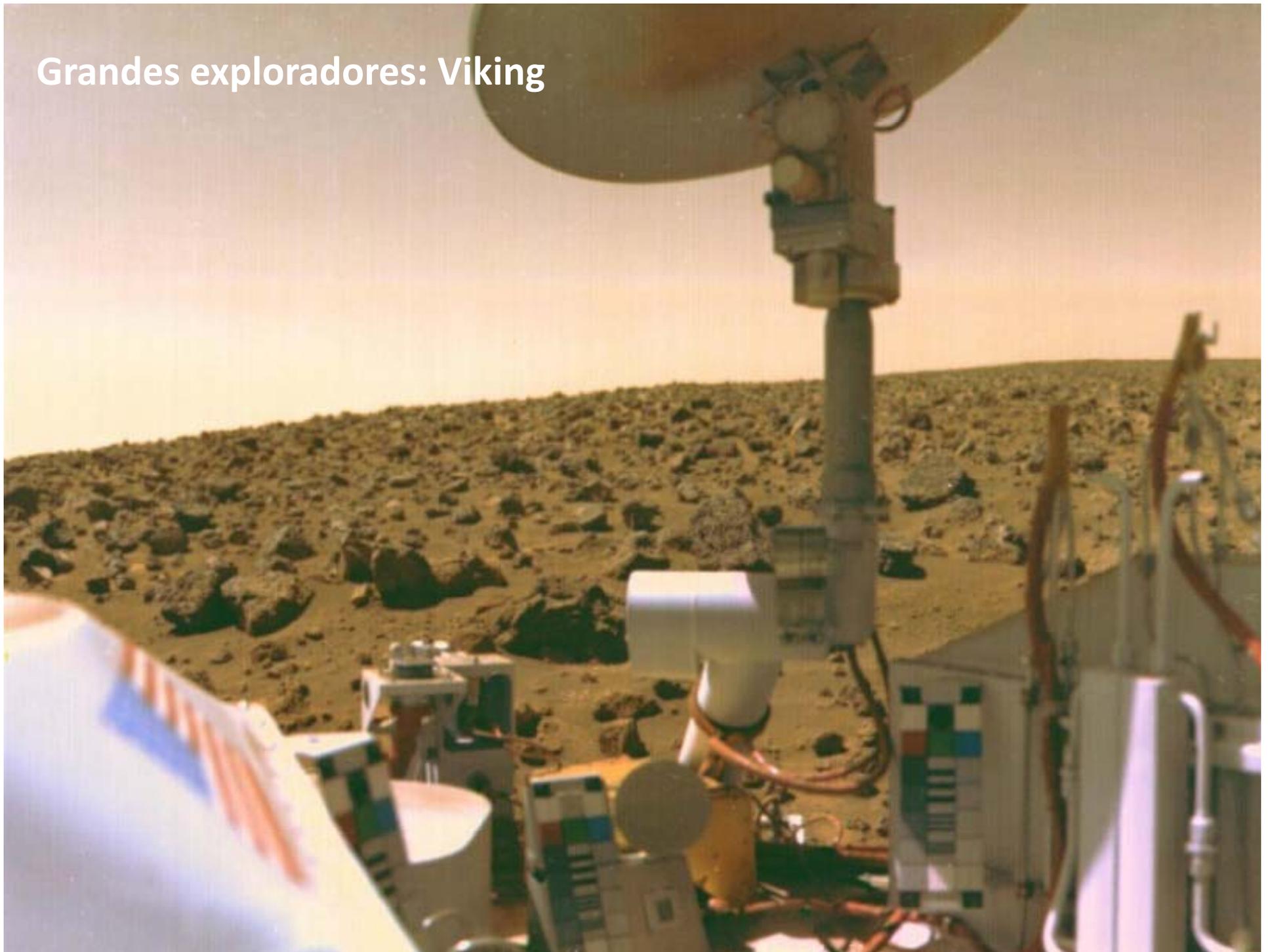
Sojourner
Spirit and Opportunity
Phoenix
Curiosity
Viking 1 and 2

Image credits: NASA, Roscosmos, ESA, JAXA, Lockheed Martin
Additional research sources: space.com, mars.nasa.gov
Flags indicated are for launch, only dedicated Mars missions are listed.
Created by Jason B. Davis
www.artofspace.com

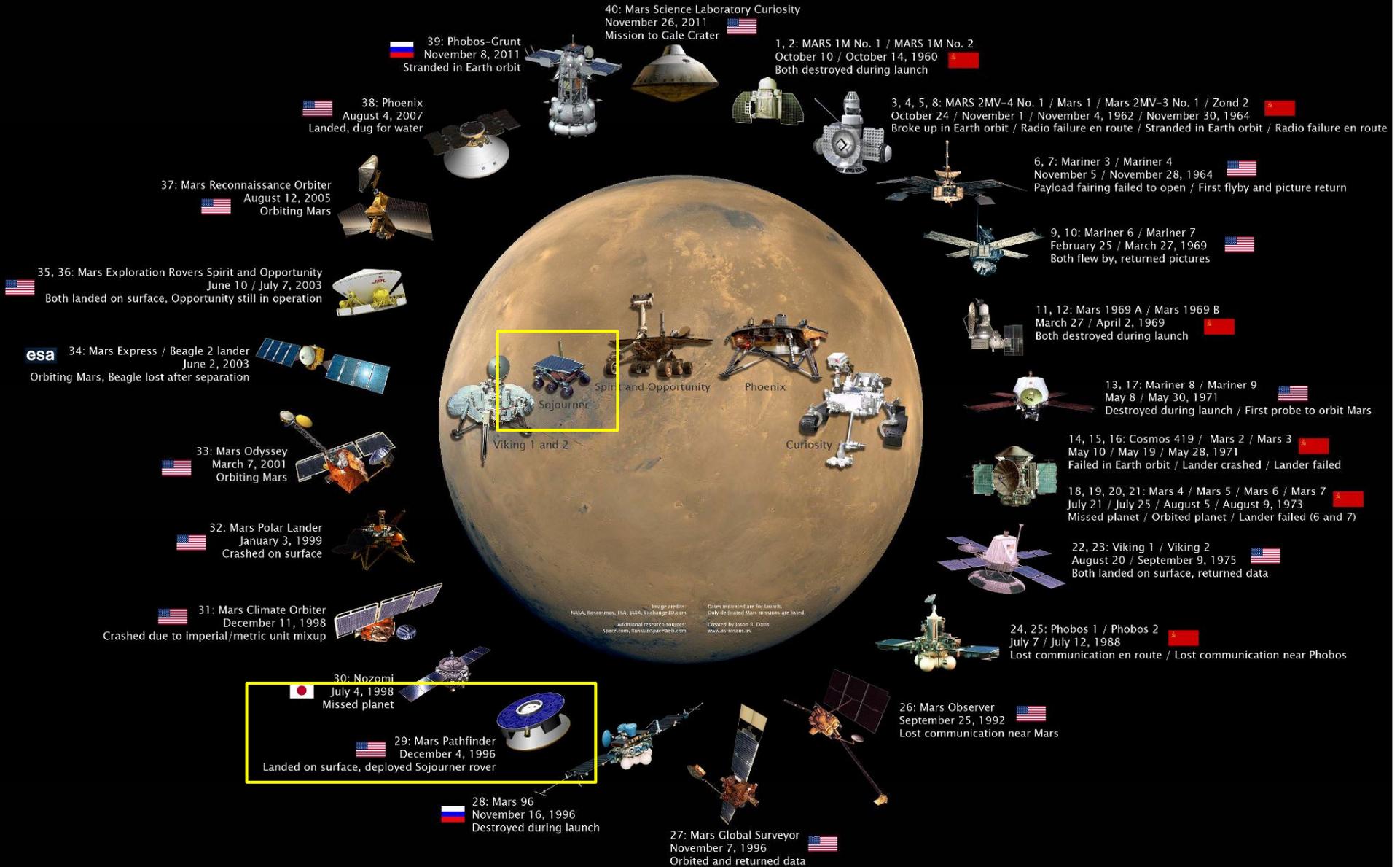
Grandes exploradores: Viking



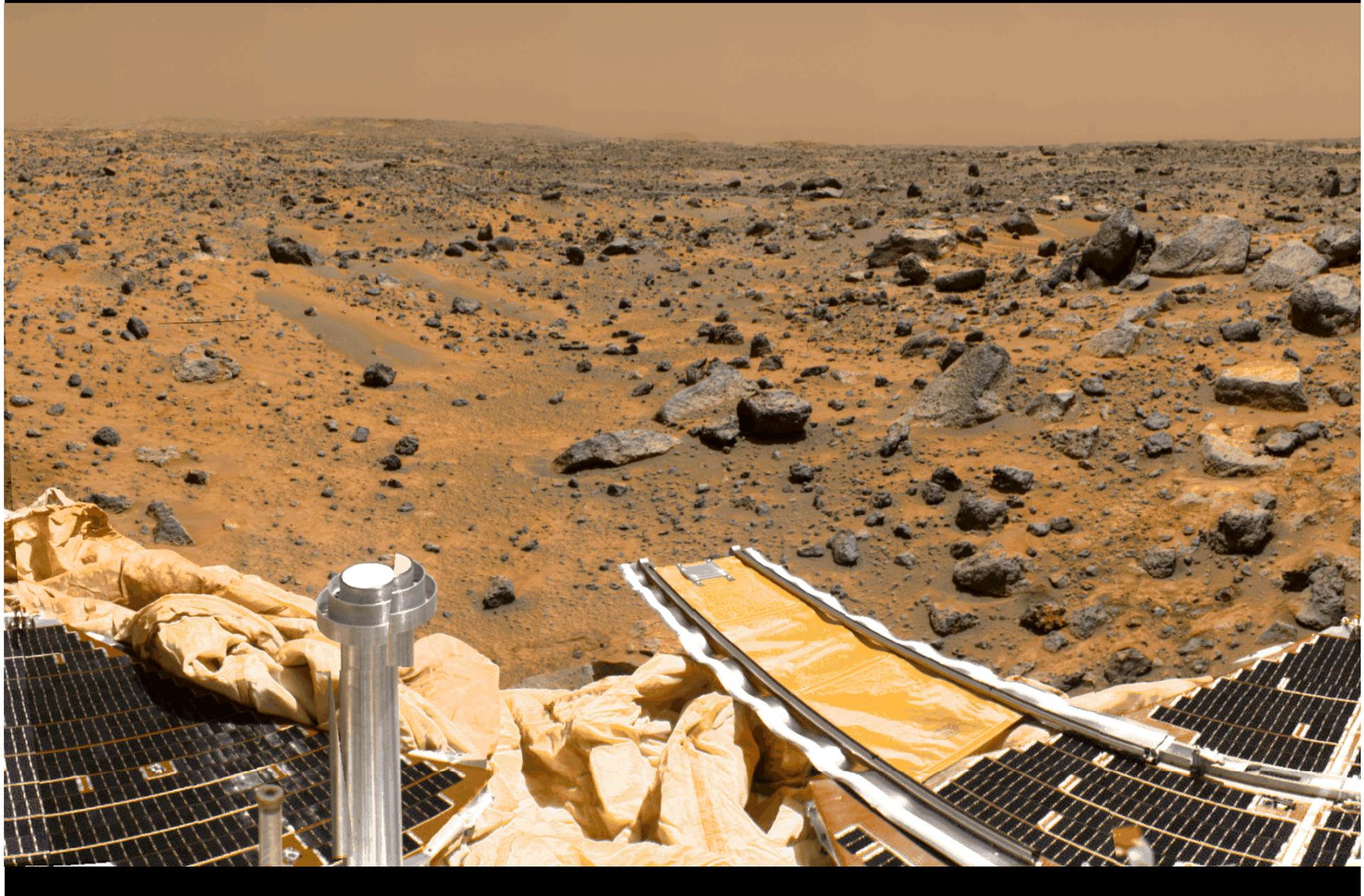
Grandes exploradores: Viking



Retrato de familia de la exploración de Marte



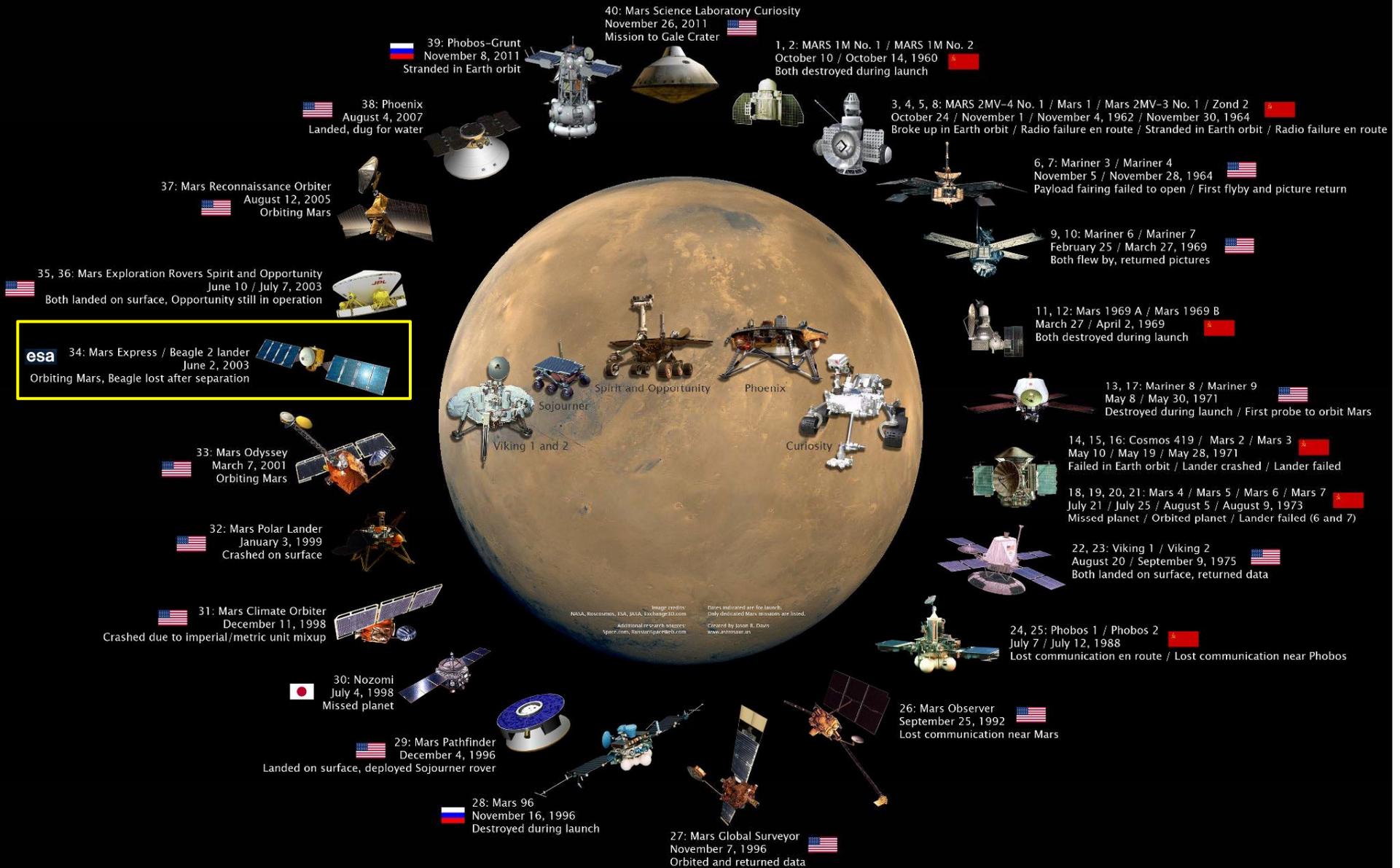
Grandes exploradores: Mars Pathfinder & Sojourner



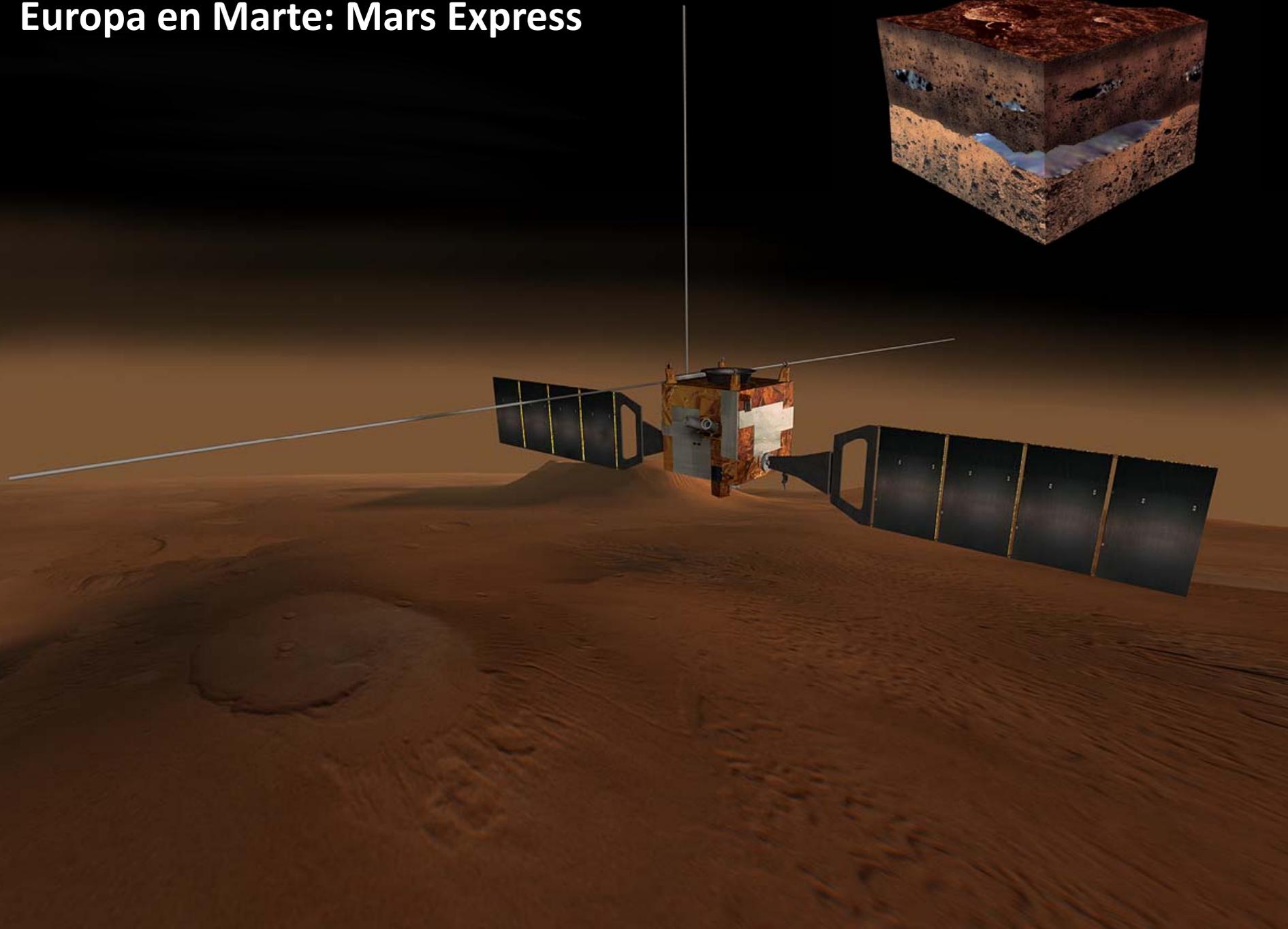
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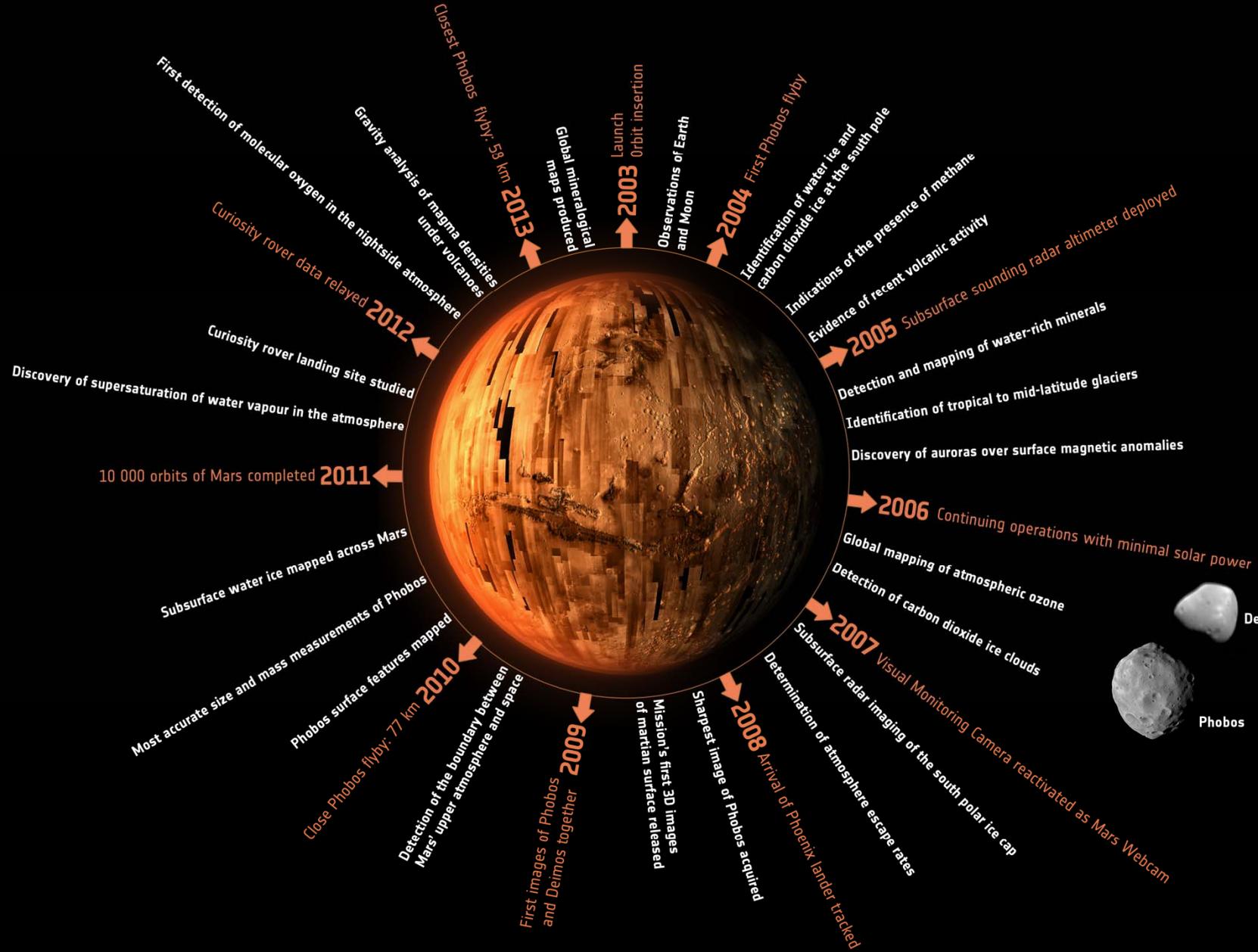


Europa en Marte: Mars Express



Hoja de ruta de MEX

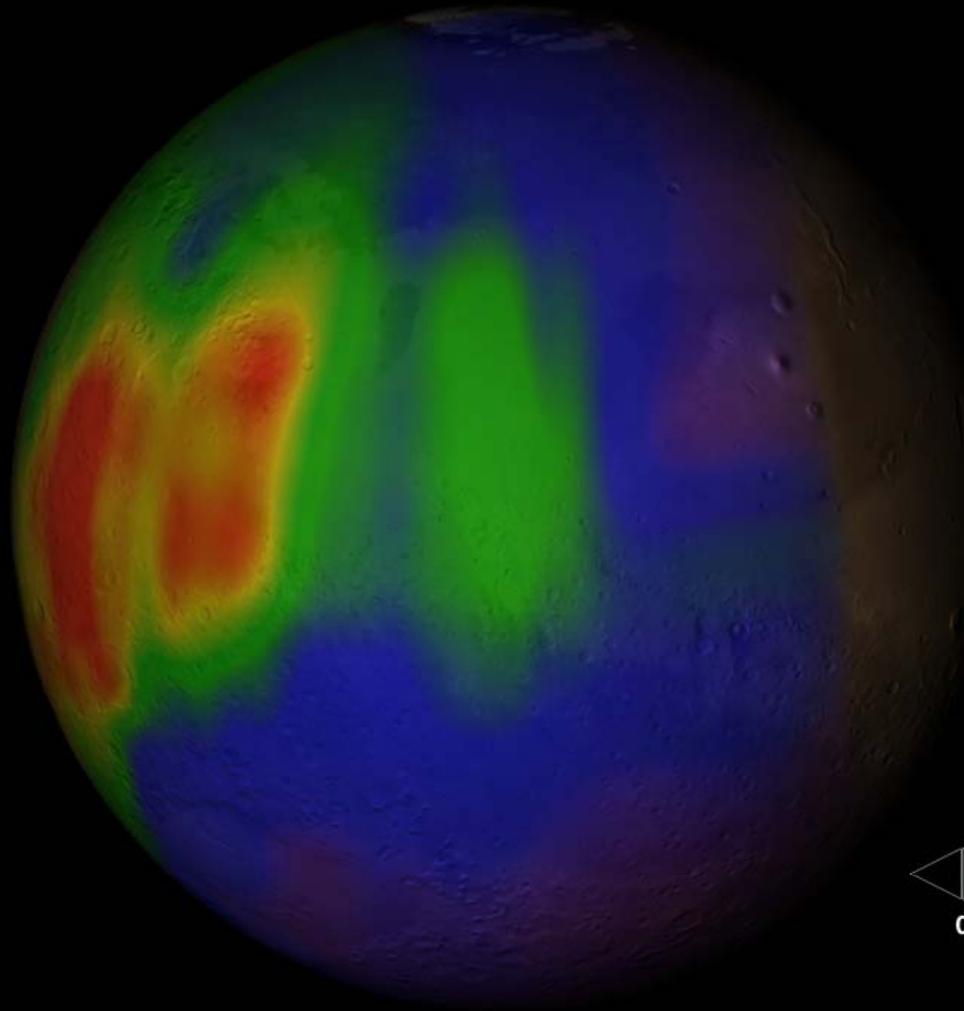
Images of Mars, Phobos & Deimos: ESA/DLR/FU Berlin (G. Neukum)



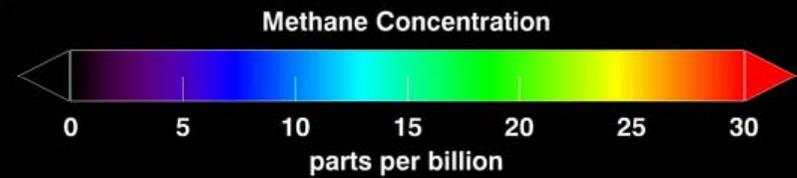
Not to scale



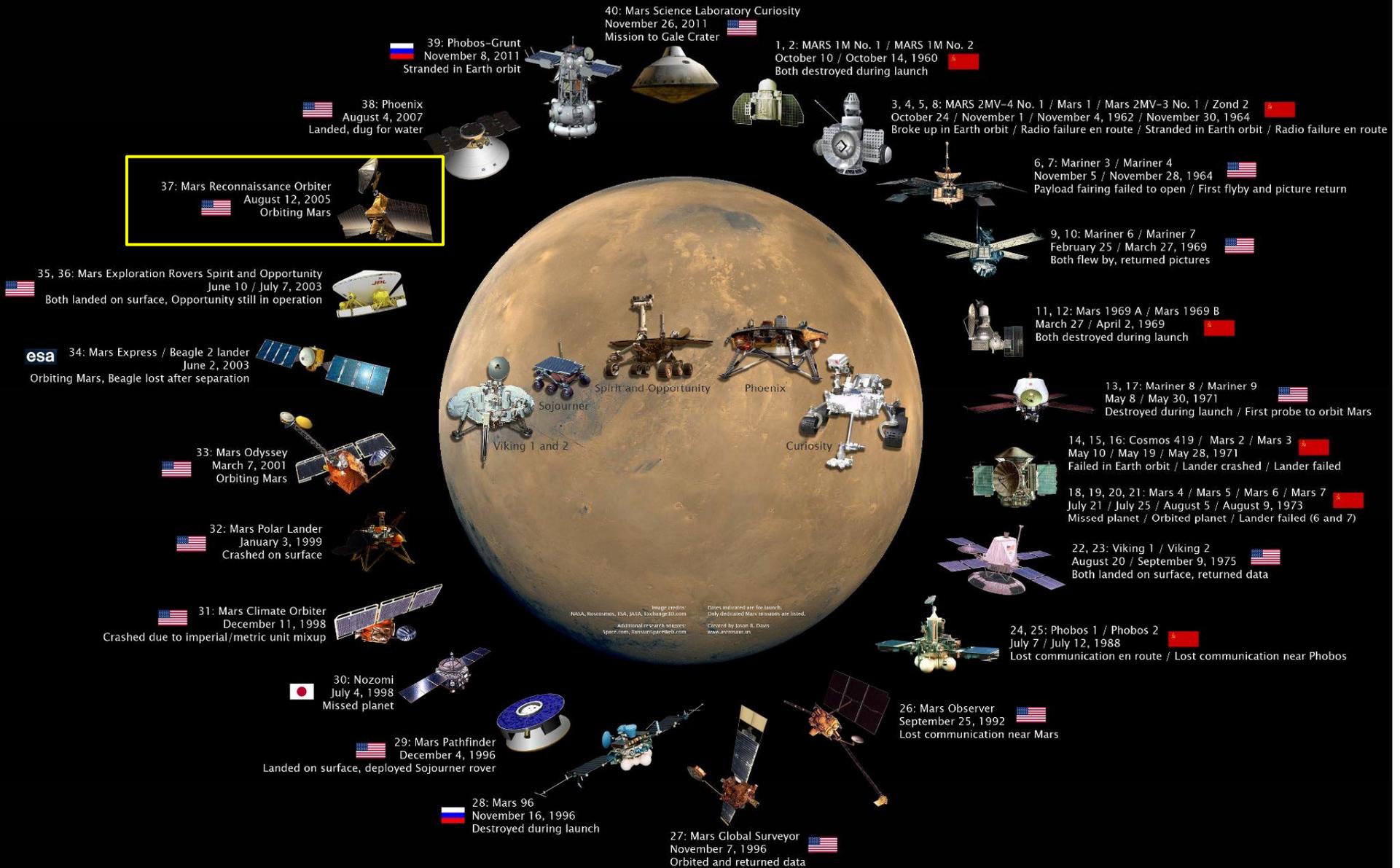
¿Metano en Marte?



Methane release:
Northern summer



Retrato de familia de la exploración de Marte



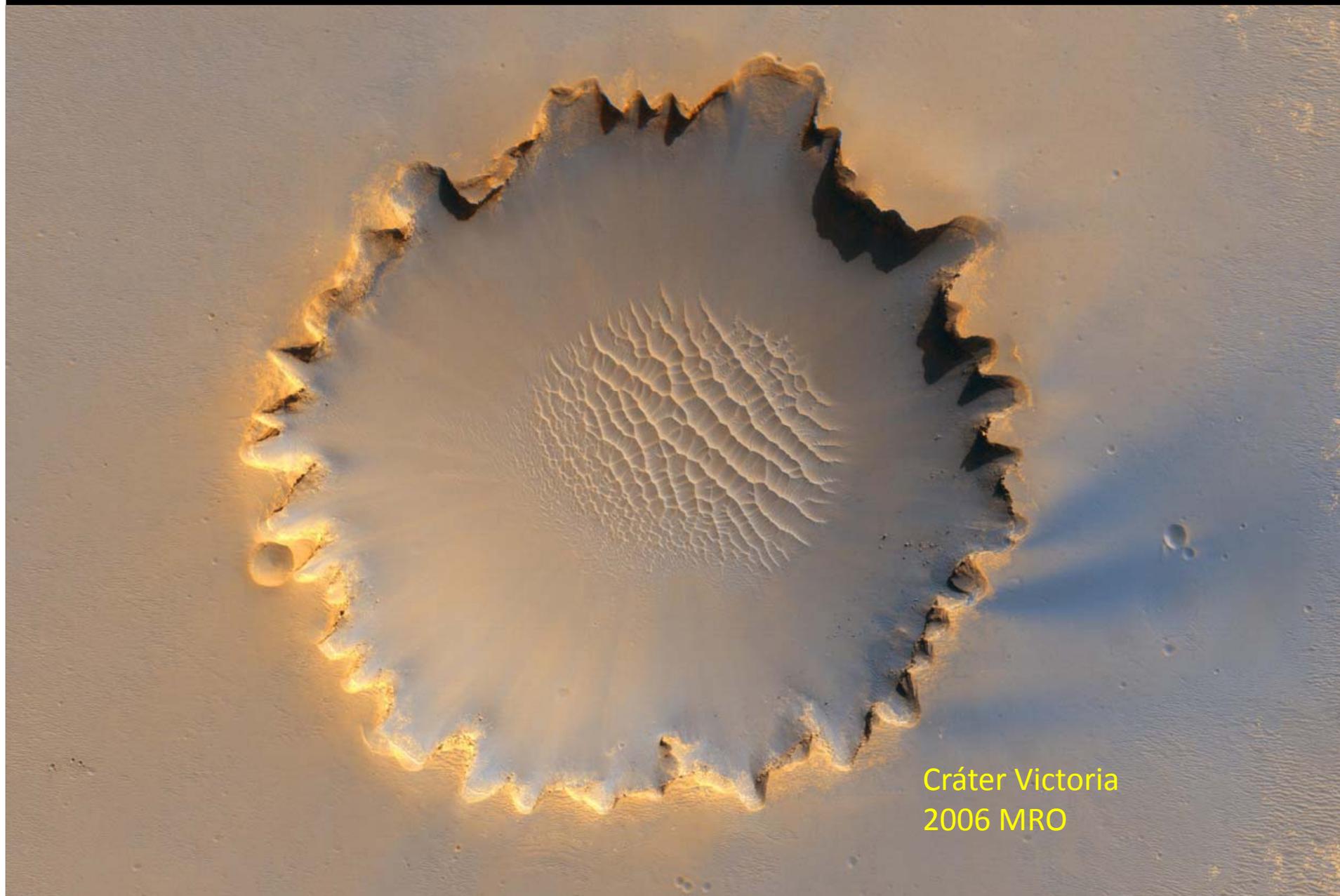
This infographic illustrates various Mars exploration missions, centered around a large image of the planet Mars. Missions are arranged around the planet, each accompanied by a small illustration of the spacecraft and its mission details, including the launch date, status, and the country of origin. The missions shown include:

- 39: Phobos-Grunt** (Russia): November 8, 2011. Stranded in Earth orbit.
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Planet Labels: Sojourner, Spirit and Opportunity, Phoenix, Curiosity, Viking 1 and 2.

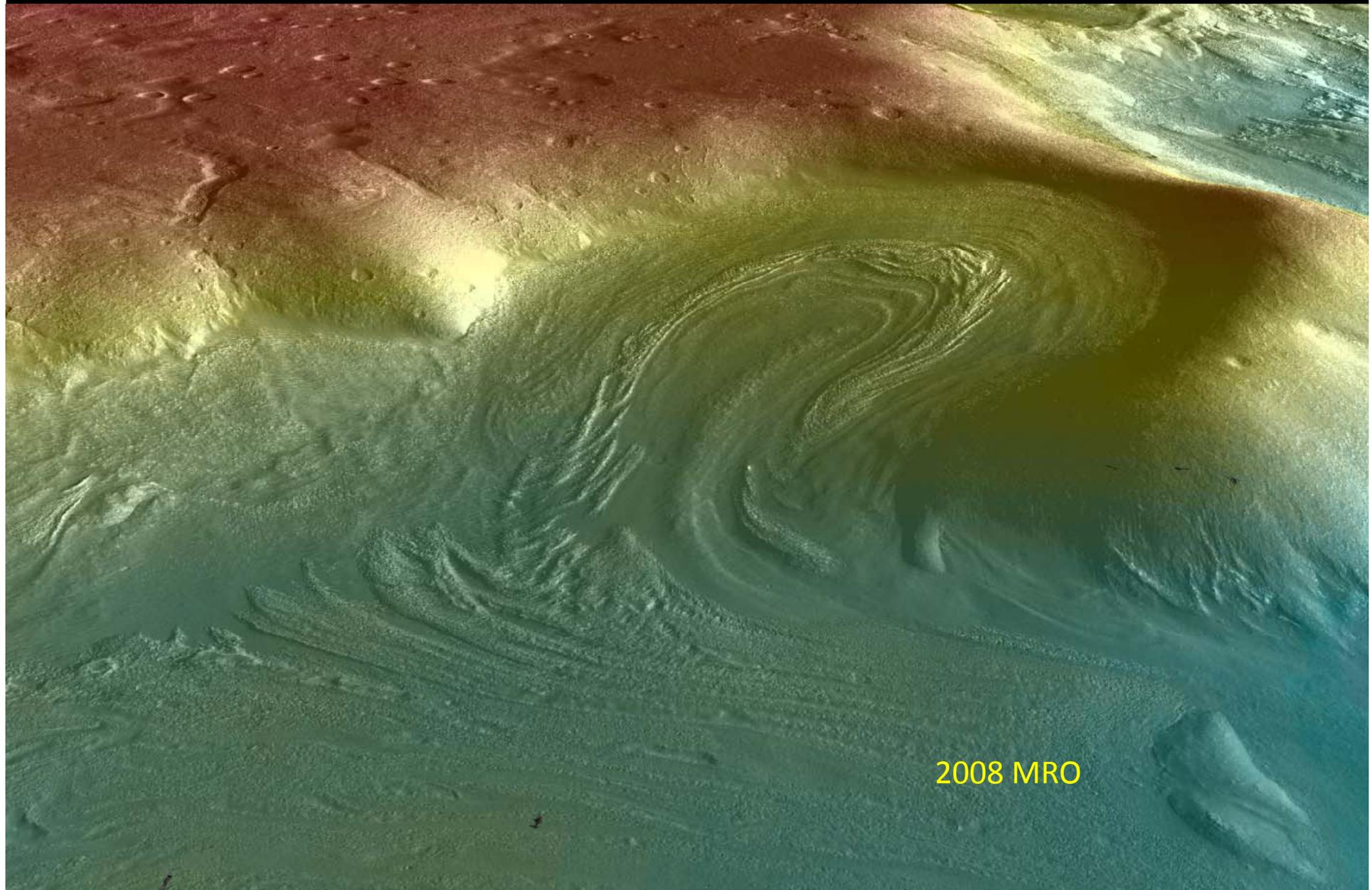
Image credits: NASA, Roscosmos, ESA, JAXA, Lockheed Martin. Additional research sources: SPeRT.com, MarsSocietyWeb.com. Planes indicated are for launch. Only dedicated Mars missions are listed. Created by Jason B. Davis www.astrospace.us

Mars Reconnaissance Orbiter



Cráter Victoria
2006 MRO

Mars Reconnaissance Orbiter



2008 MRO

Mars Reconnaissance Orbiter



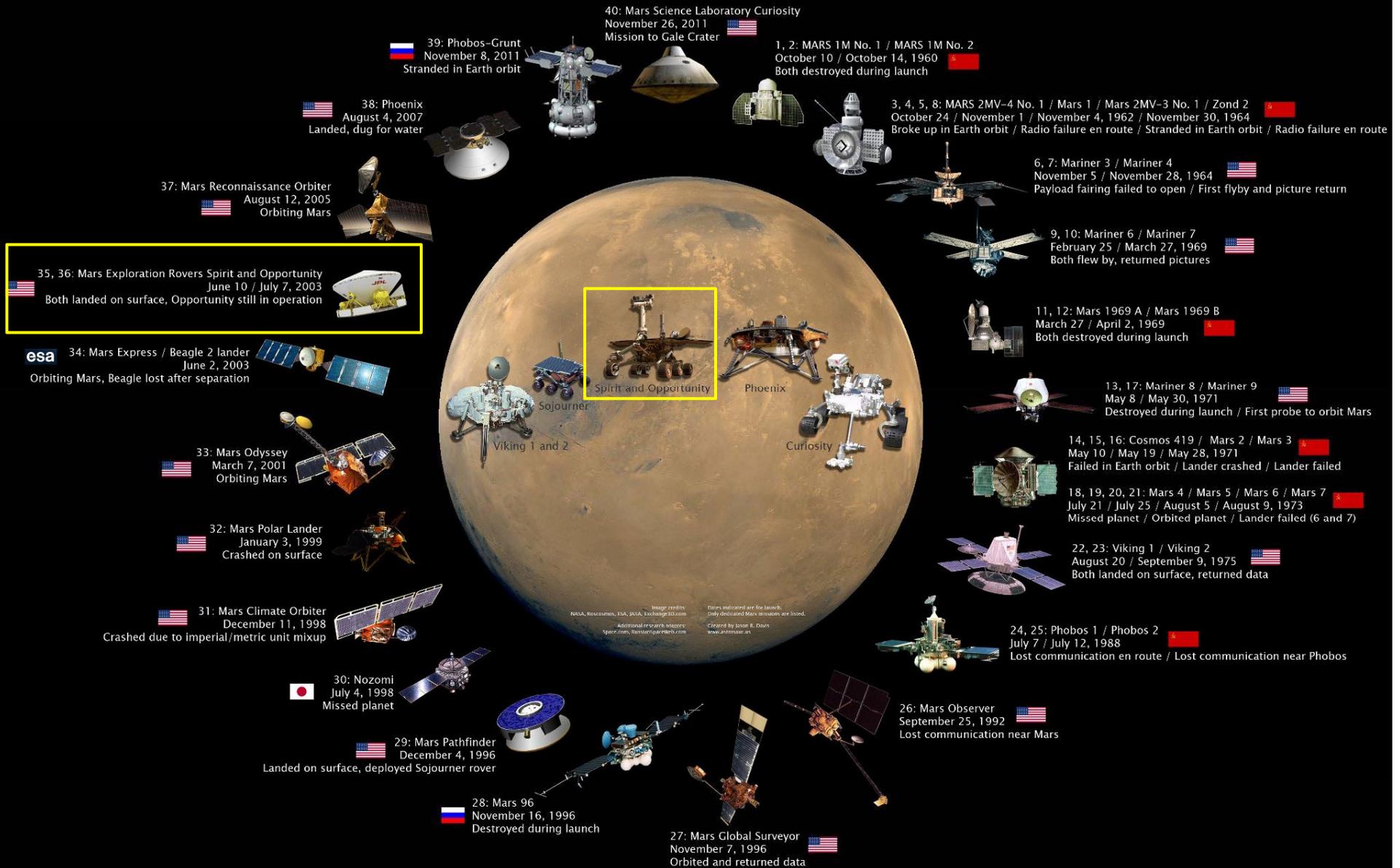
Tornado
2012 MRO

Mars Reconnaissance Orbiter



Labirintus Noctis
2013 MRO

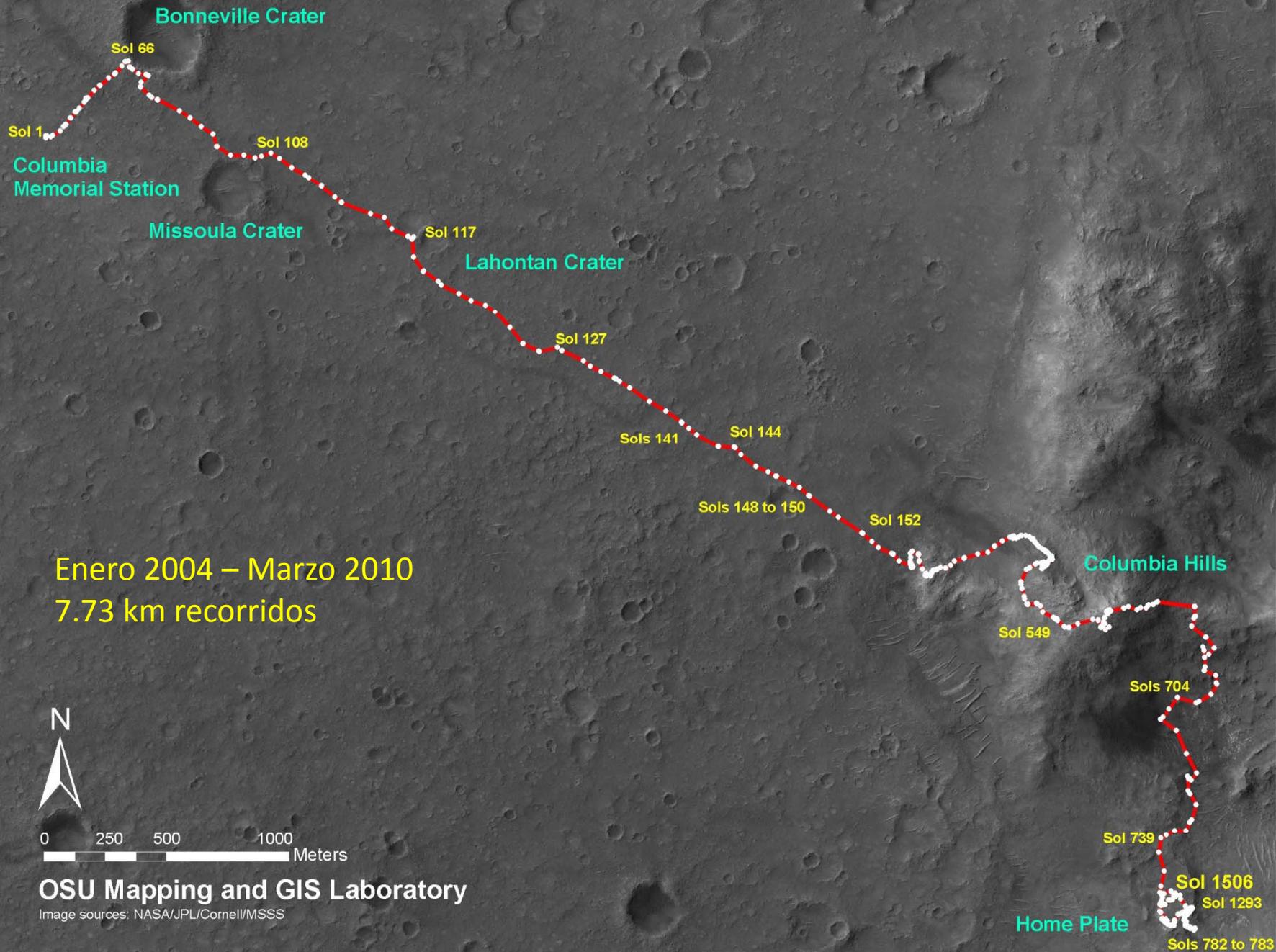
Retrato de familia de la exploración de Marte



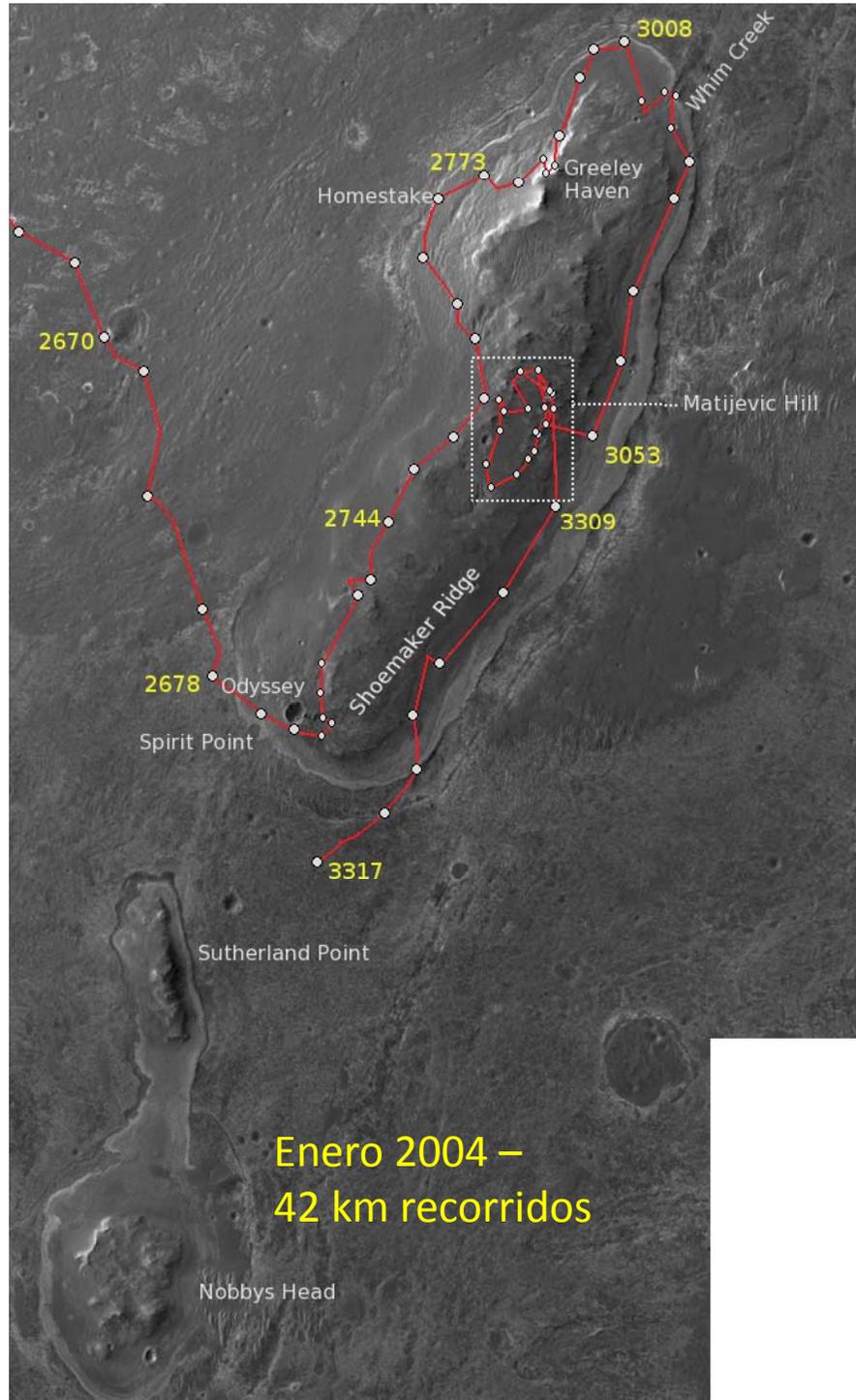
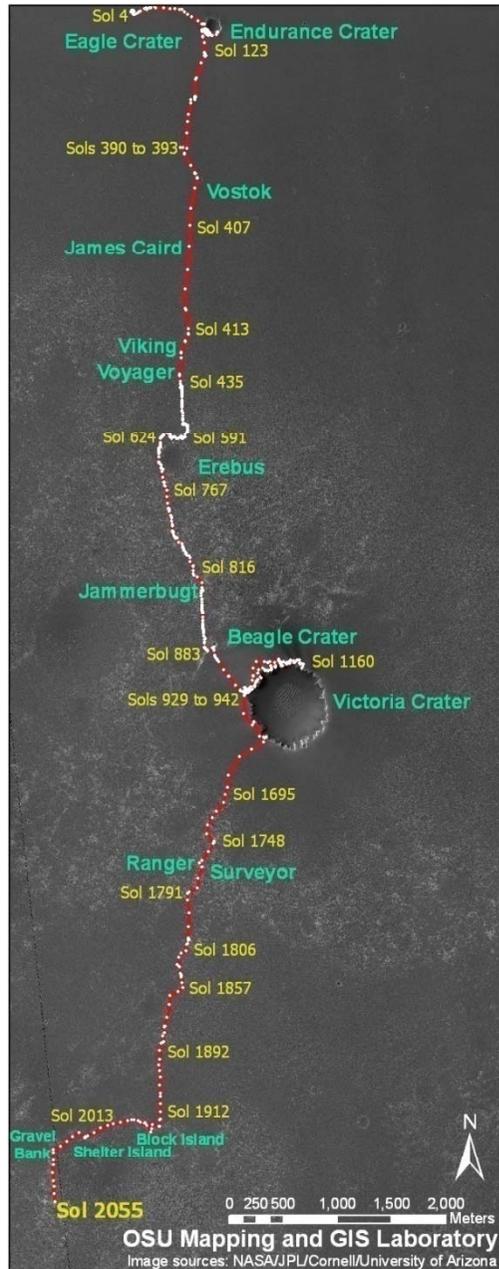
Espíritu y Oportunidad



Spirit Traverse Map (Sol 1506)

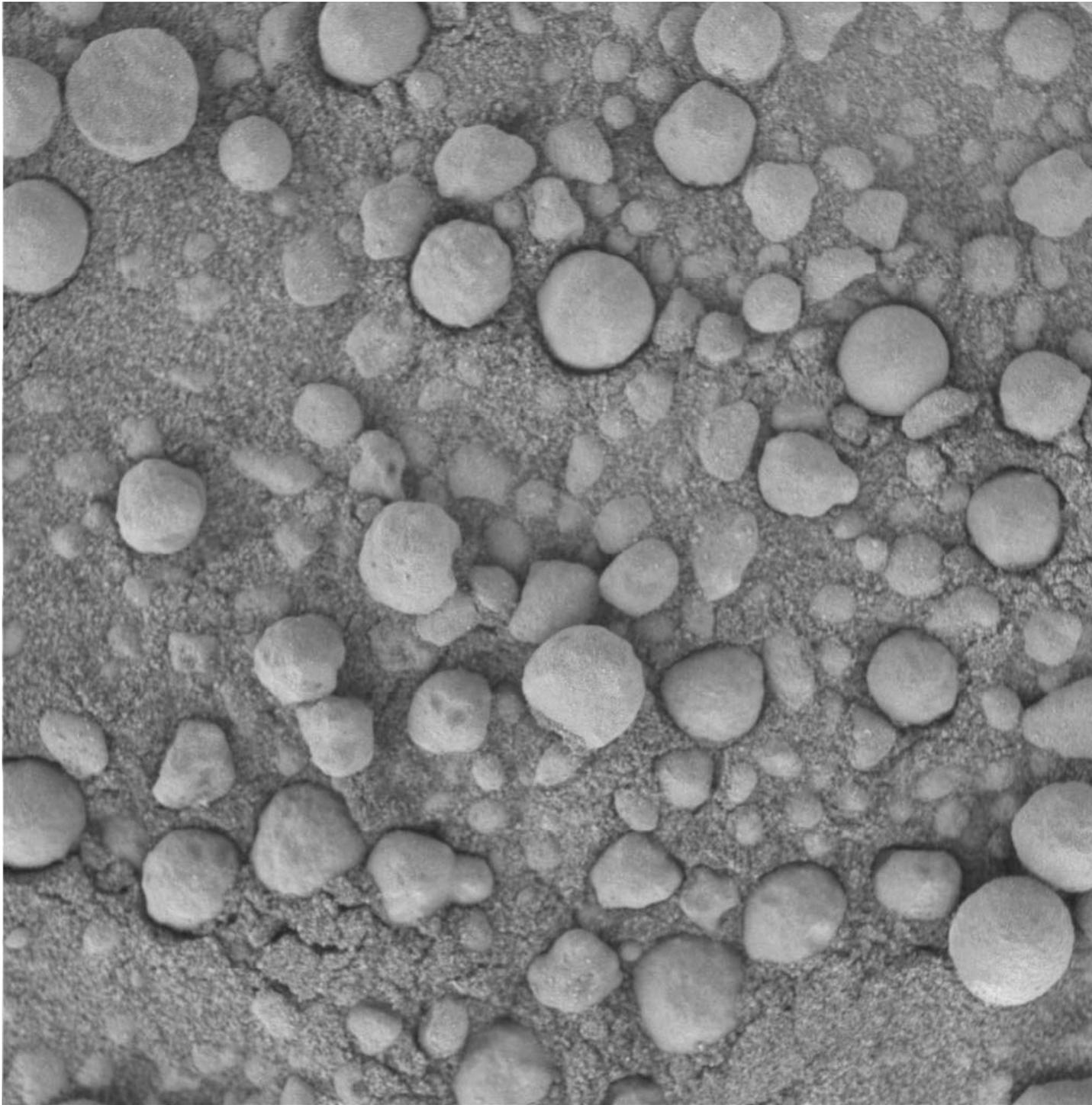


Opportunity Traverse Map (Sol 2055)



Cae la noche en Marte



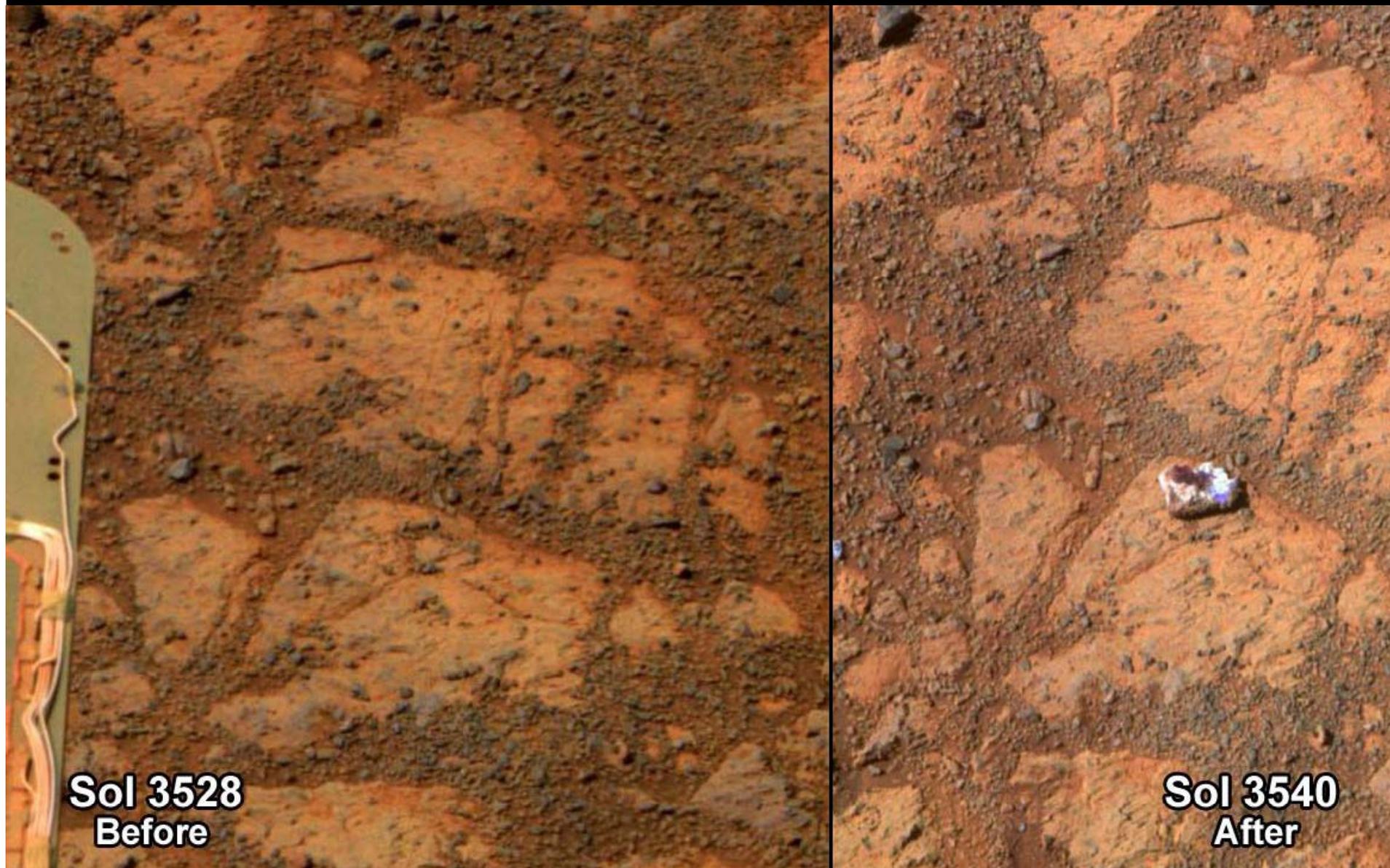


Sigue el agua

Dentro de la tormenta



Una roca misteriosa



Sol 3528
Before

Sol 3540
After

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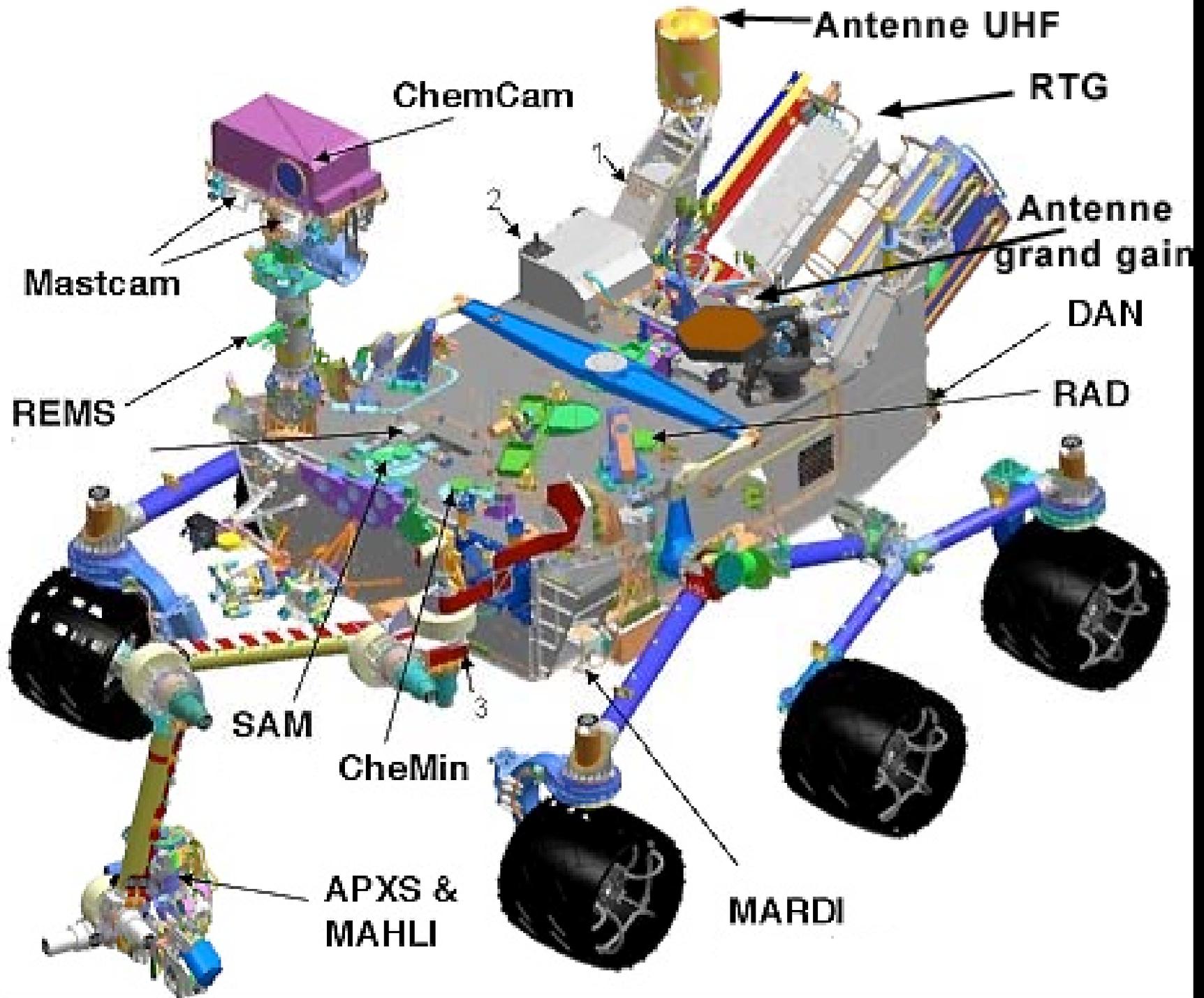
26: Mars Observer
September 25, 1992
Lost communication near Mars

Sojourner
Spirit and Opportunity
Phoenix
Viking 1 and 2
Curiosity

Image credits: NASA, Roscosmos, ESA, JAXA, Lockheed Martin
Additional research sources: space.com, mars.nasa.gov
Dates indicated are for launch, only dedicated Mars missions are listed.
Created by Jason B. Davis
www.astronautix.com

La hora de la Curiosidad

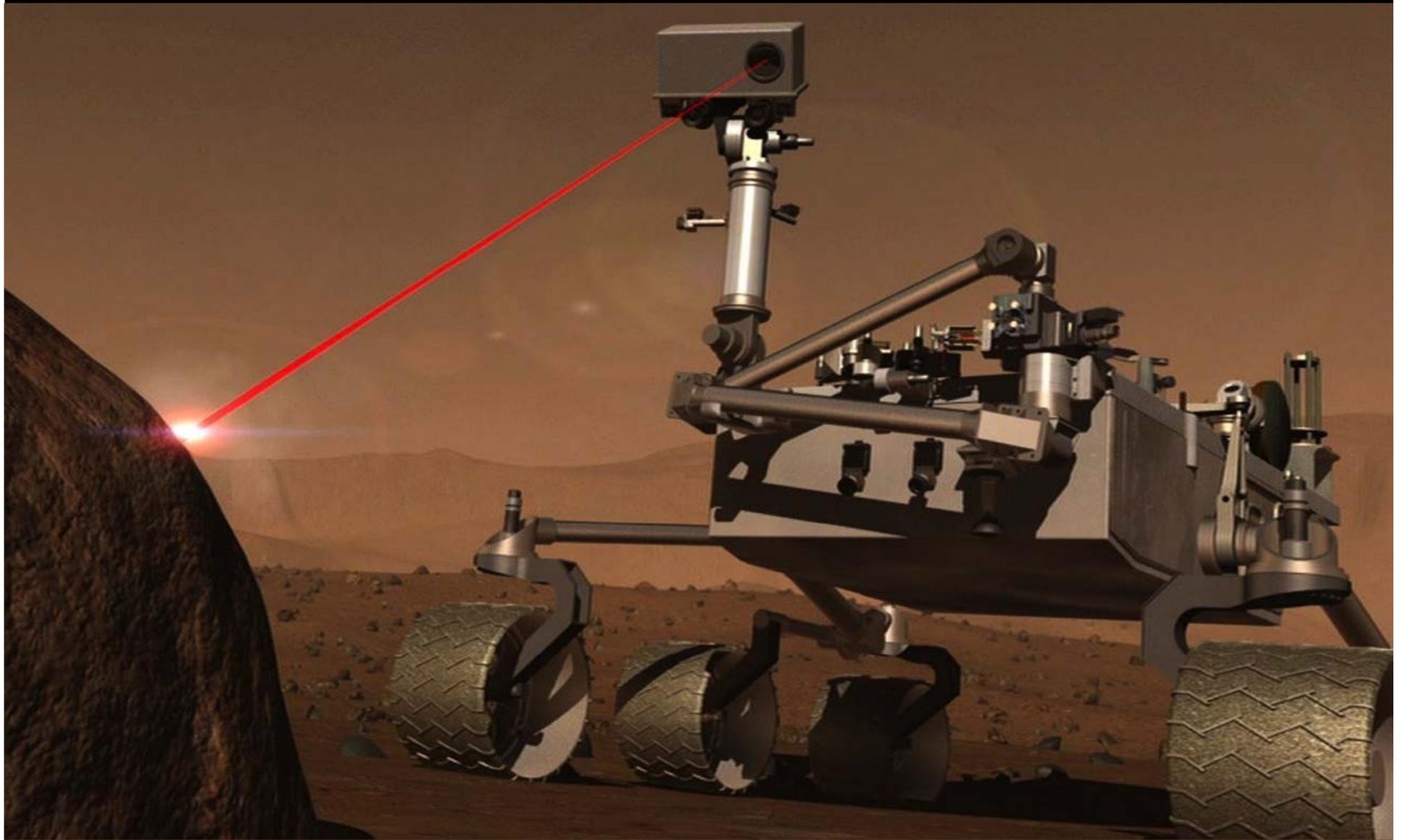




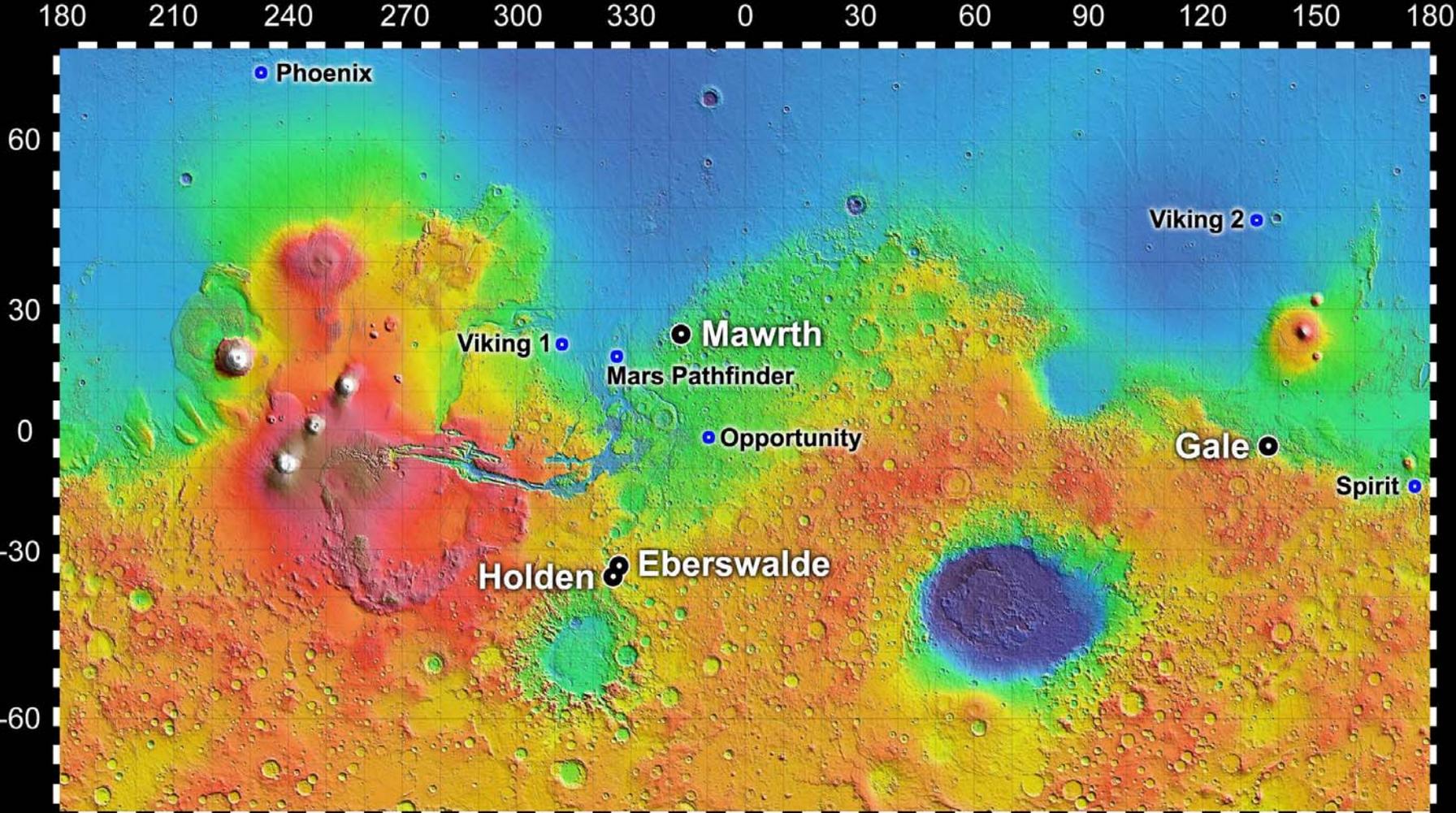
¡Abran fuego!



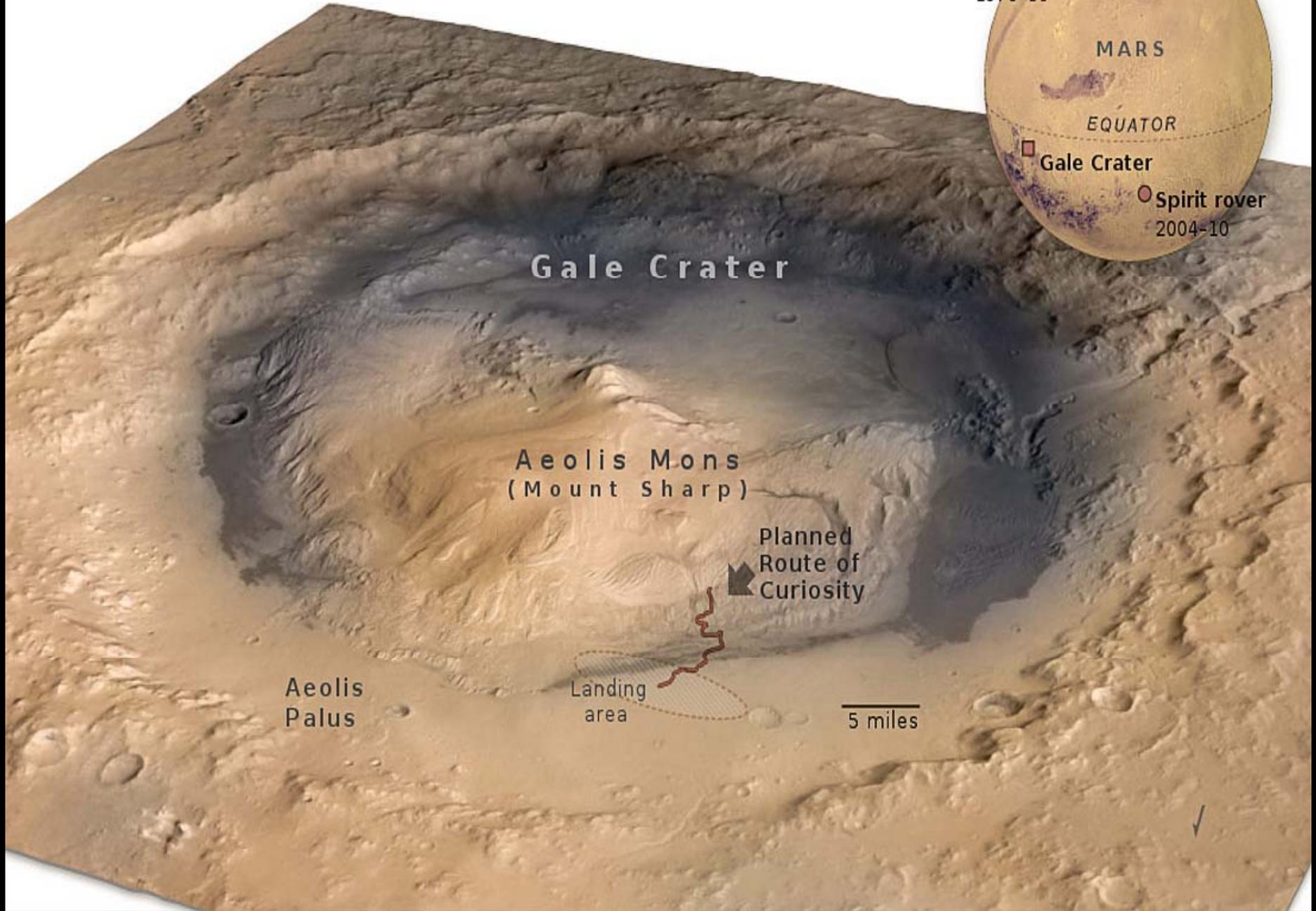
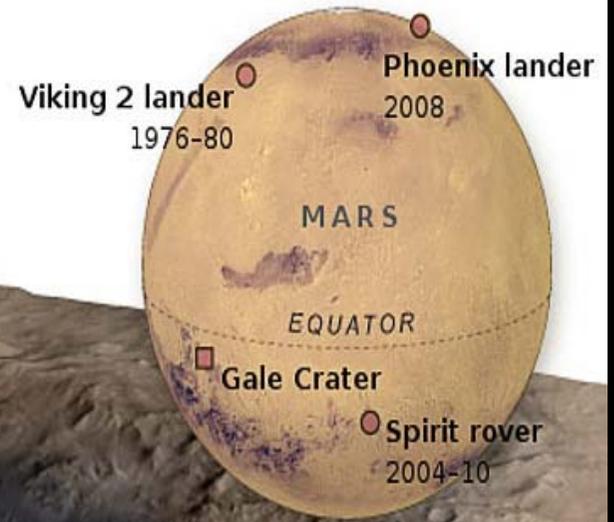
¡Abran fuego!



Buscando una pista de aterrizaje



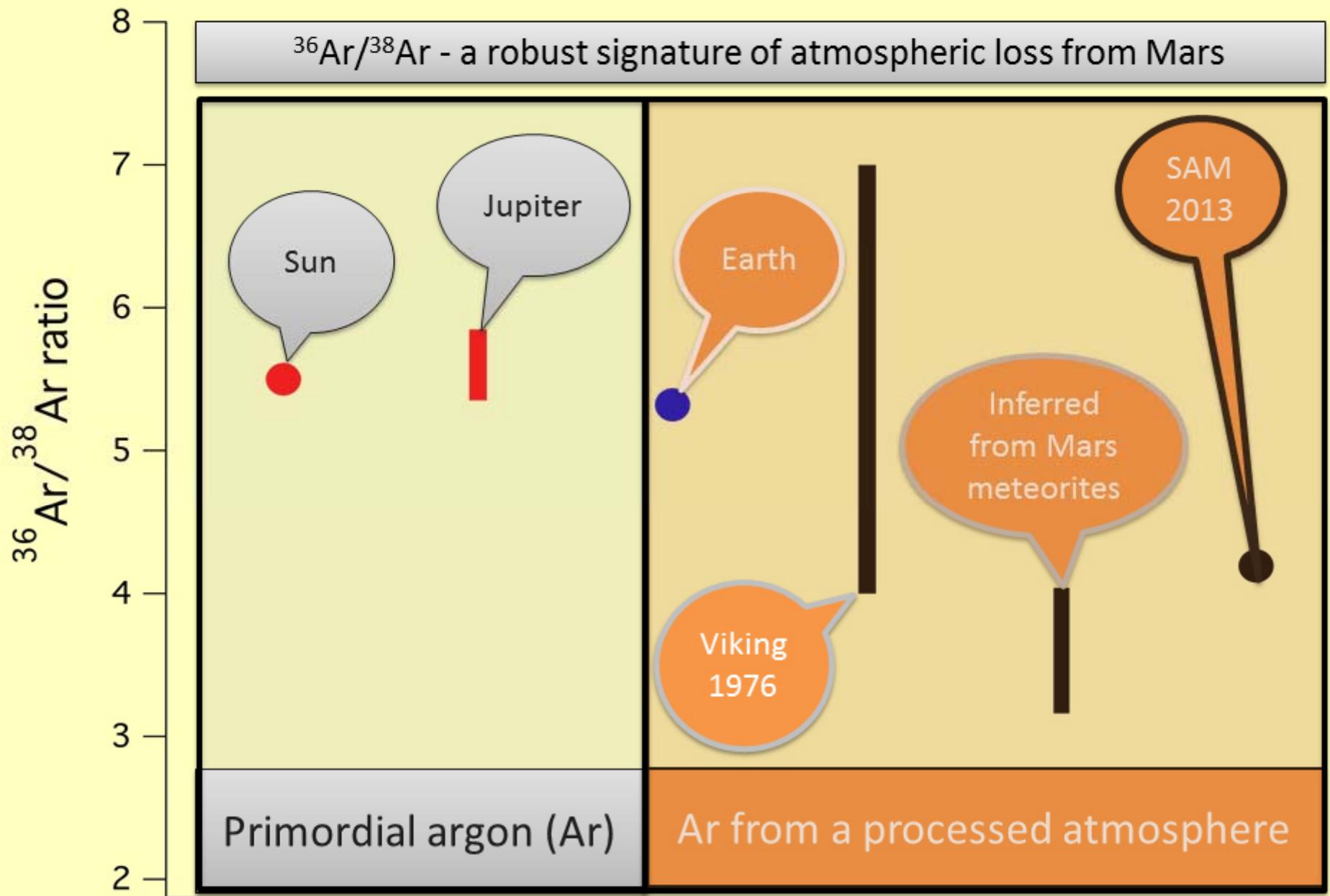
Trazando una ruta



Aeolus Mons – Mount Sharp



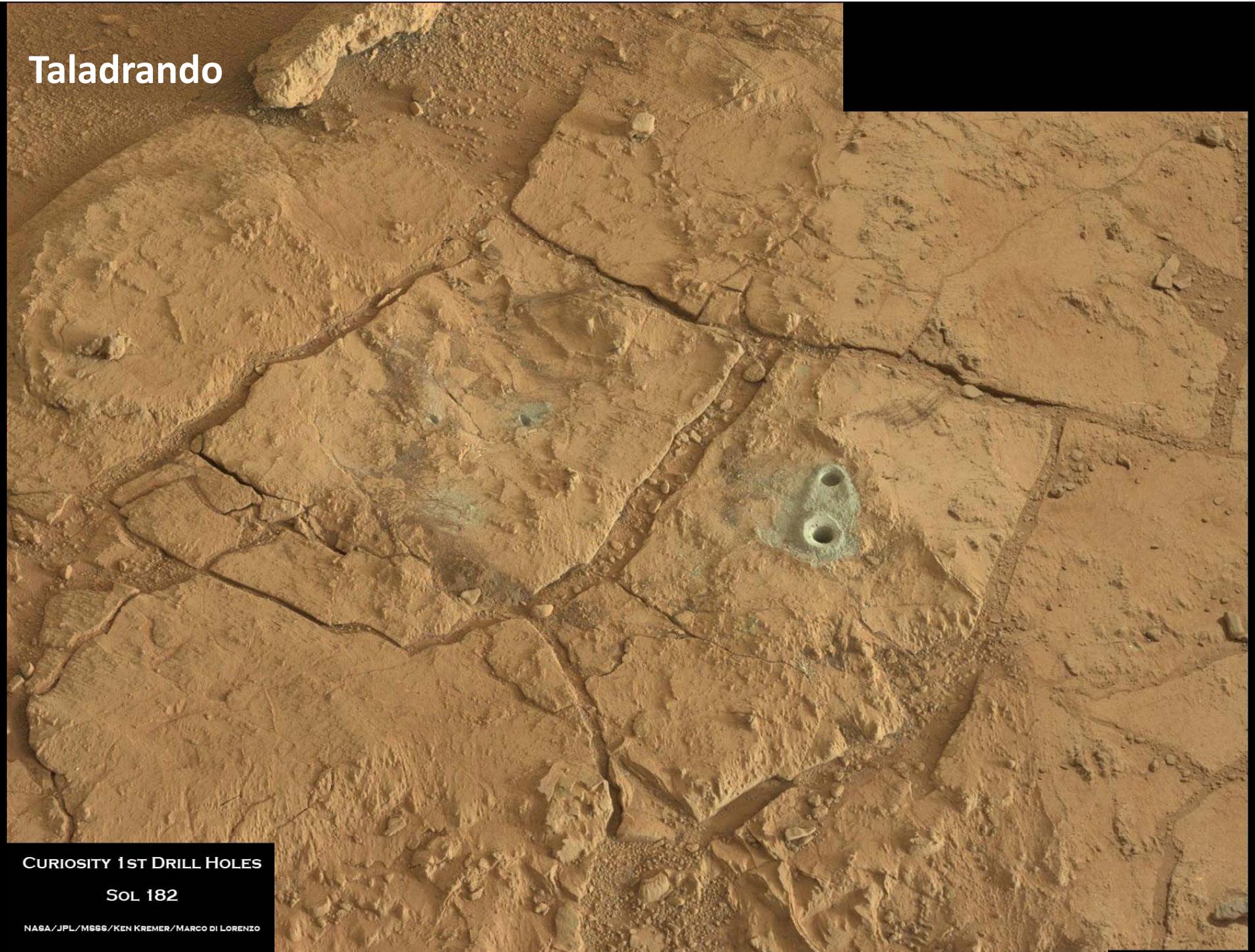
$^{36}\text{Ar}/^{38}\text{Ar}$ - a robust signature of atmospheric loss from Mars



Más evidencias de agua



Taladrando



CURIOSITY 1ST DRILL HOLES

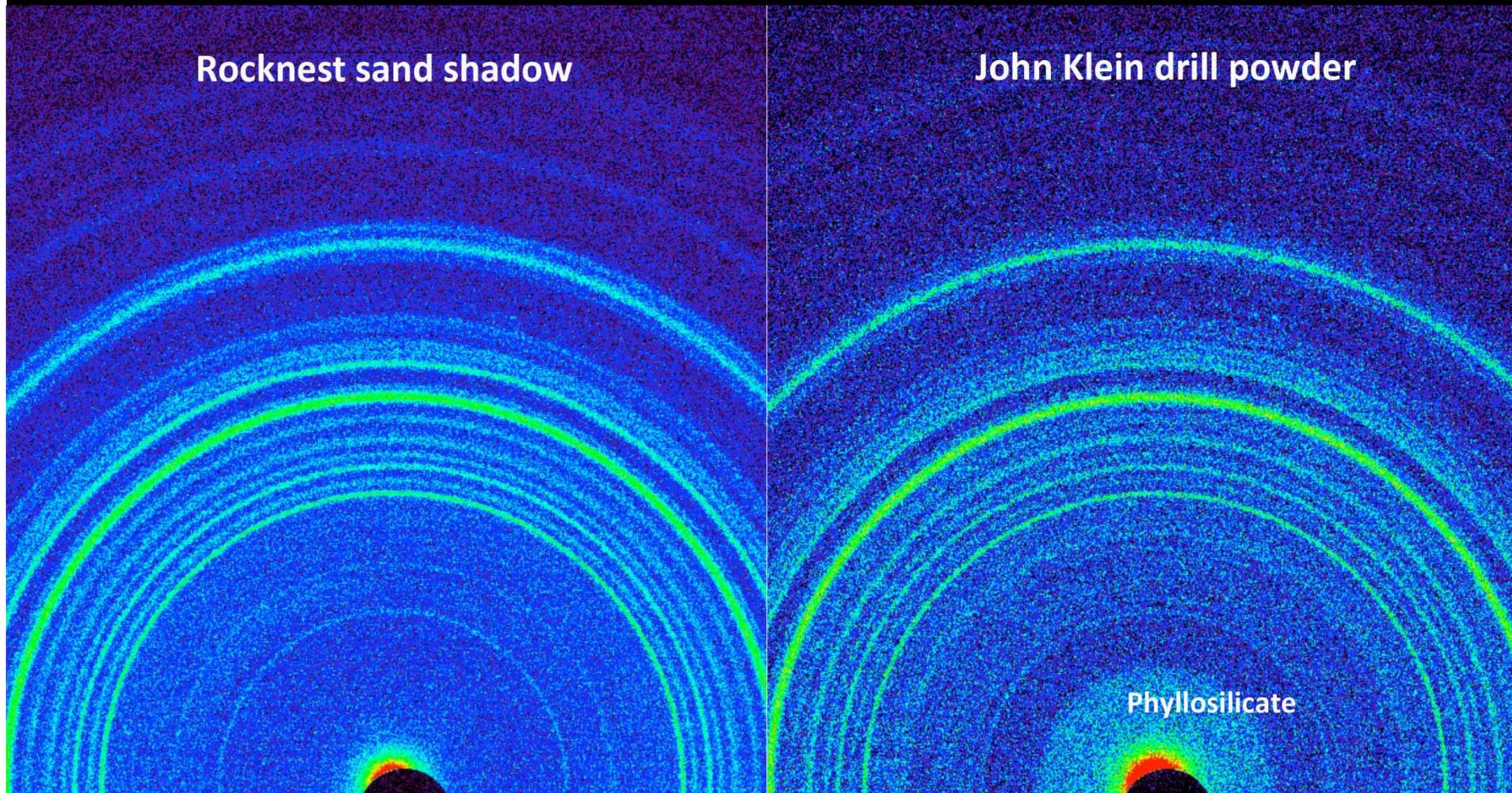
SOL 182

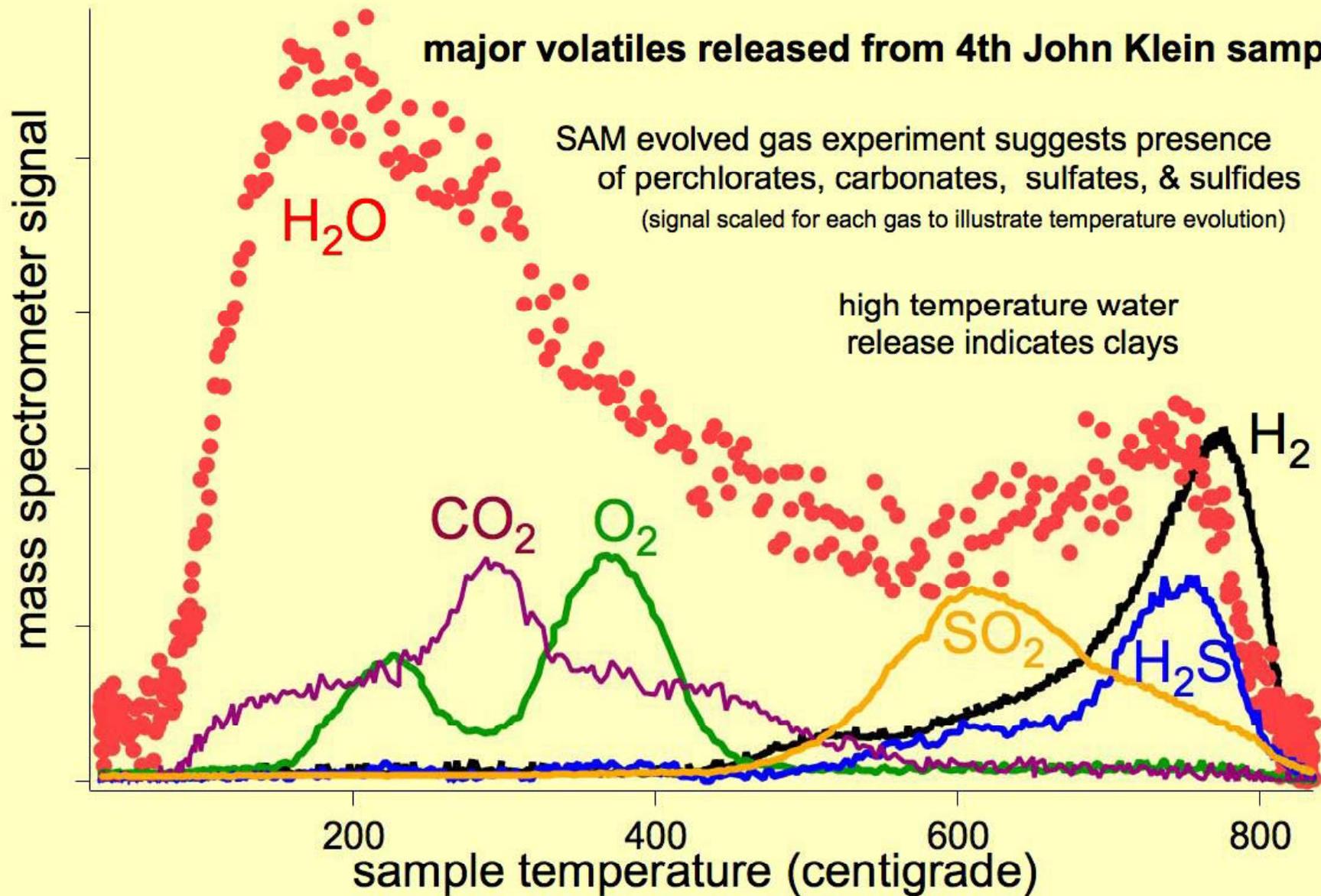
NASA/JPL/MSSS/KEN KREMER/MARCO DI LORENZO

Analizando los resultados

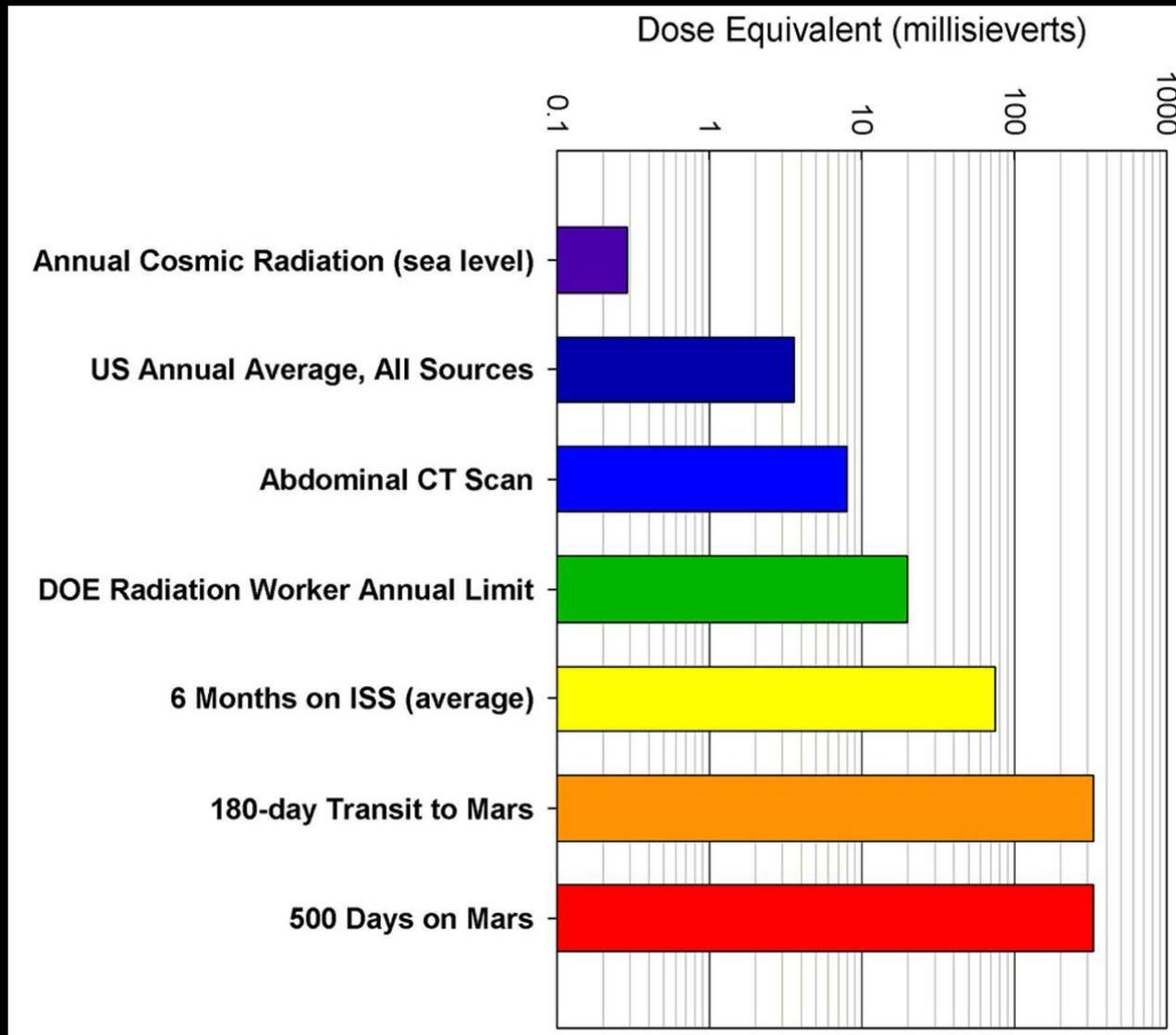
Rocknest sand shadow

John Klein drill powder

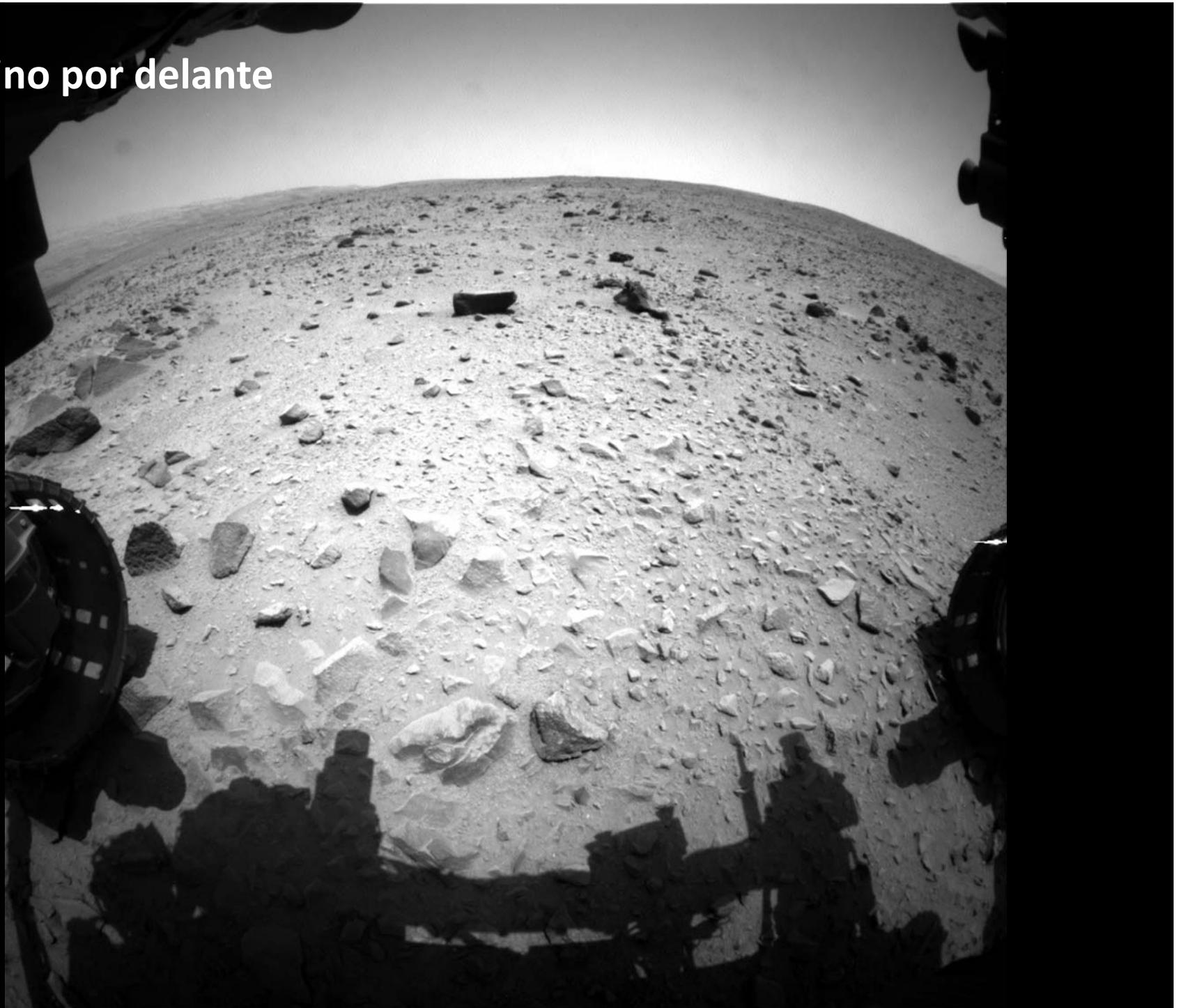




Sobrevivir en Marte



El camino por delante



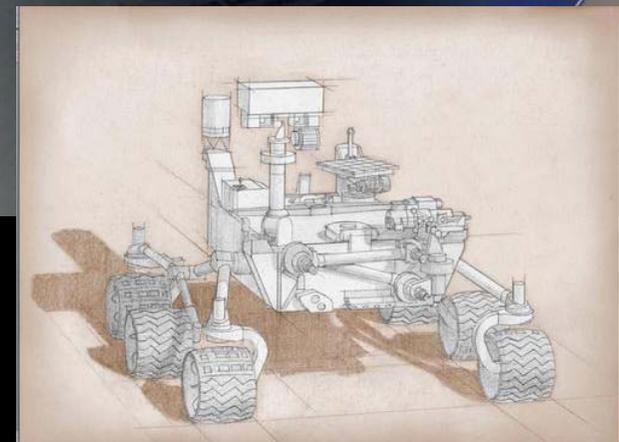
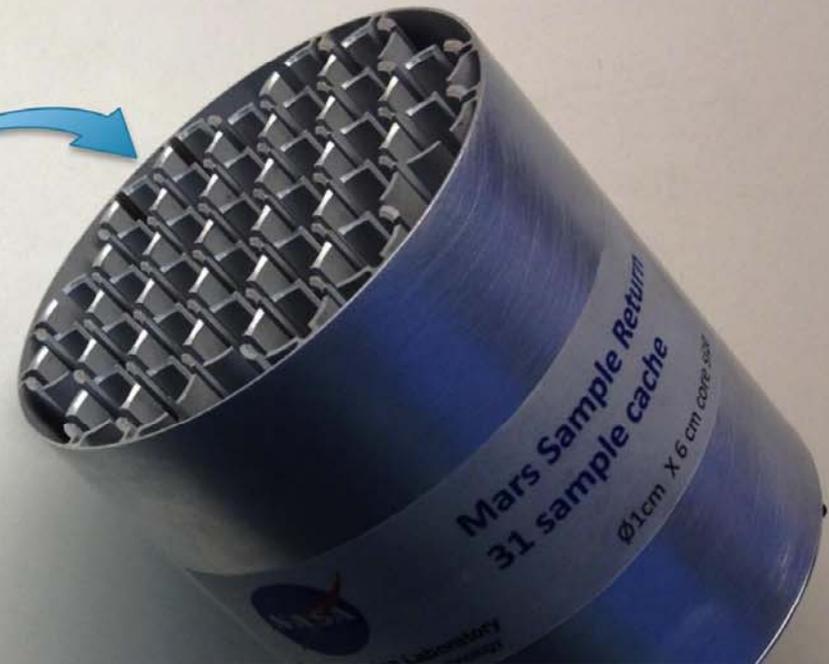
El Marte de mañana

31 sample cache

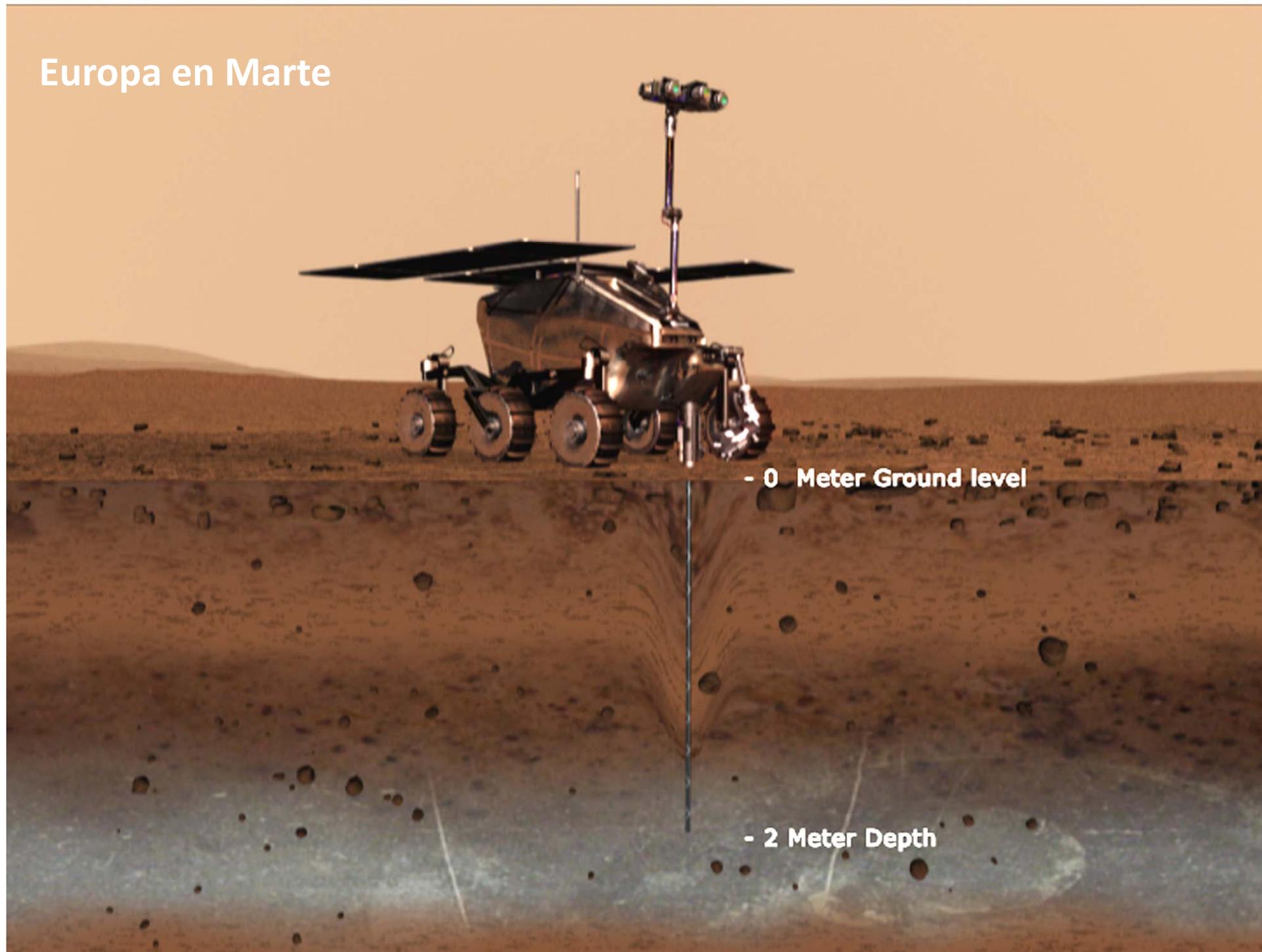
core sample

seal

sample tube



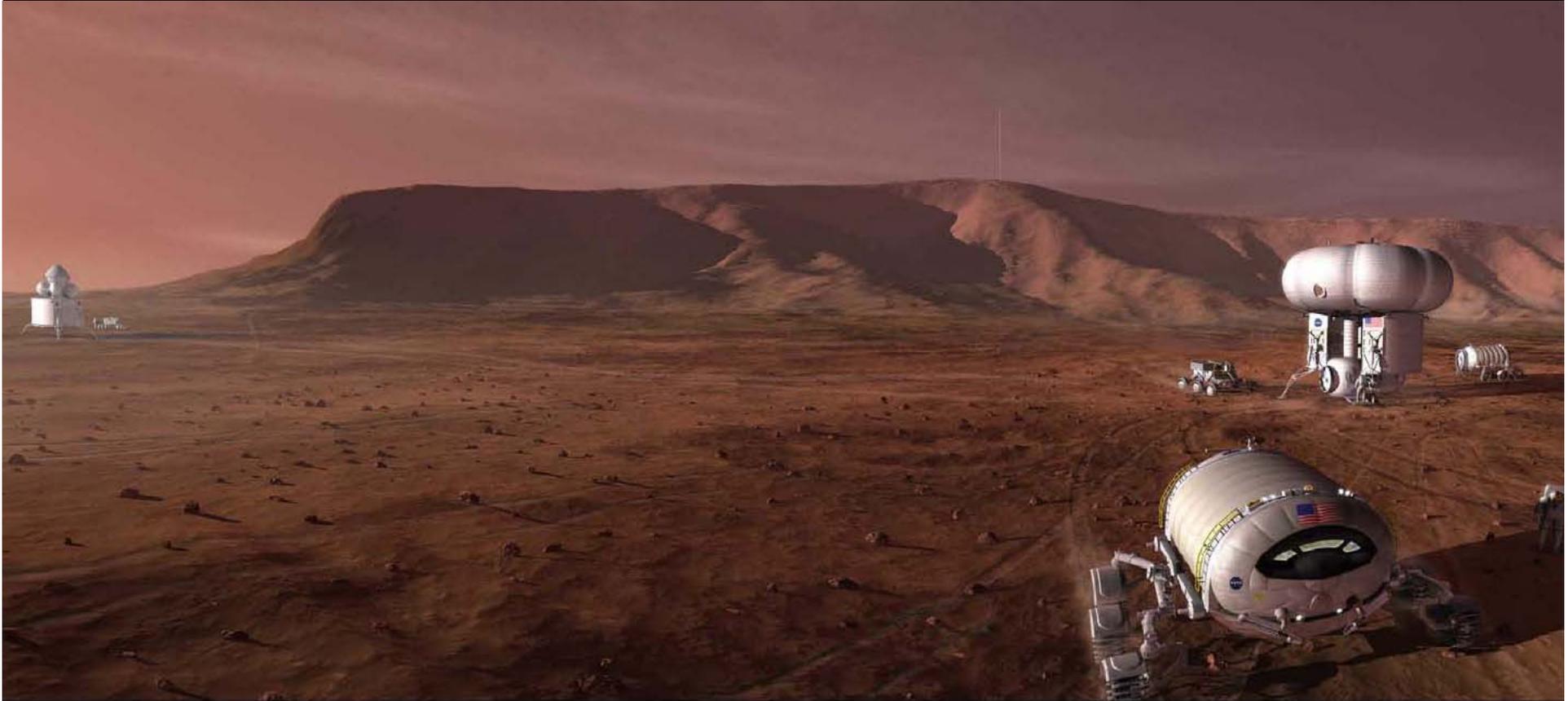
Europa en Marte



- 0 Meter Ground level

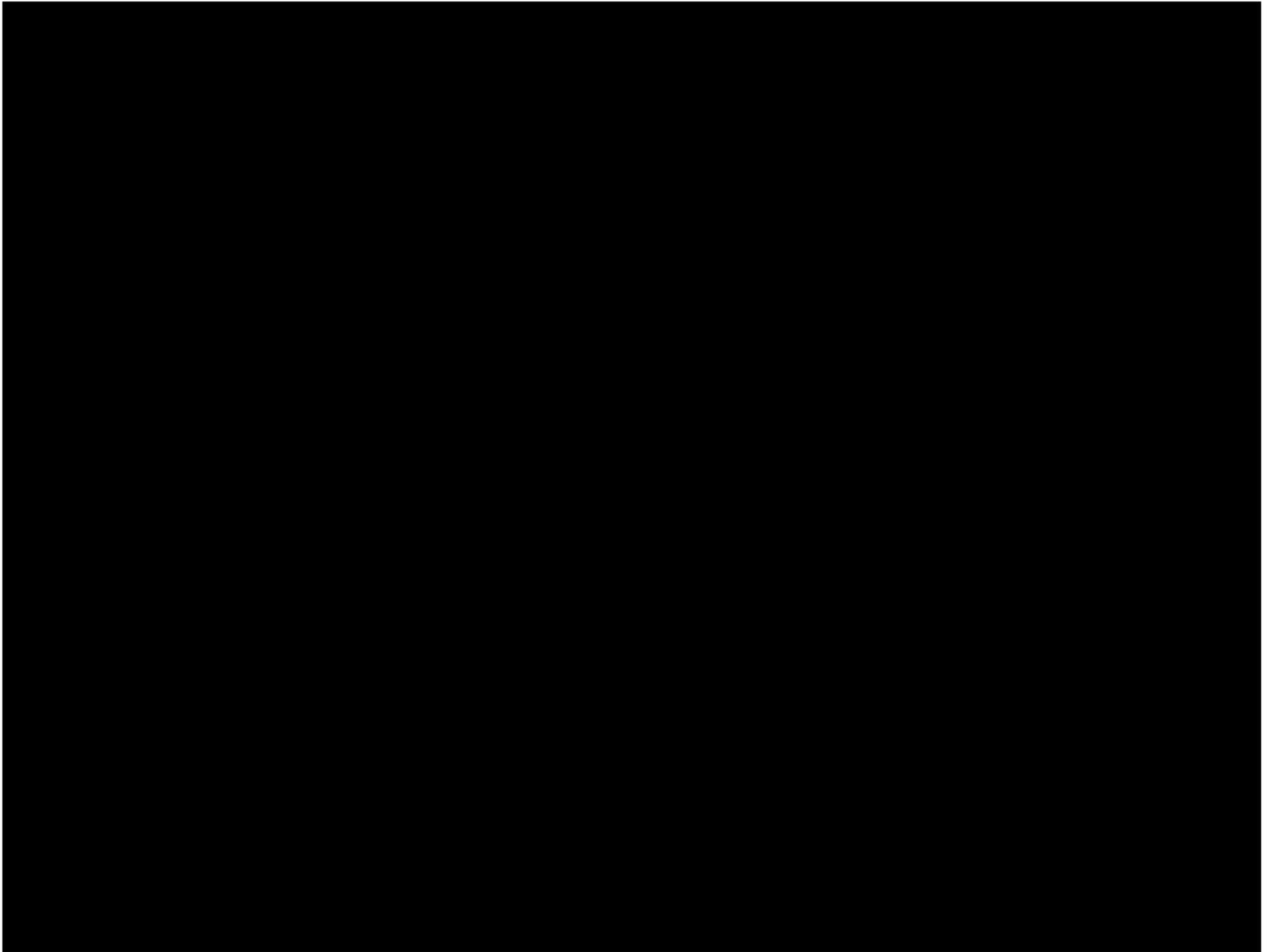
- 2 Meter Depth

Exploración humana: ¿a Marte para quedarse?



Algunas conclusiones

- Marte fue **húmedo** en el pasado.
- Posiblemente, sigue siéndolo en el presente **bajo la superficie** en muchas regiones.
- La **radiación** en superficie en la actualidad no parece compatible con la vida.
- No tenemos ninguna evidencia de **vida actual** en el planeta.
- La **exploración de Marte** continuará intensamente durante las próximas décadas.
- La **exploración humana** será técnicamente viable.
- ¿Qué **implicaciones éticas** tiene la exploración de un mundo como Marte?



La cara de Marte y otros ejemplos

