Take Your Patrons to Mars

The webinar will begin at 1:00 p.m. (Mountain Time) and will be recorded.

While you're waiting:

1) Find the toolbar – it will either be on the bottom or top of your Zoom window
2) Click audio "Join by Computer"
3)Find the chat box. **Change the default** from "**Share with Panelists**" ***to*** "**Share with Panelists and Attendees**"
4) Introduce yourself in the chat box!

Tip for viewing: You can resize and move the location of the video and slide screens by clicking and dragging them

Dial(for higher quality, dial a number based on your current location):
US: +1 253 215 8782 or +1 346 248 7799 or +1 408 638 0968 or +1 669 900 6833 or +1 646 876 9923 or +1 301 715 8592 or +1 312 626 6799
Webinar ID: 988 6568 9116

Expectations / Guidelines

- **Try to use the Q&A feature for questions**
- **When using Chat, make sure your messages are being sent to "All Panelists and Attendees"**
- **Some of us are working from home: tech problems may happen!**
- **Call in #'s:**

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Resource List on STAR Net Blog

https://bit.ly/2ZFP5QY

(or)

http://www.starnetlibraries.org/uncategorized/resources-for-take-your-patrons-to-mars-webinar-7-7-20/

For chats: please select Share with "All Panelists and Attendees" *not* "All Panelists"

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STEAM Ahead @ Home

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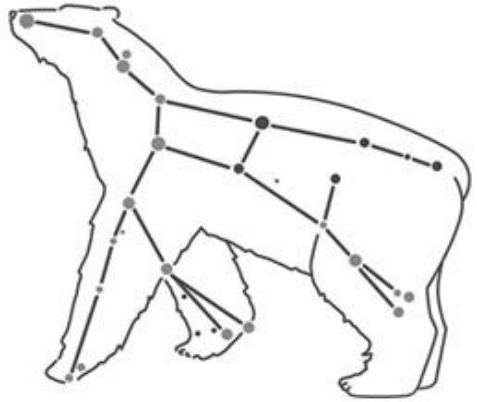
Virtual Programs

Use this featured resource to add easy, hands-on STEAM activities (using common household materials) to your online Story Time programs. Note: Book recommendations are included.



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Participants celebrate their heroes by creating connect-the-dot star patterns to represent them.

View This Virtual Program Activity

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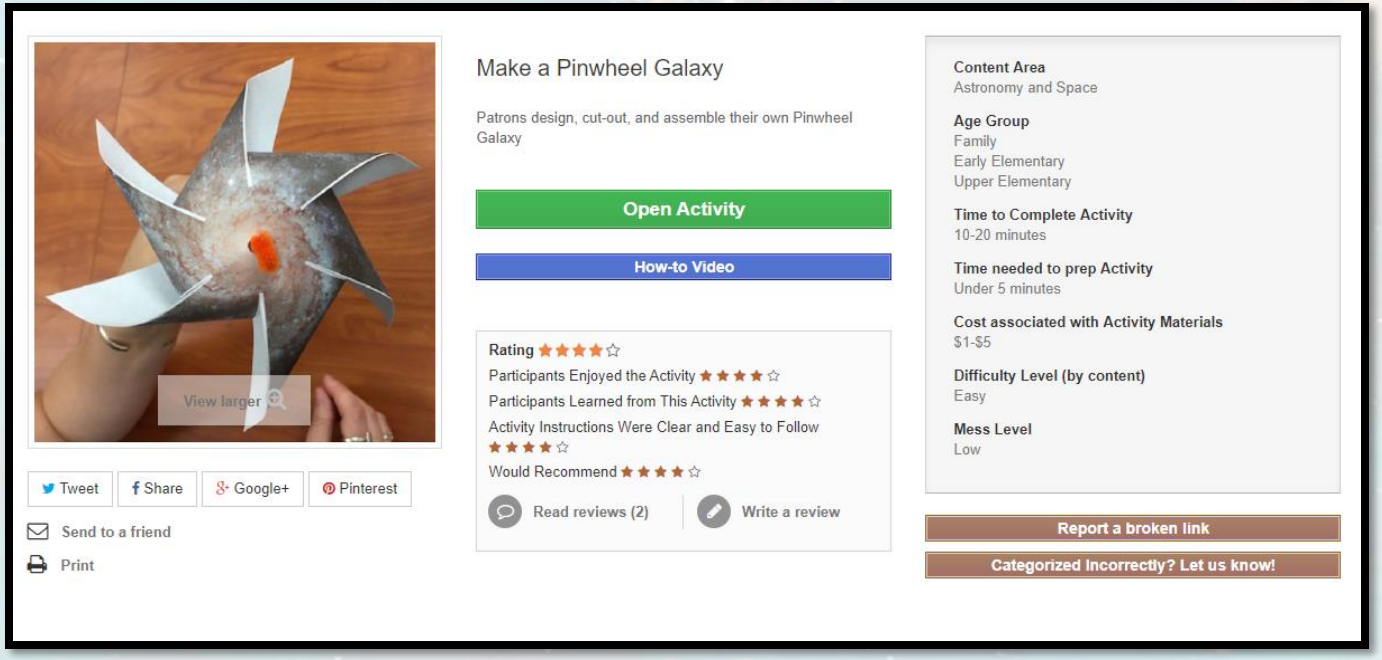
STEM ACTIVITY Clearinghouse

www.clearinghouse.starnetlibraries.org



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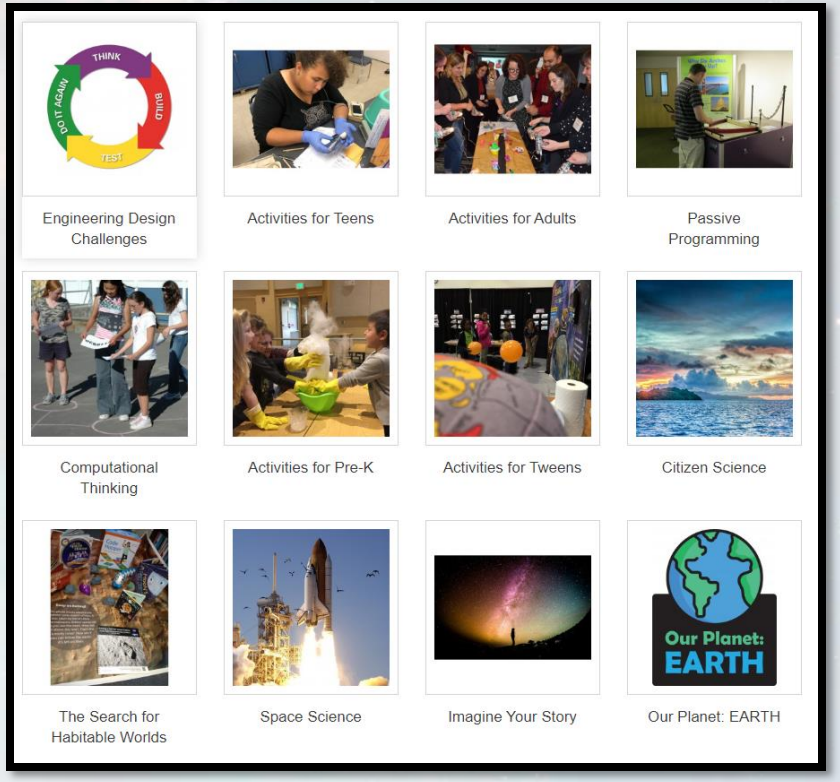


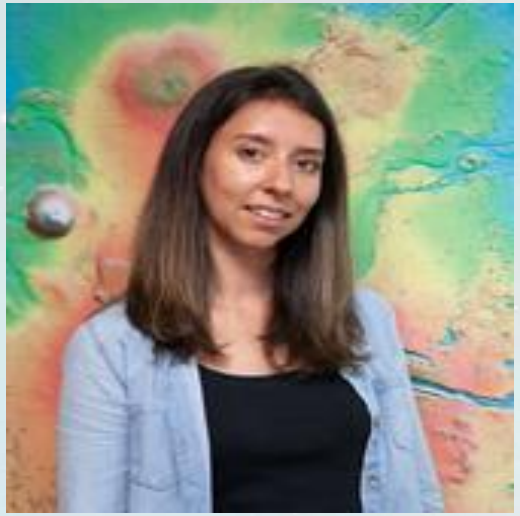
*Check out the **"Take and Make" collection!***

Poll Question

- **Would you go to Mars, if given the chance? (Explain in Chat)**
  - **Yes**
  - **No**
  - **Unsure**

Guest Presenters from the Lunar and Planetary Institute

Christine Shupla
Education and Public Engagement Manager

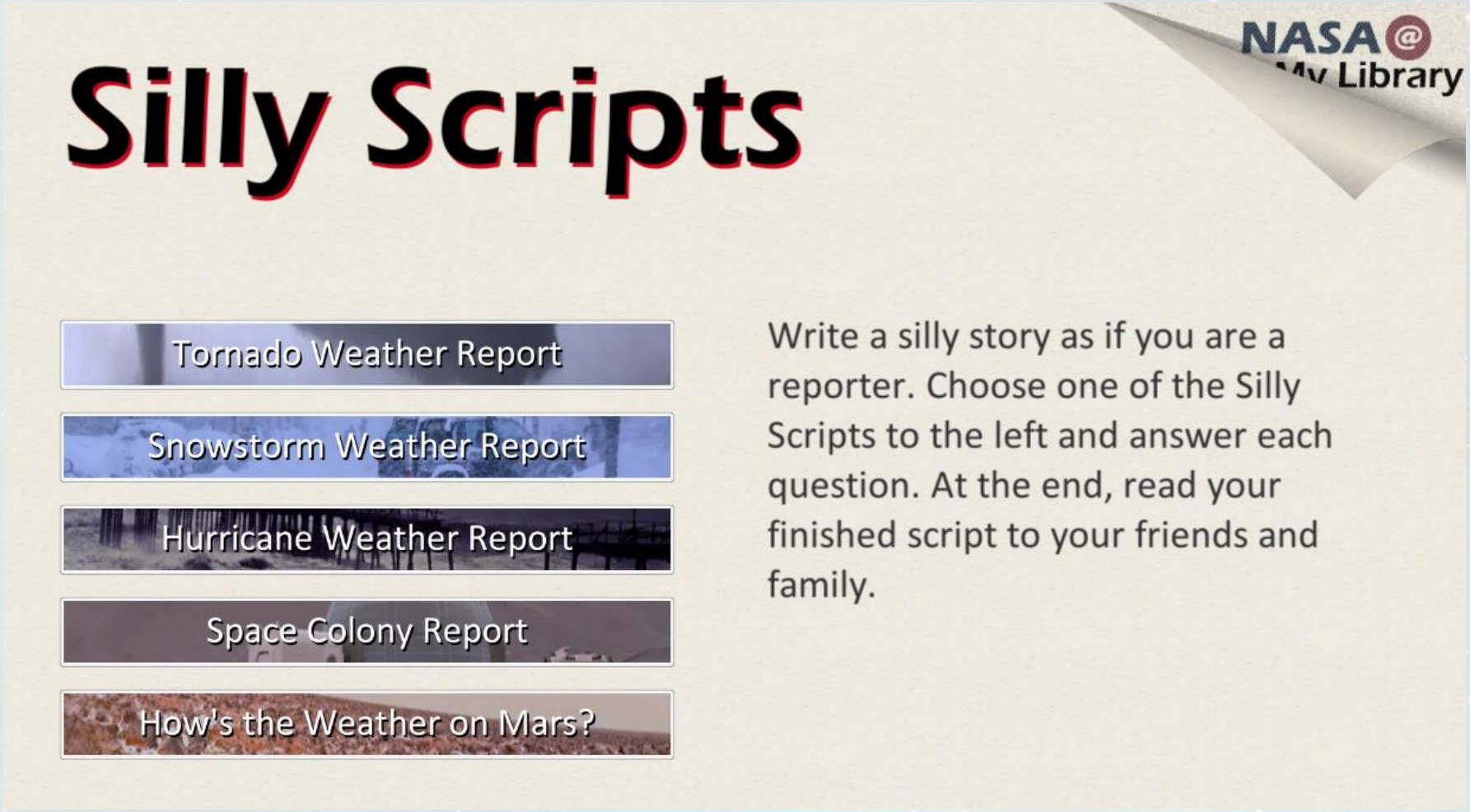


Dr. Candice Bedford
LPI/JSC Postdoctoral Fellow

Sha'Rell Webb
Education Specialist

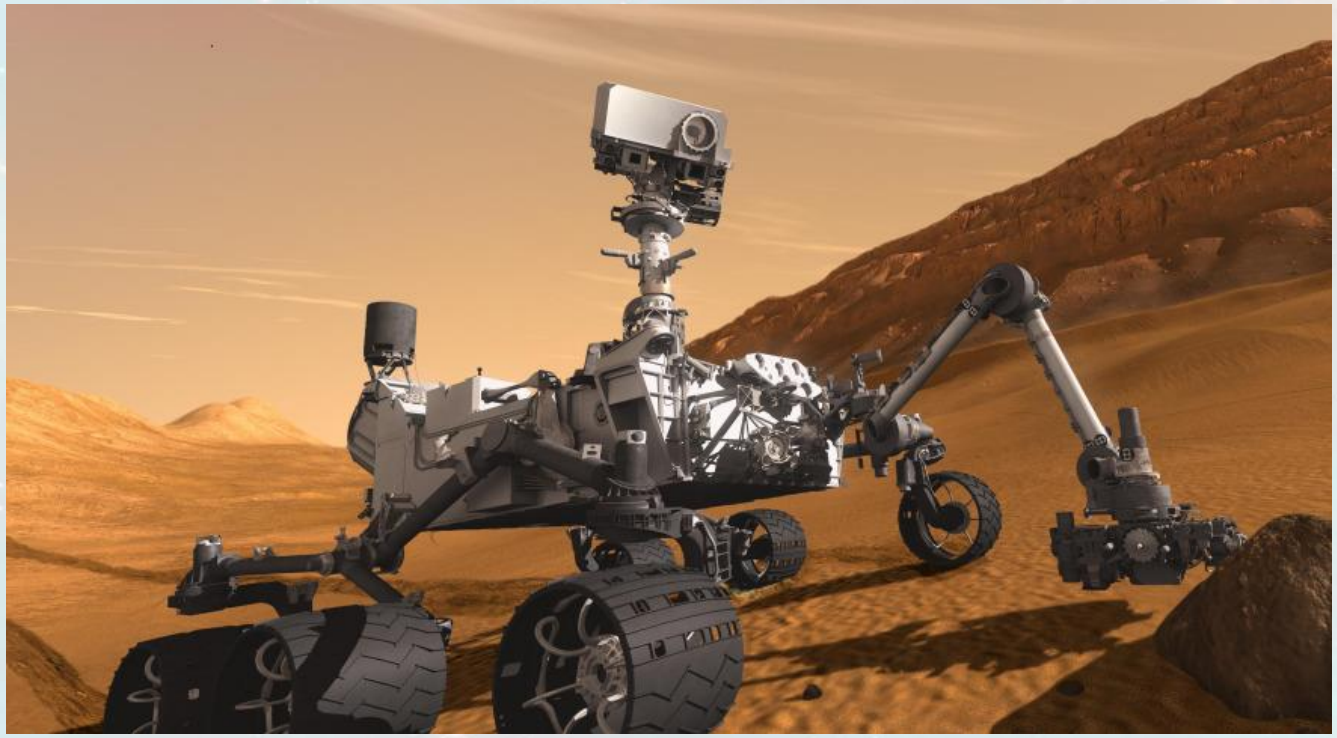
Poll Question

- **What vehicles are a part of the Mars 2020 mission? (select all that apply)**
  - **Rover**
  - **Motorcycle**
  - **Kite**
  - **Canoe**
  - **ATV**
  - **Helicopter**
  - **Glider**



Visit SciGames.org for more free games and apps for "direct to patron" use!

Why Mars this Summer?



Mars 2020:

Perseverance Rover

Ingenuity Helicopter

Revised Launch Window: July 30 – Aug 15

Arrival at Mars: Feb, 2021

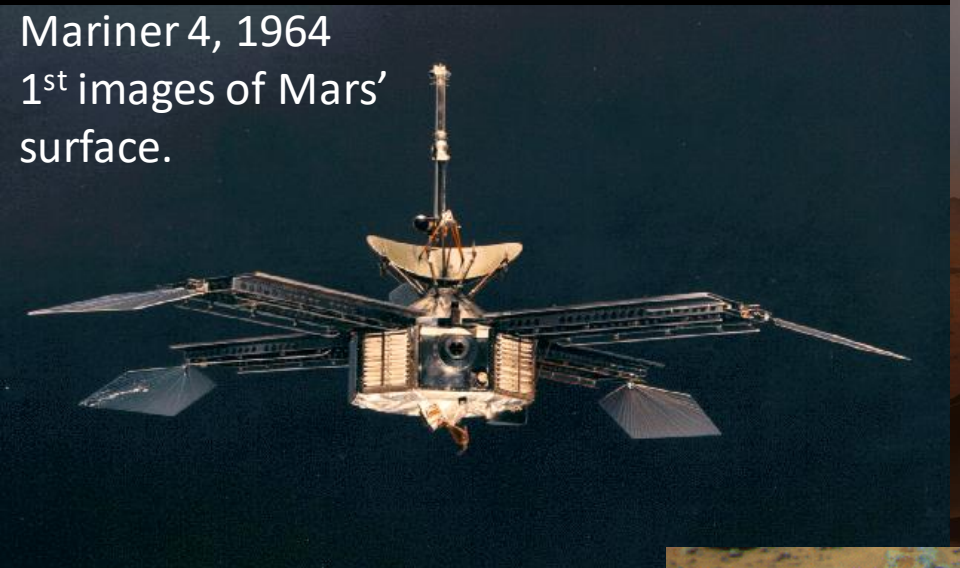
Mars Exploration: What can the Red Planet tell us about our own?

Dr. Candice C. Bedford

A world of robot explorers

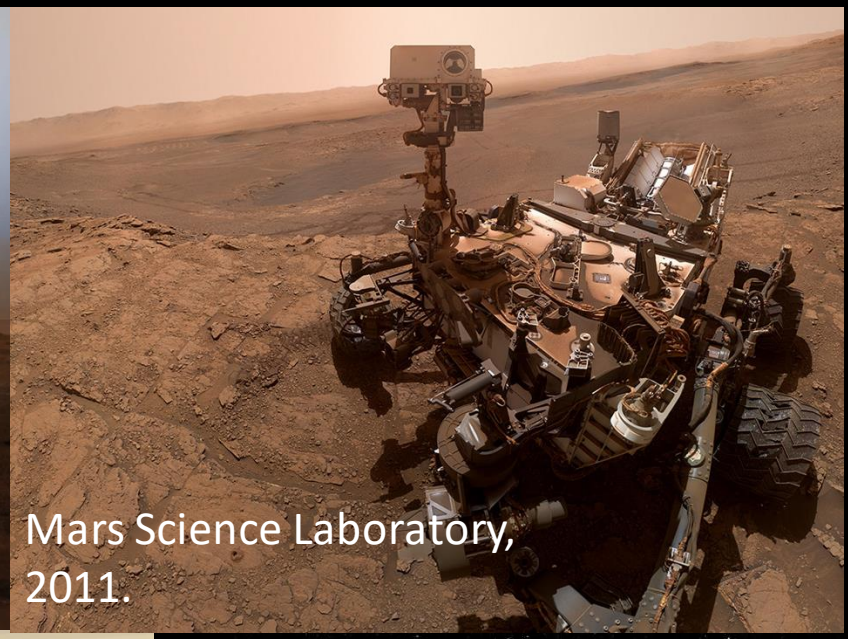
(56 missions, 26 successful)

More to come!!!

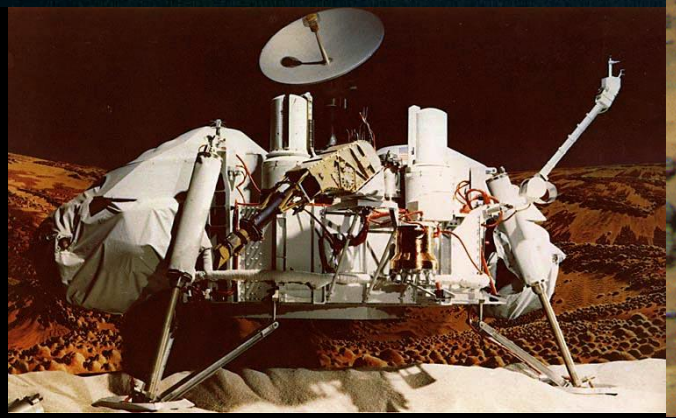


Mariner 4, 1964
1st images of Mars' surface.

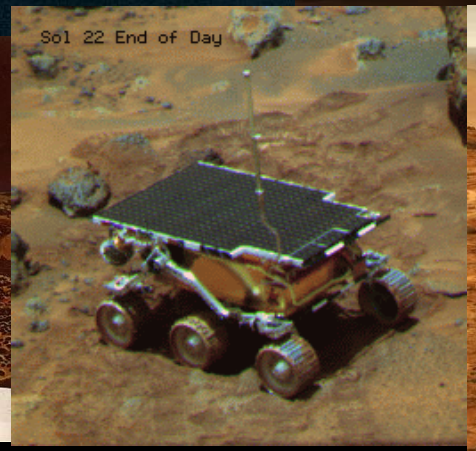
Phoenix lander, 2007.



Mars Science Laboratory, 2011.



Viking 1 lander, 1975
1st safely landed mission.



Pathfinder lander and Sojourner rover, 1996

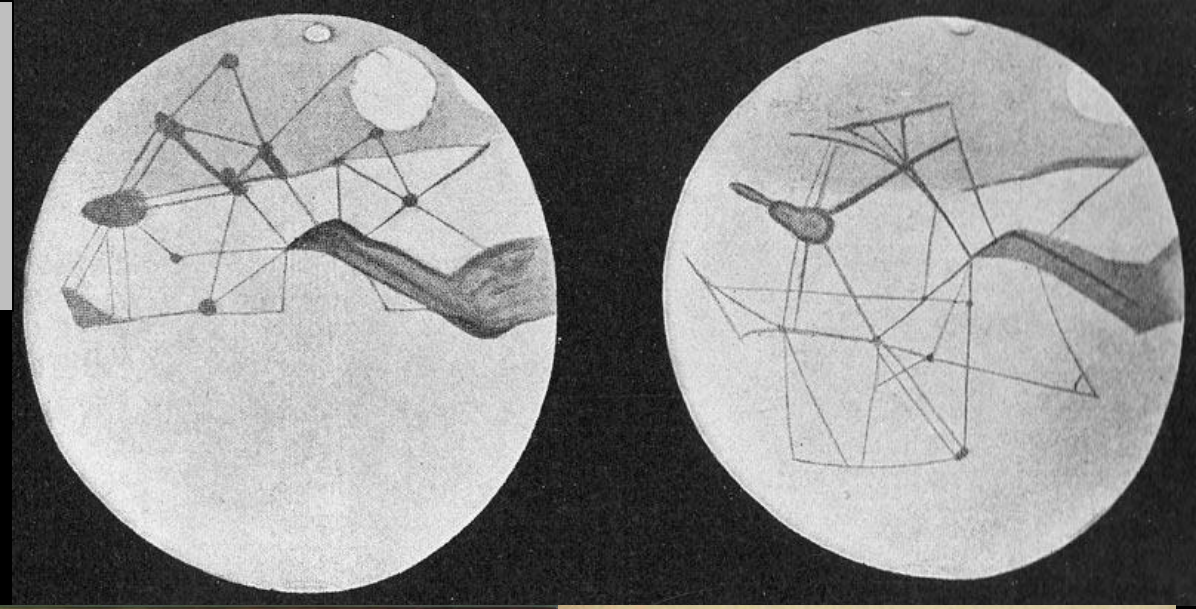
MER, Spirit and Opportunity rovers, 2003.

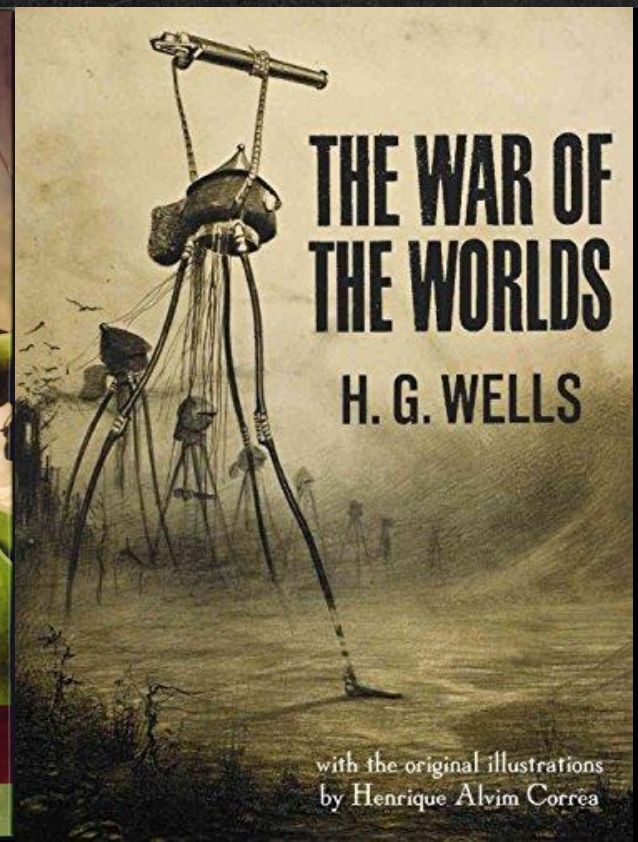
Mars Reconnaissance Orbiter, 2005.

Why Mars?

- Mars gained traction among the public when U.S. astronomer, Percival Lowell, widely published the idea that intelligent beings built canals on Mars.
- Lowell's work fueled the public's imagination and the search for life on Mars.
- **Could Mars give insight on life in the solar system?**

Canals of Mars depicted by Percival Lowell in 1895.
Image credit: Lowell observatory.

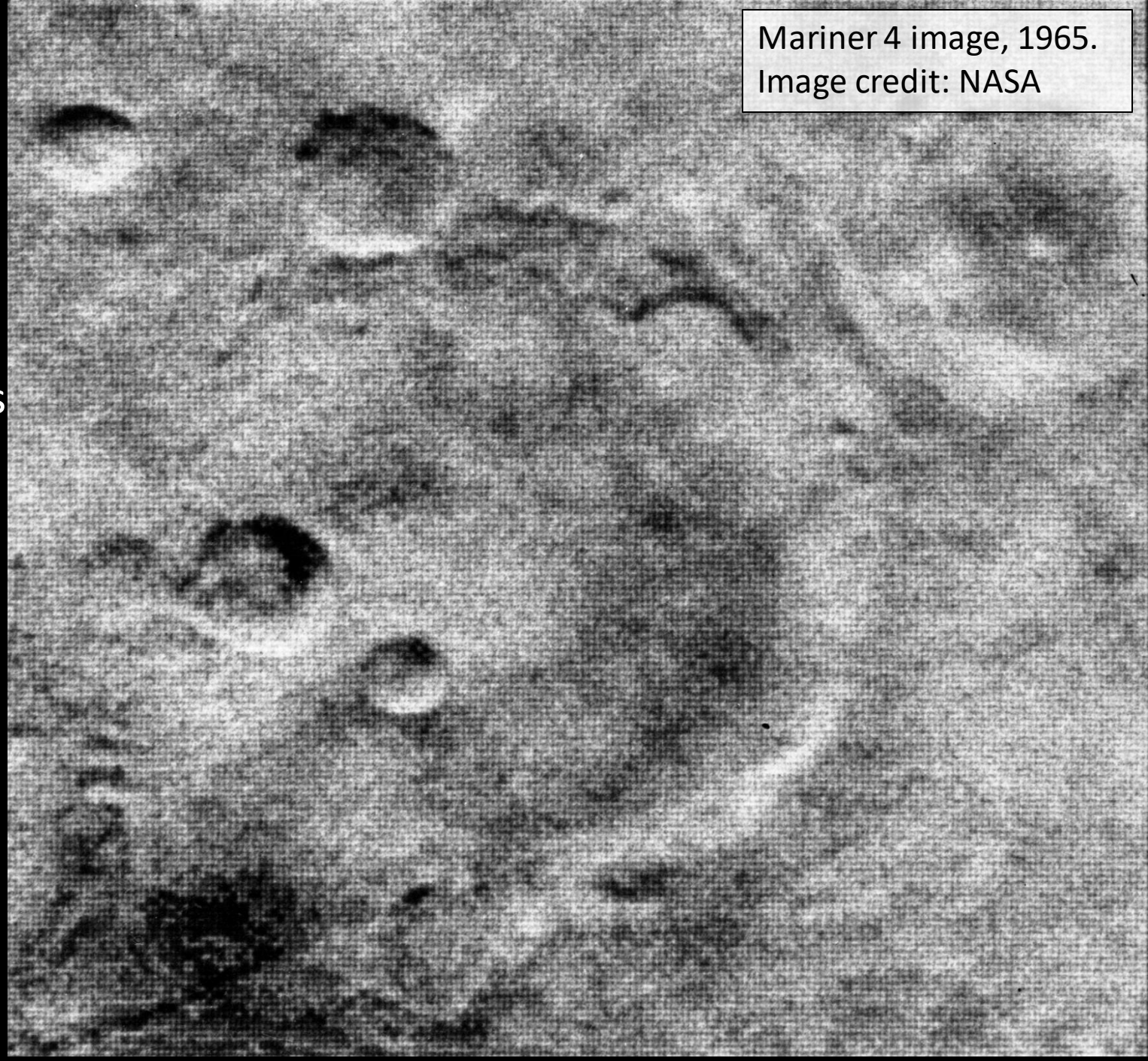




Why Mars?

- Early images from NASA Mariner 4 and results from the Viking missions showed no canals or signs of life on the surface.
- Mars appeared lifeless.

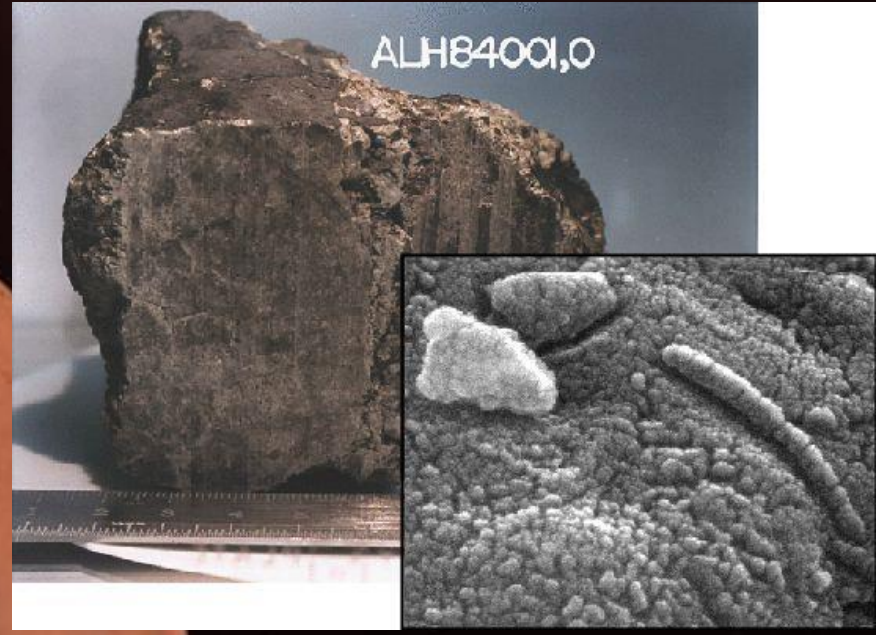
Viking lander image, 1975.
Image credit: NASA

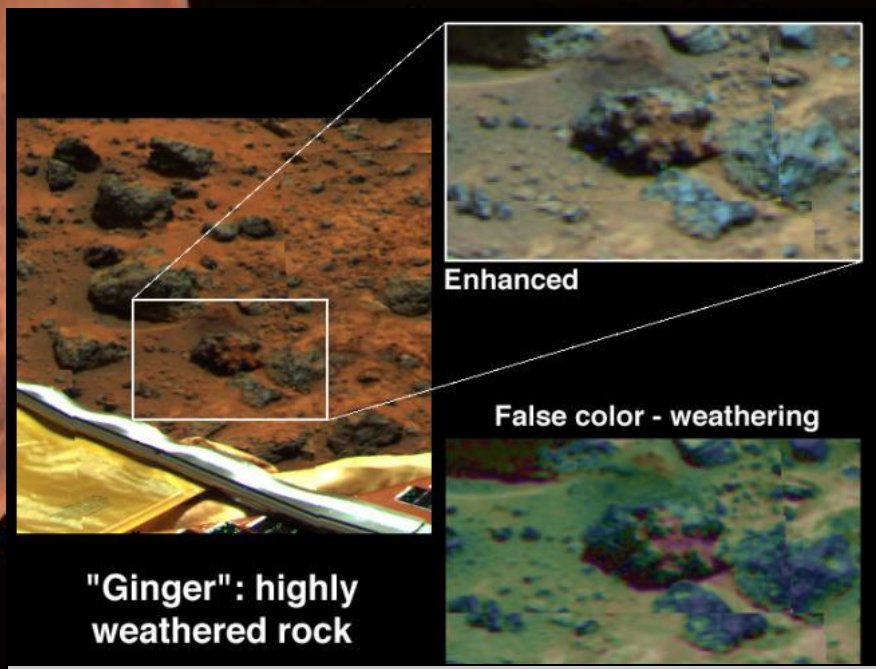


Mariner 4 image, 1965.
Image credit: NASA

What can the red planet tell us about our own? – The origin of life!

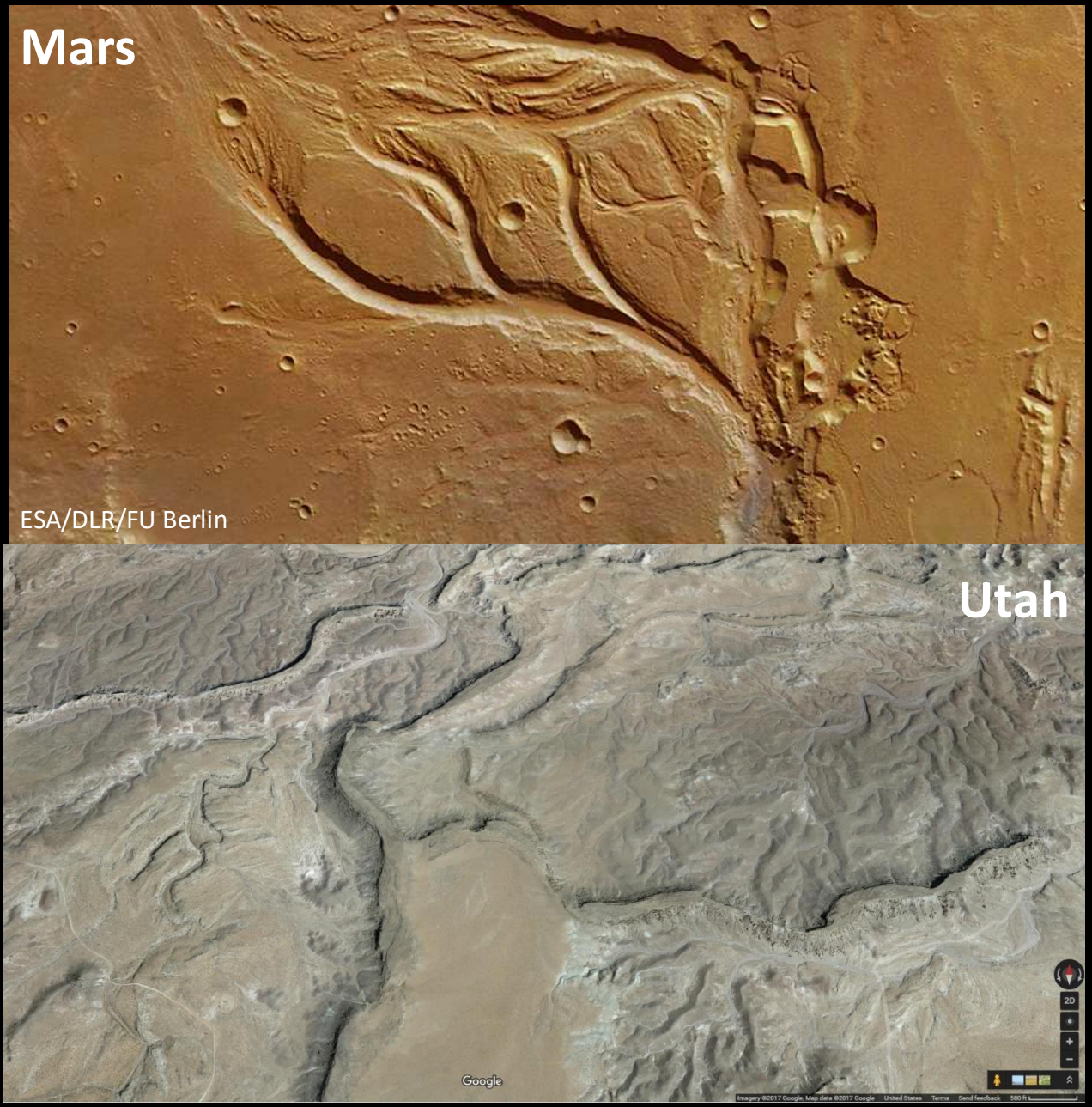
- Support for Mars research dwindled until 1996, when a meteorite (ALH 84001) contained debated Martian microfossils.
- The Pathfinder mission in 1997 also returned evidence that water was stable on Mars' surface in the past.
- A new era of Mars exploration began that would "Follow the Water" and search for ancient habitable environments.





Images from the Sojourner rover showing evidence of weathering on Mars.

Follow the water!



The closer we looked at Mars, the more we saw evidence that water existed on the surface.

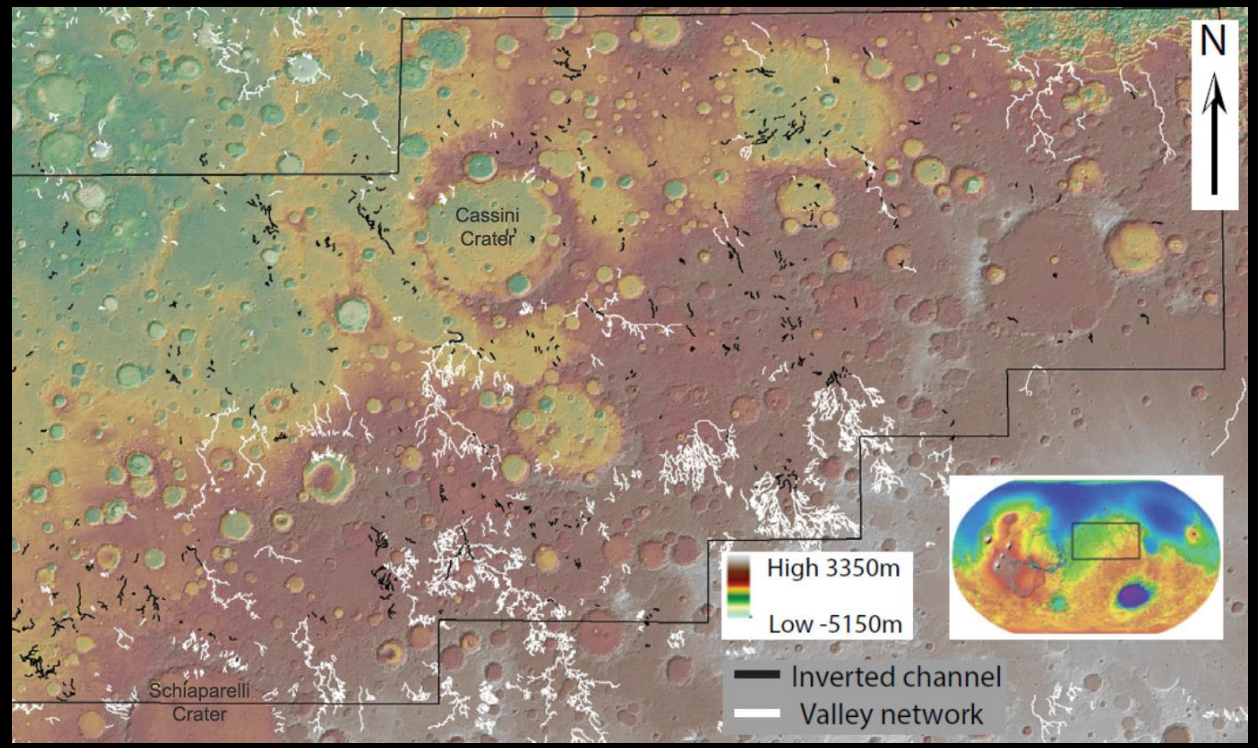
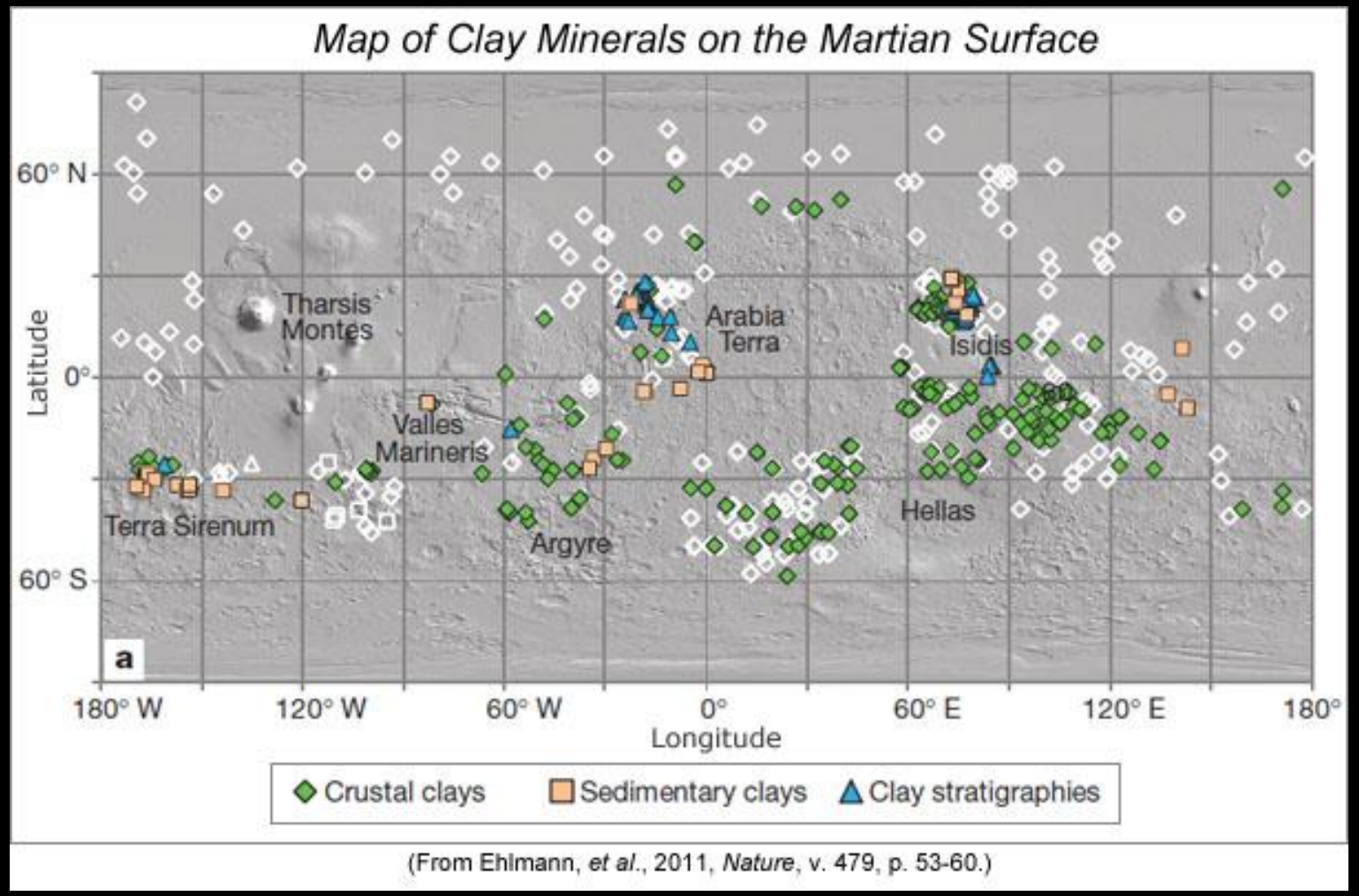


Figure 1 from Davis et al. (2016) of Arabia Terra inverted channels

Follow the water!



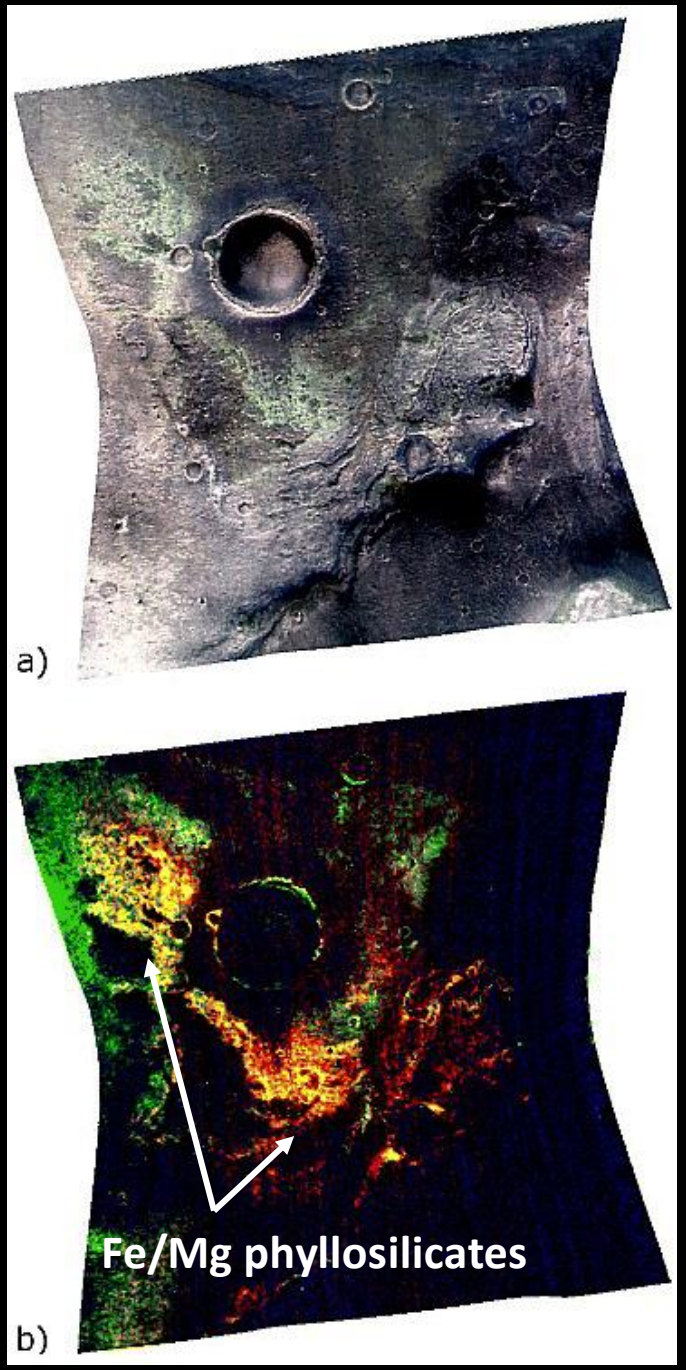


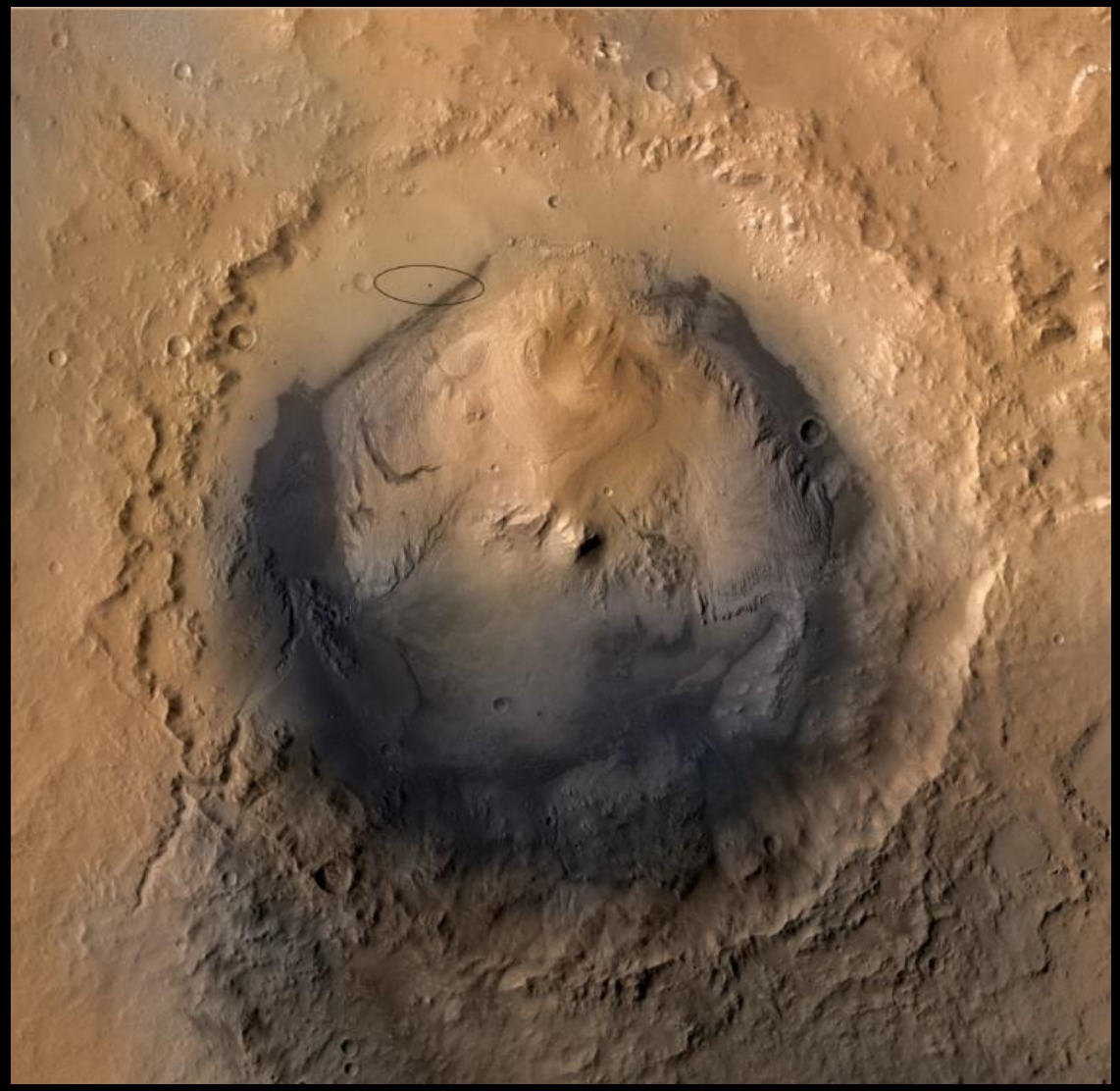
Figure 13 from Dobrea et al. (2010)

Follow the water: NASA Mars Science Laboratory

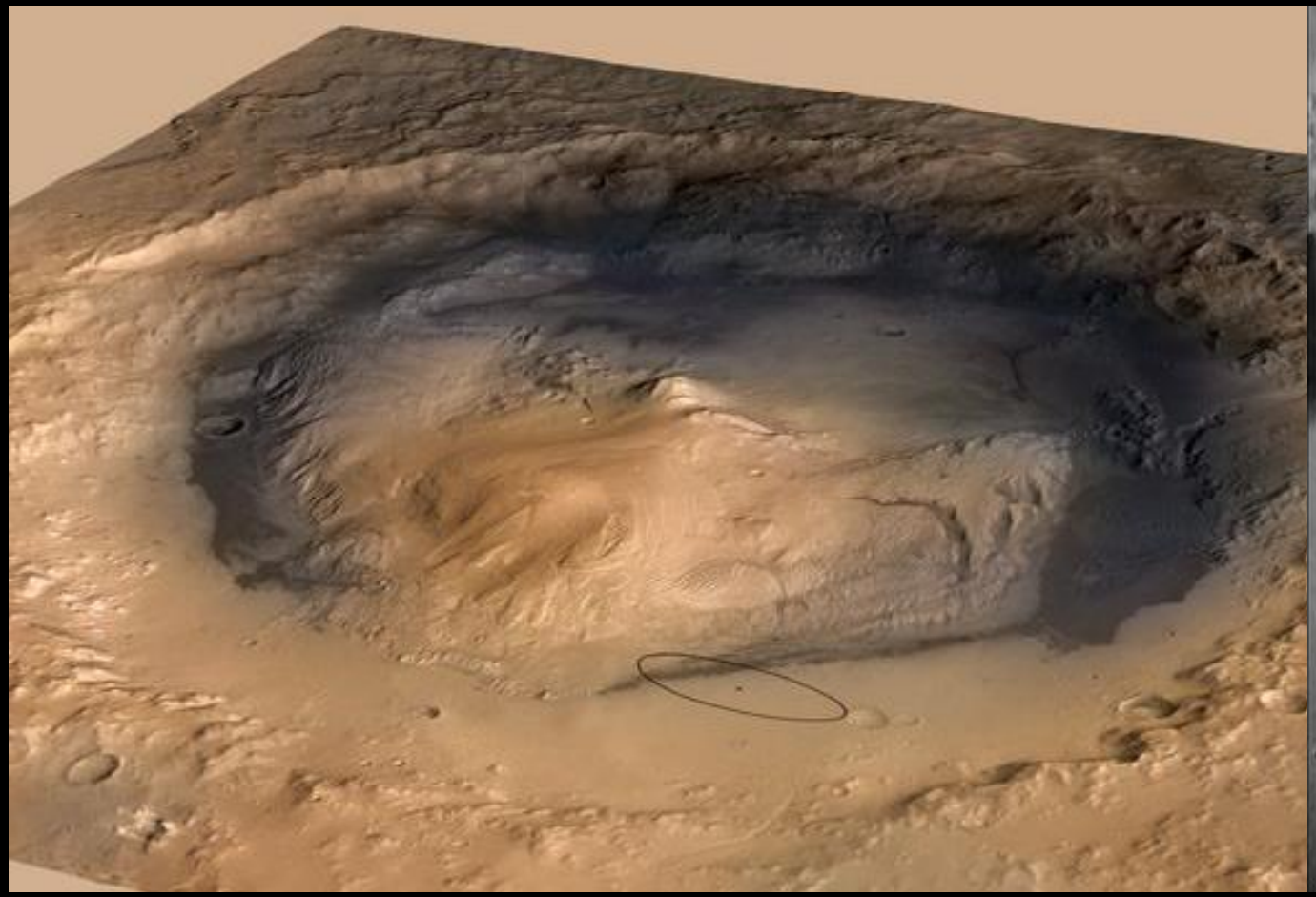
Primary mission aim is to determine the habitability of Gale crater:

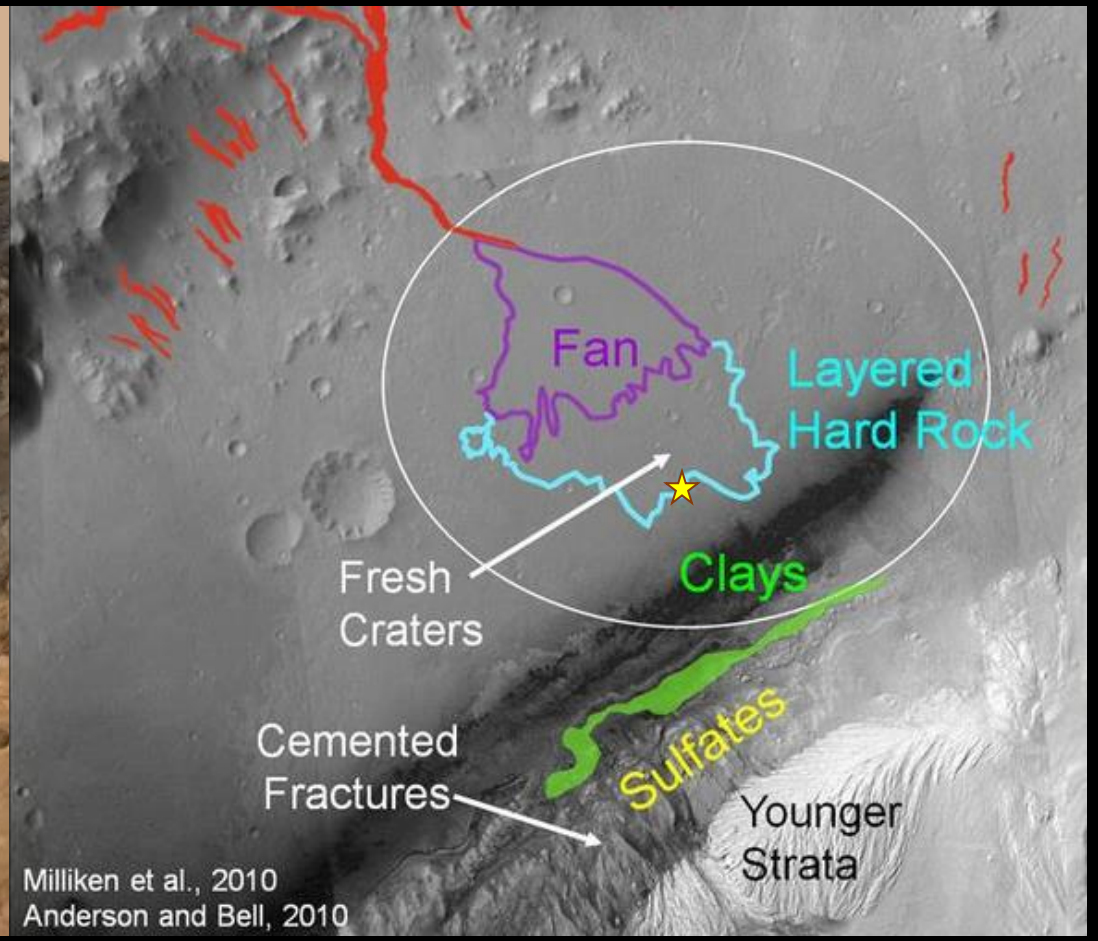
- Biological potential
- Geology and geochemistry
- Water, weather, and climate
- Radiation levels and hazards

NASA/JPL-Caltech/MSSS



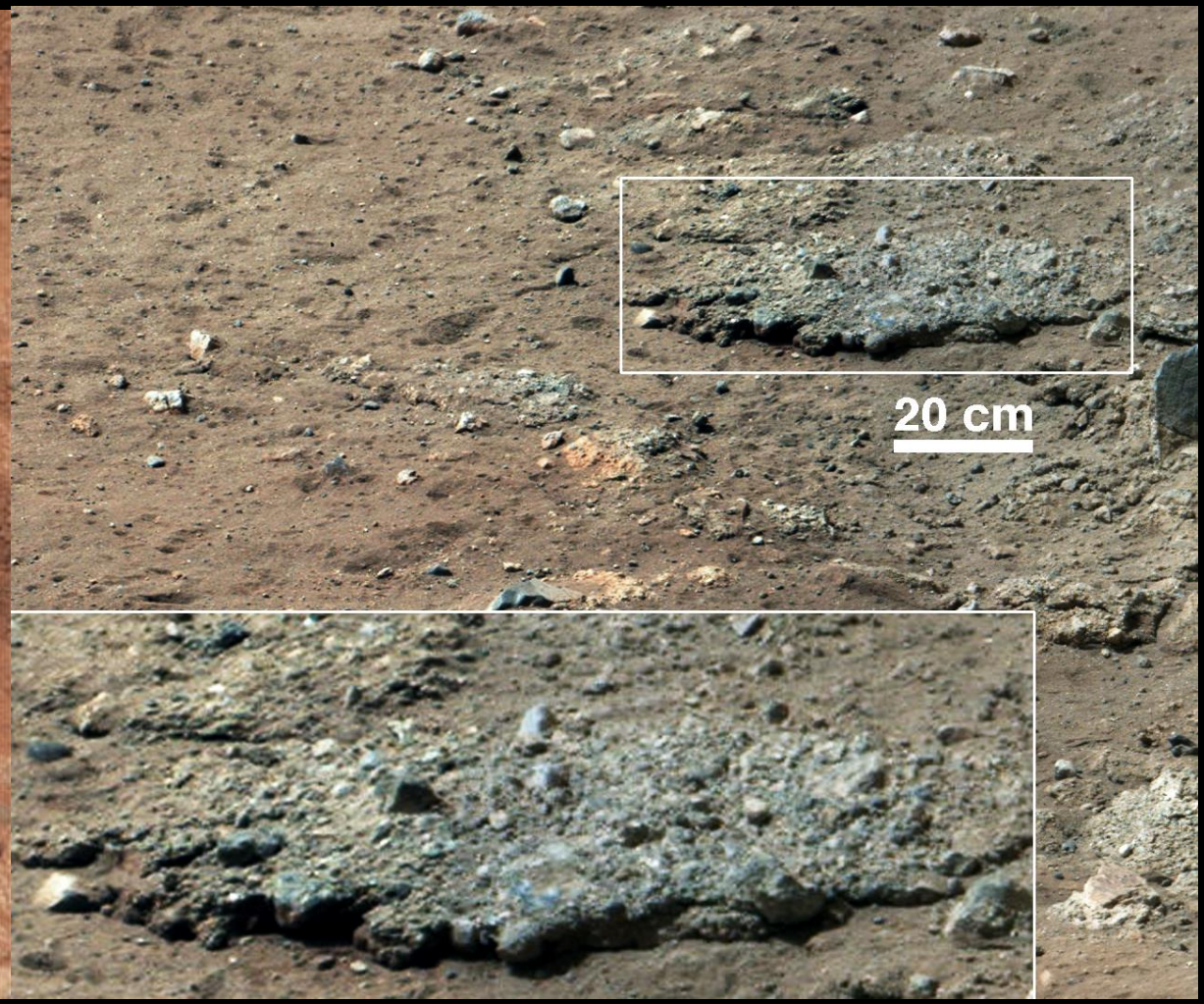
Follow the water: NASA Mars Science Laboratory





150-km Gale Crater contains a 5-km high mound of stratified rock. Strata in the lower section of the mound vary in mineralogy and texture, suggesting that they may have recorded environmental changes over time.

Follow the water: NASA Mars Science Laboratory

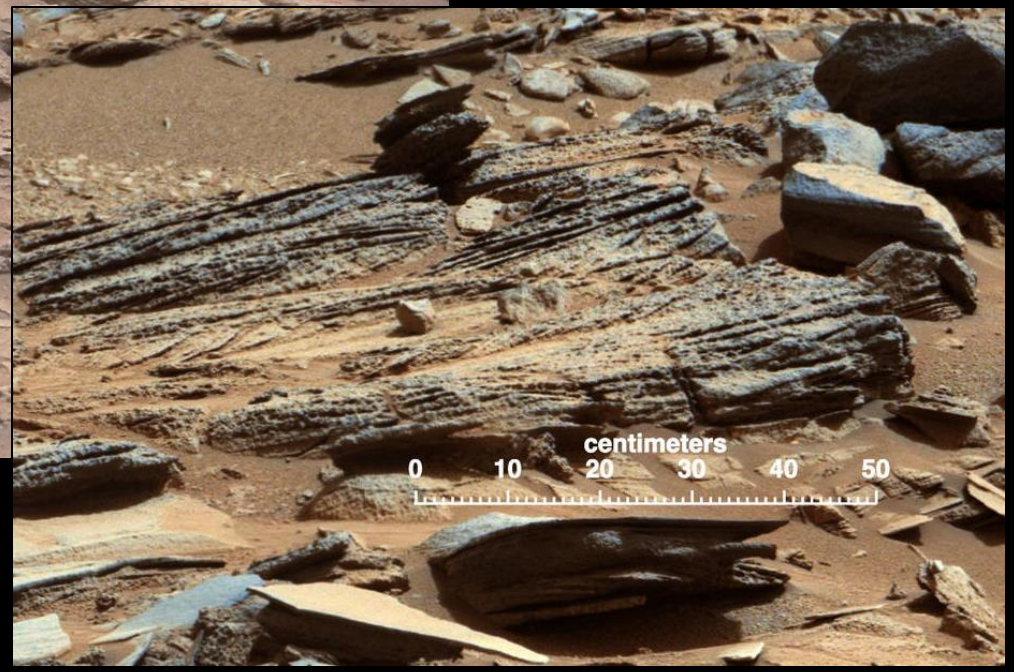


Rounded pebbles and sand in the conglomerate “Link” indicate water flowed ankle to hip deep.

NASA/JPL-Caltech/MSSS

Follow the water: NASA Mars Science Laboratory

NASA/JPL-Caltech/MSSS



NASA/JPL-Caltech/UofA

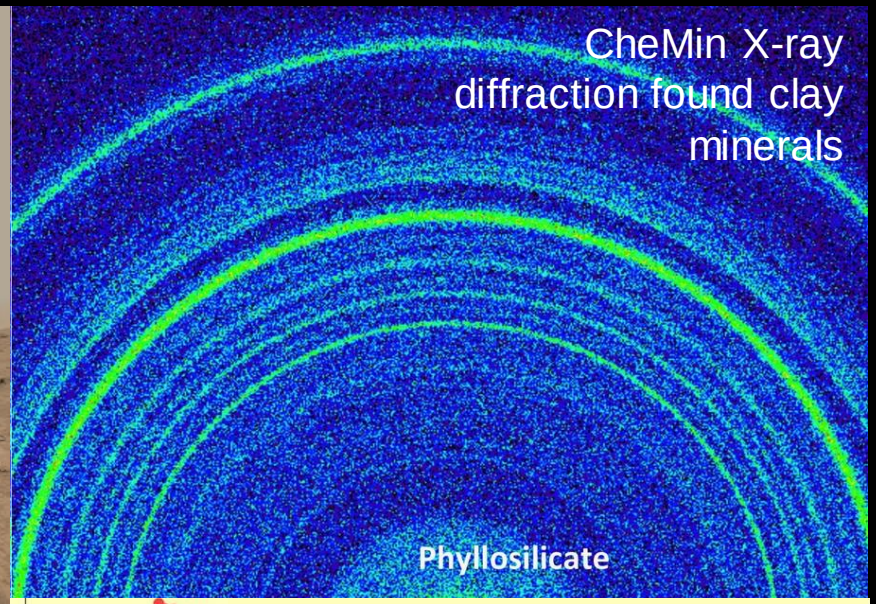
The Shaler outcrop contains trough-cross bedded sandstone indicating that a river once flowed here.

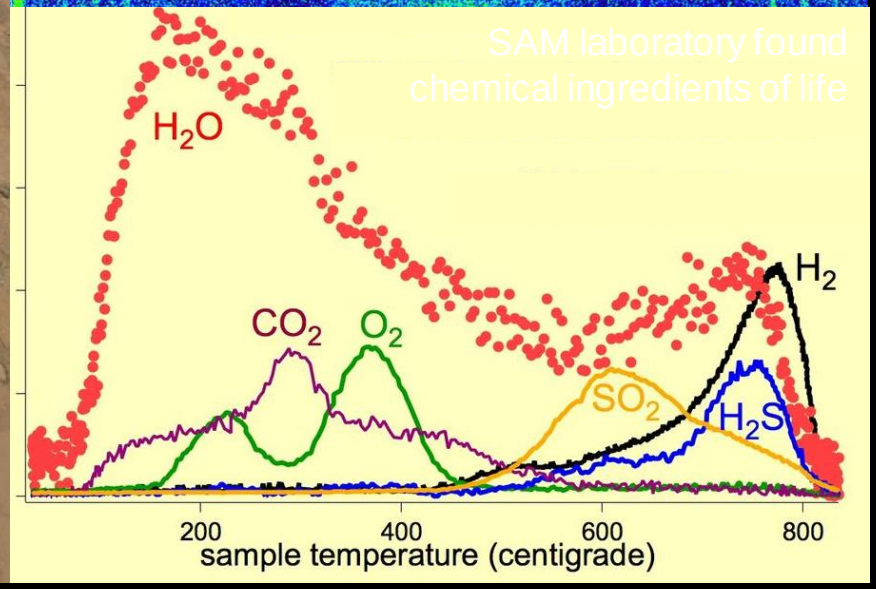
Curiosity determined that ancient Mars was capable of supporting life

Habitability:

- ✓ **Water**
- ✓ **Key Chemical Ingredients**
- ✓ **Source of Energy**

NASA/JPL-Caltech/MSSS





- Mineralogy suggests sustained interaction with liquid water that was not too acidic or alkaline, and low salinity.
- Key chemical ingredients of life were present; C, H, N, O, P, S.
- **Gale crater was habitable in the past!**

Follow the Water: Mars 2020

NASA/JPL

PHOENIX

VIKING 2

MARS 2020

INSIGHT

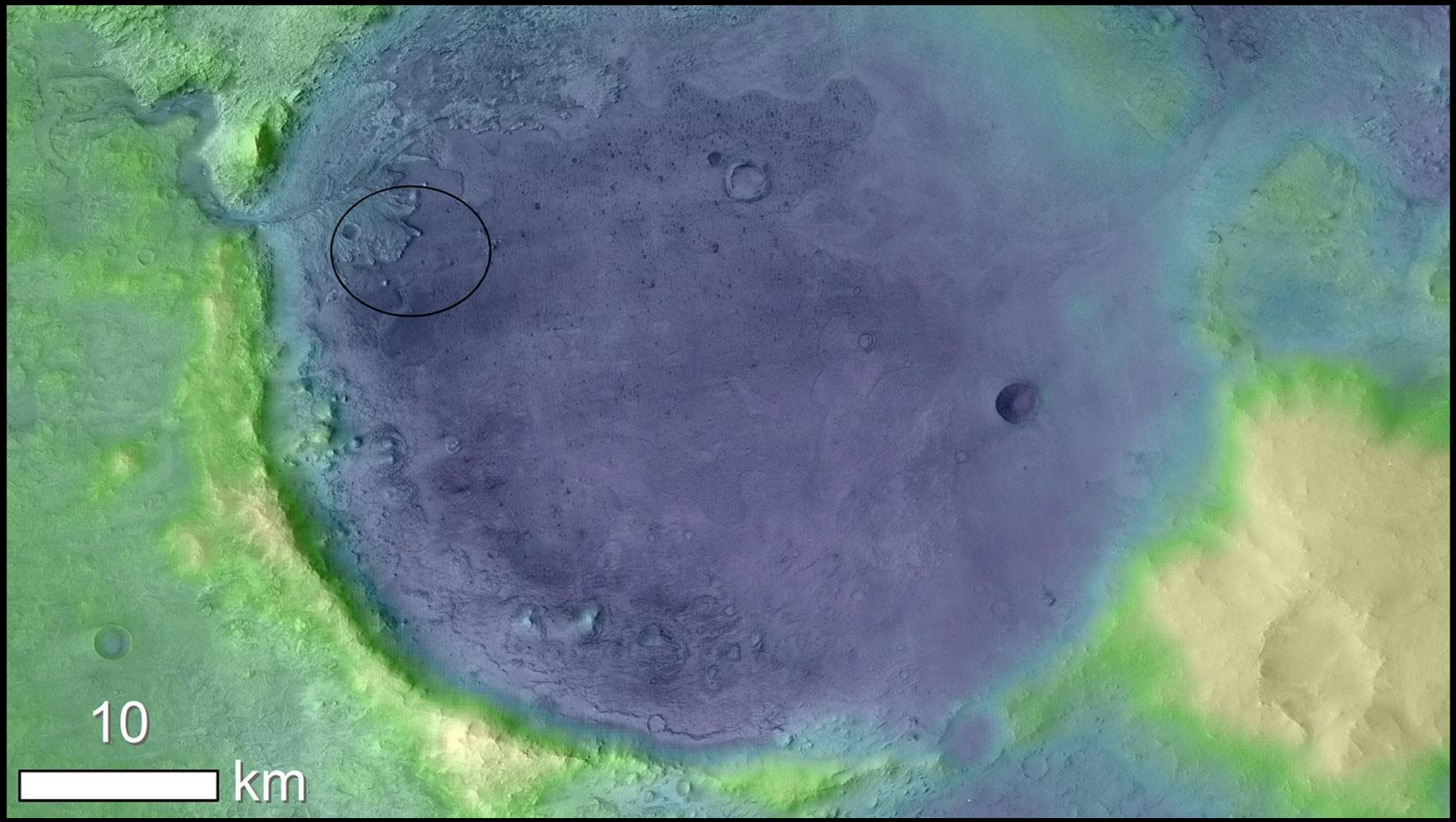
OPPORTUNITY

CURIOSITY

SPIRIT

NASA/JPL

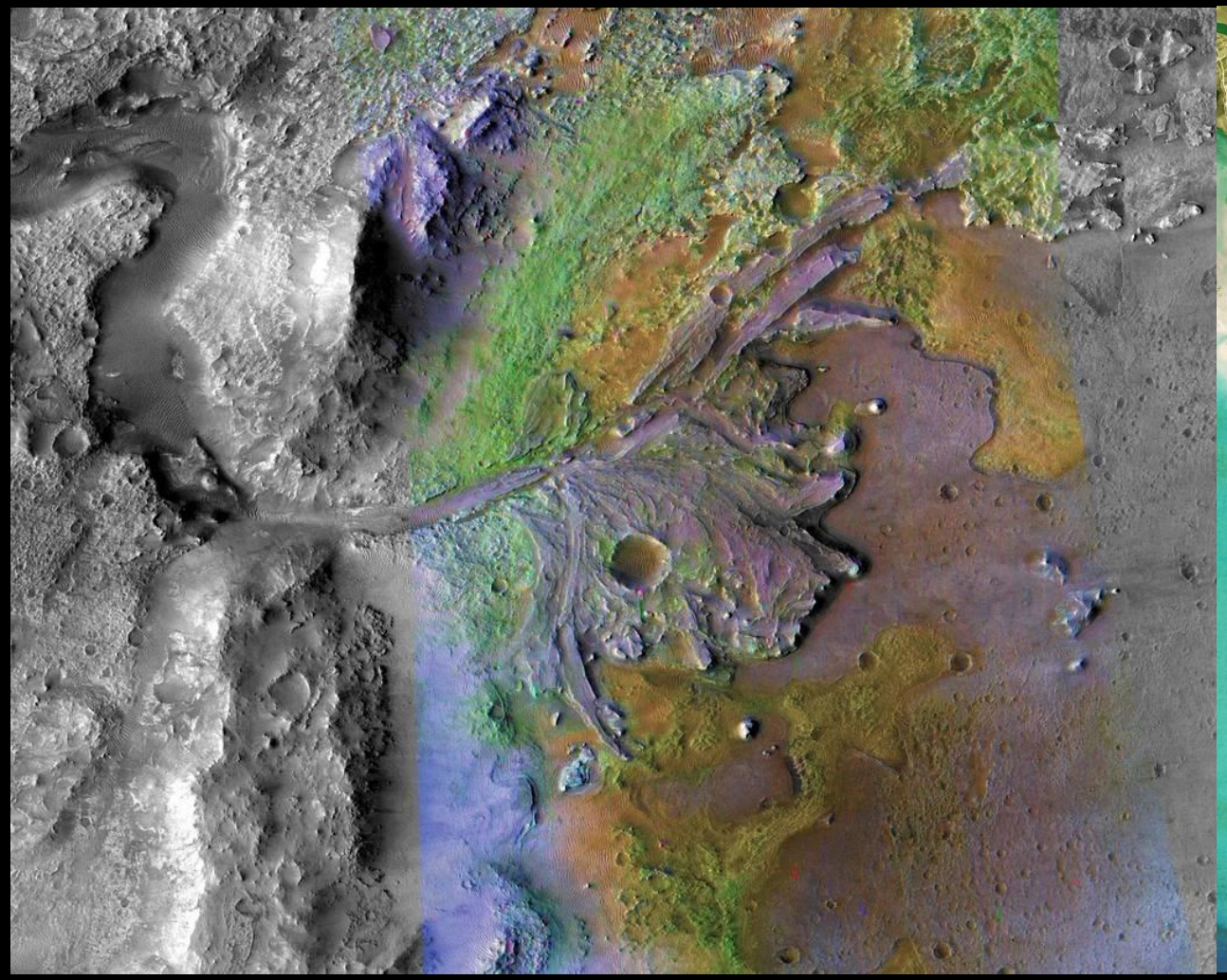
Follow the Water: Mars 2020



NASA/JPL

Follow the Water: Mars 2020

Jezero crater



NASA/JPL

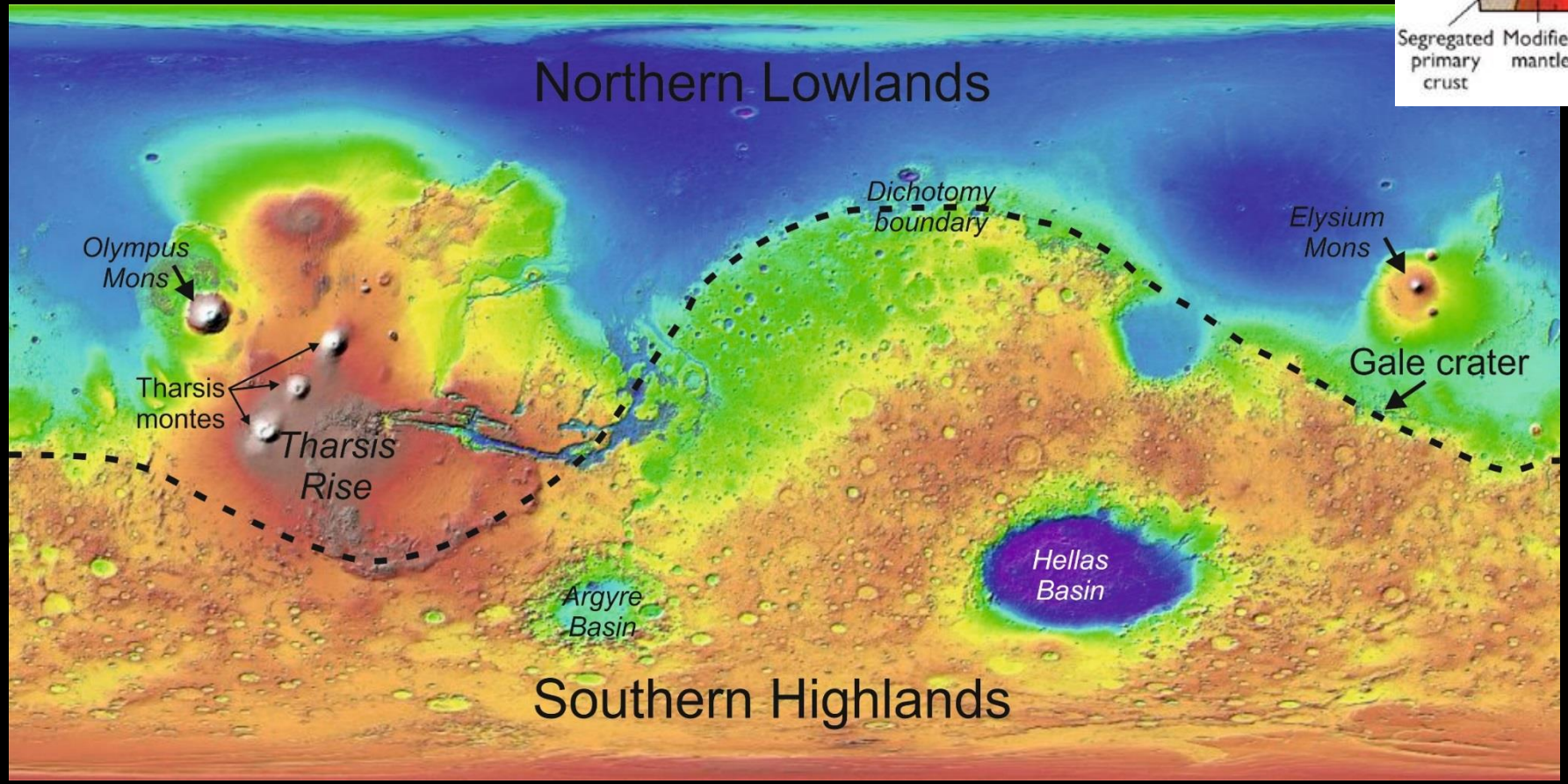
Mississippi river delta

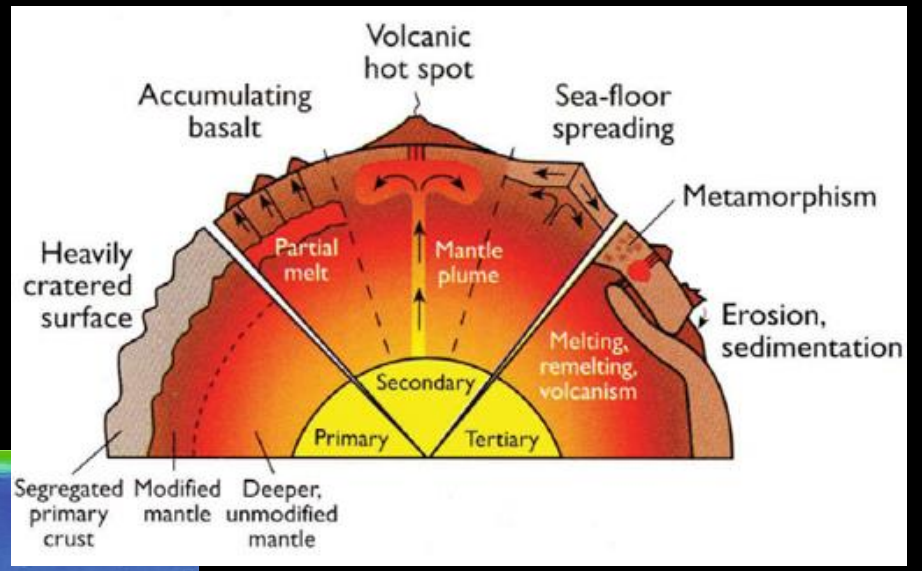
DKfindout!

Mineral signatures and features on the surface of Jezero crater suggests it had rivers and lakes in the past. A good hunting ground for signs of ancient life!

What else can Mars tell us? Planetary evolution!

An annotated, topographic, shaded relief map of Mars from the Mars Orbiter Laser Altimeter (MOLA) instrument on-board Mars Global Surveyor (MGS).



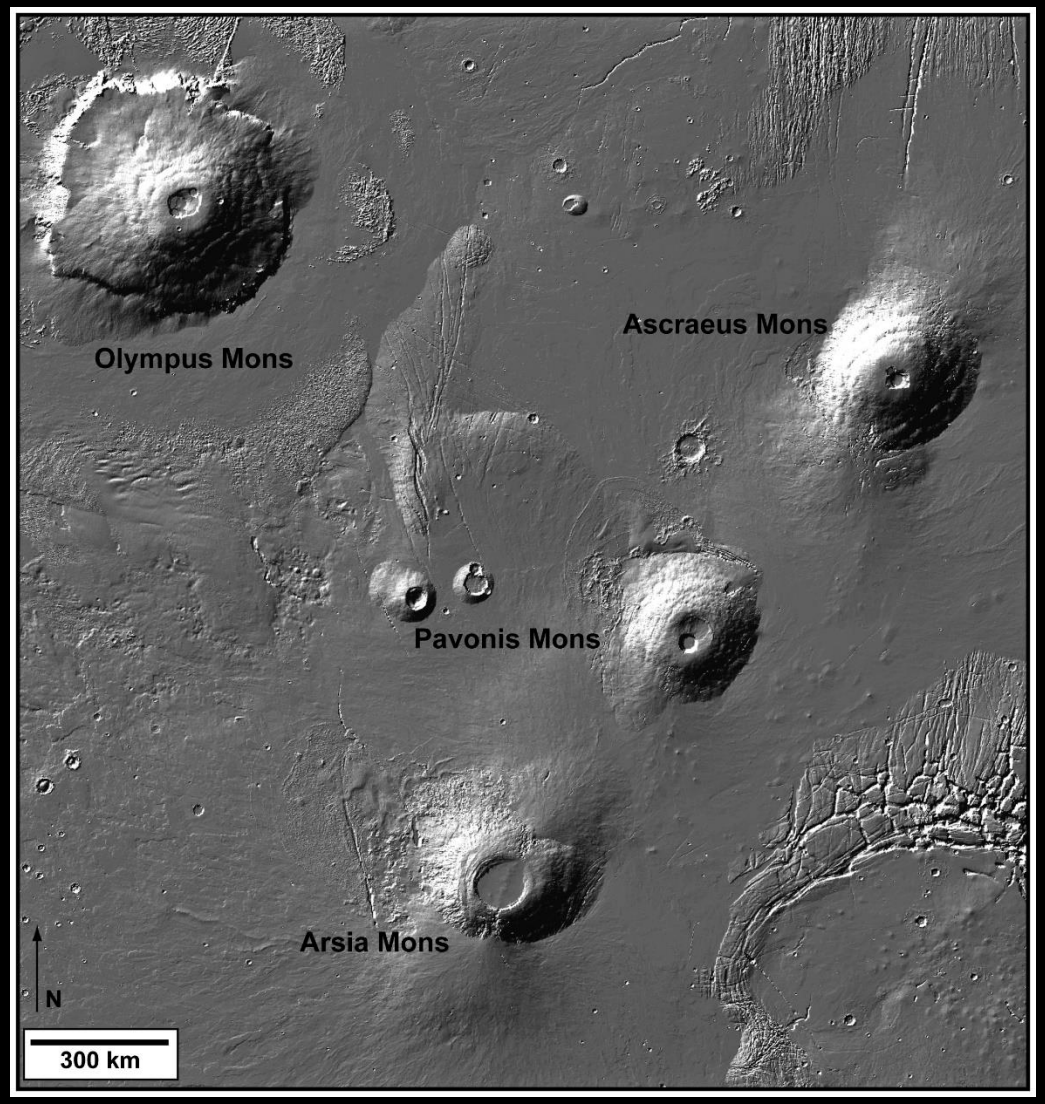


S. R. Taylor

- Most of Mars' crust is ancient (> 4 Ga) and has not been effected by tectonics and extensive weathering.
- Mars provides a window into planetary evolution that we don't have here on the Earth.

What else can Mars tell us? Volcanoes!

Mars



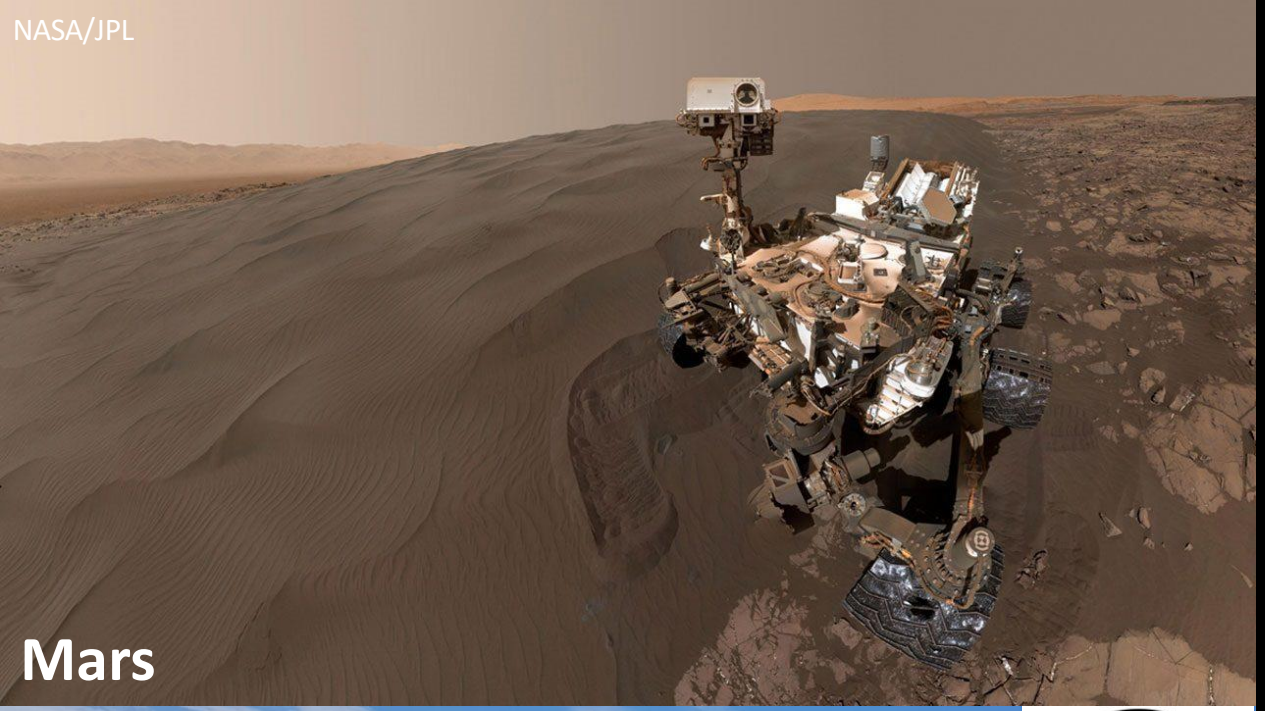
NASA/JPL

Iceland

There are places on the Earth and on other planetary bodies across the solar system with primitive volcanism, similar to Mars.

Mars research can expand our knowledge on volcanism across the solar system!

NASA/JPL

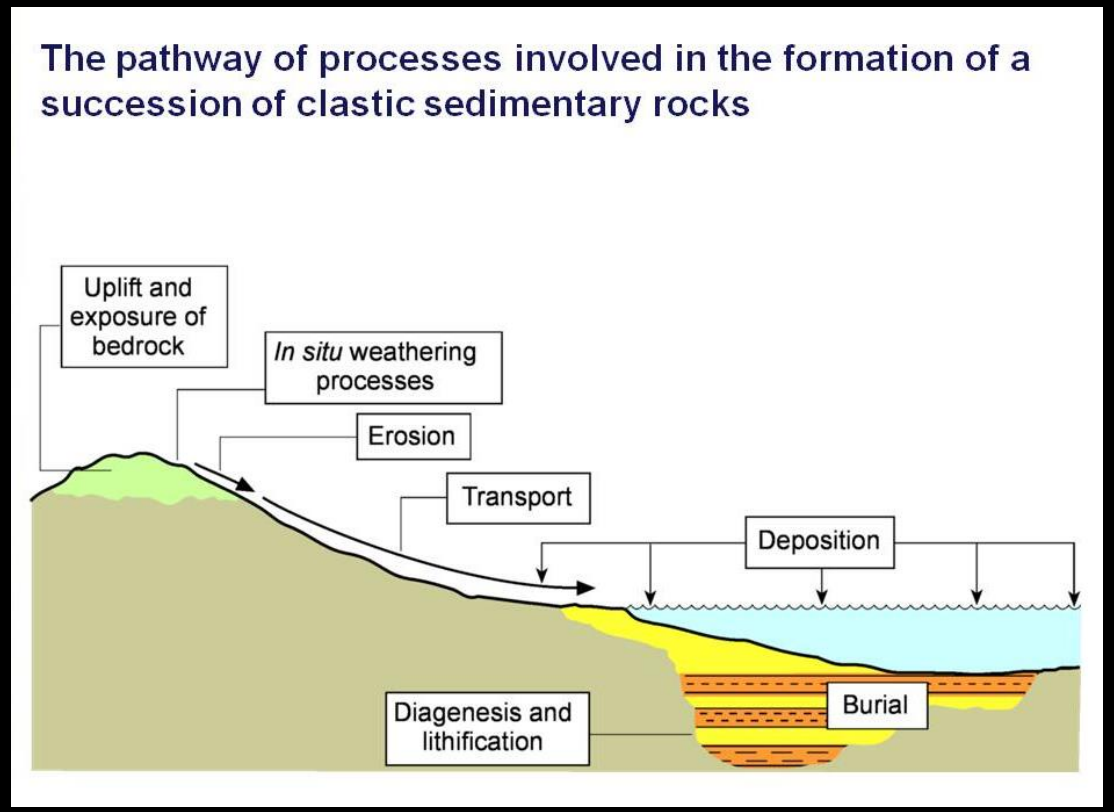


Mars

Iceland

What else can Mars tell us? Sediments!

Mars research has boosted our incentive to better understand processes that effect parts of secondary crust here on Earth.



Mars Exploration: What can the Red Planet tell us about our own?

- A window into planetary evolution and the origin of life.
- A look at volcanism across the solar system.
- Provides incentive to better understand processes that effect parts of secondary crust here on Earth.
- The next step in human exploration!

Searching for Life

What are examples of living things? Non-living things?

What tells us that something is alive?

Searching for Life

Some (not all) characteristics of life

1. Needs water (or liquid solvent)
2. Needs energy (fuel)
3. Grows or changes
4. Releases waste products (aka ALL LIFE POOPS)
5. Evolves and adapts to its environment

Life does something and keeps doing it

Searching for Life

What do you see in the samples?

Which observations suggest the possibility of life?

Cup A

growing slushy foamy warm cold moving

shrinking bubbly smelly (add your own description)

Cup B

growing slushy foamy warm cold moving

shrinking bubbly smelly (add your own description)

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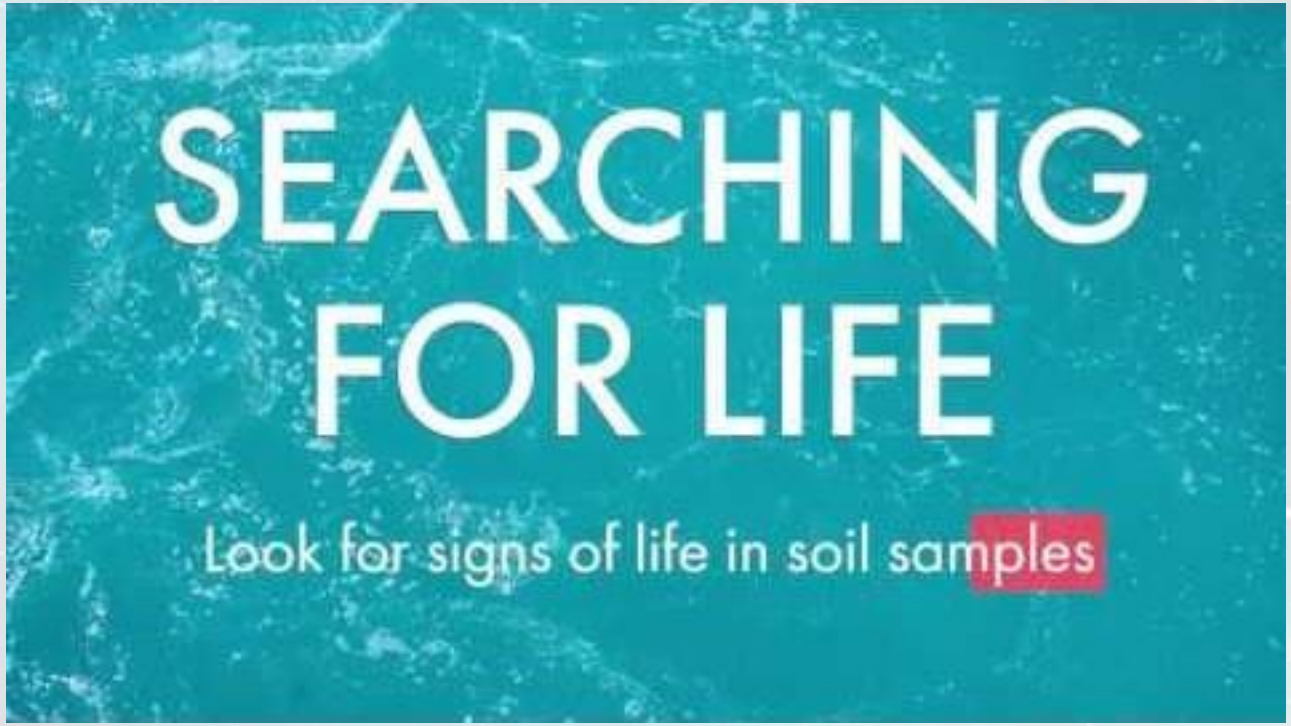


Video at
https://www.youtube.com/watch?list=PLvQkYyArNCy1U2R2fn1ugXaJ0EnqX4FaN&v=19MsbyQgPT8&feature=emb_logo

Poll Question

Are you planning Mars programs or activities (including virtual, take & make, sharing recordings) for your patrons? (Single Choice)

Answer 1: Yes, absolutely!

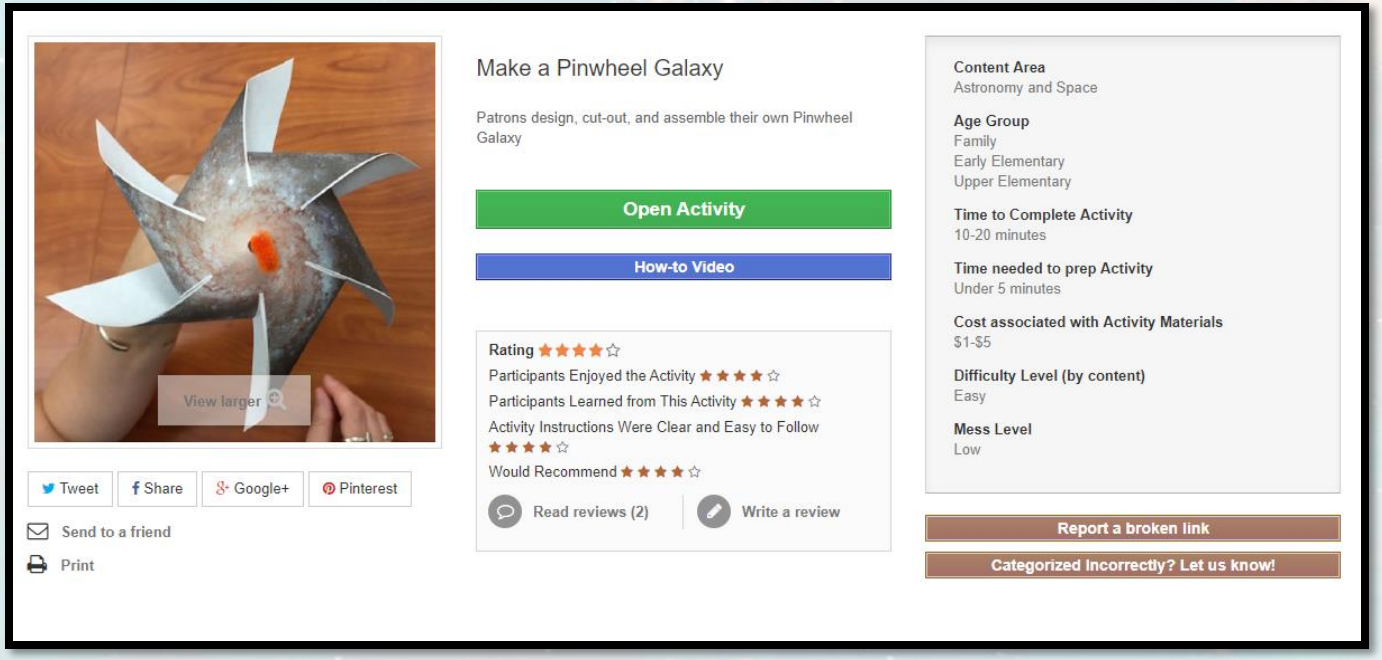
Answer 2: Probably

Answer 3: Not really sure

Answer 4: Probably Not

STEM ACTIVITY Clearinghouse

www.clearinghouse.starnetlibraries.org



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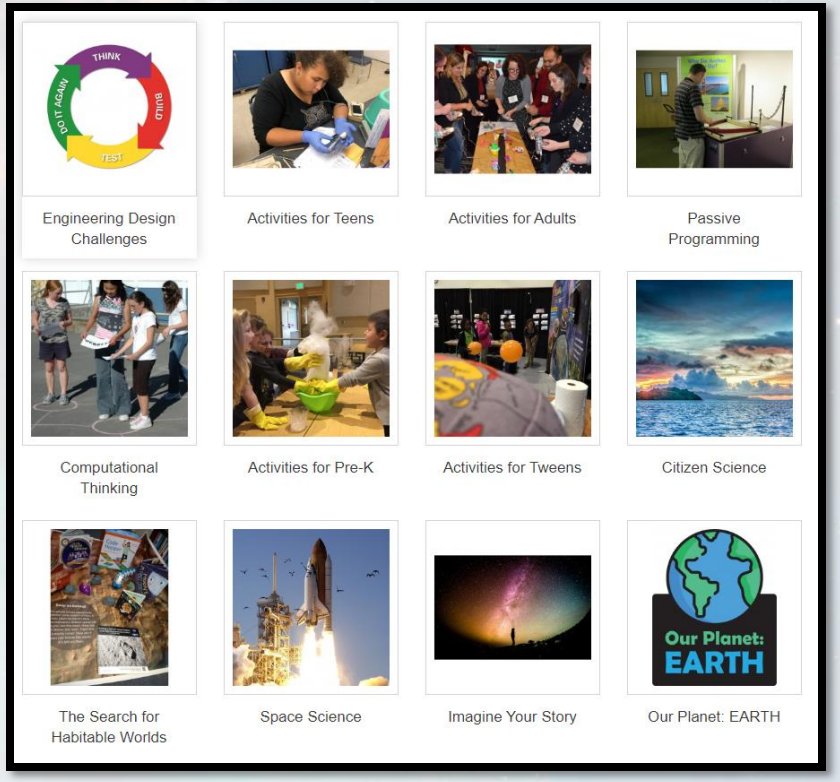

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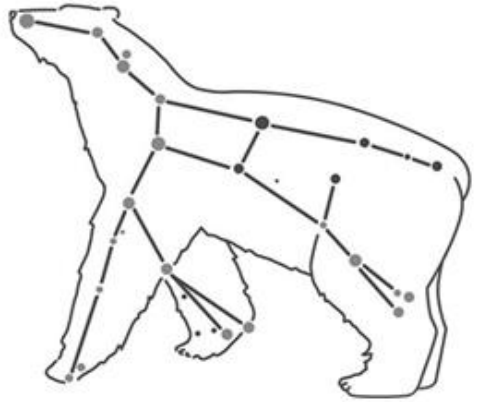

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https://bit.ly/2ZFP5QY

(or)

http://www.starnetlibraries.org/uncategorized/resources-for-take-your-patrons-to-mars-webinar-7-7-20/