The Future of Mars Exploration

Dr. Anita Sengupta
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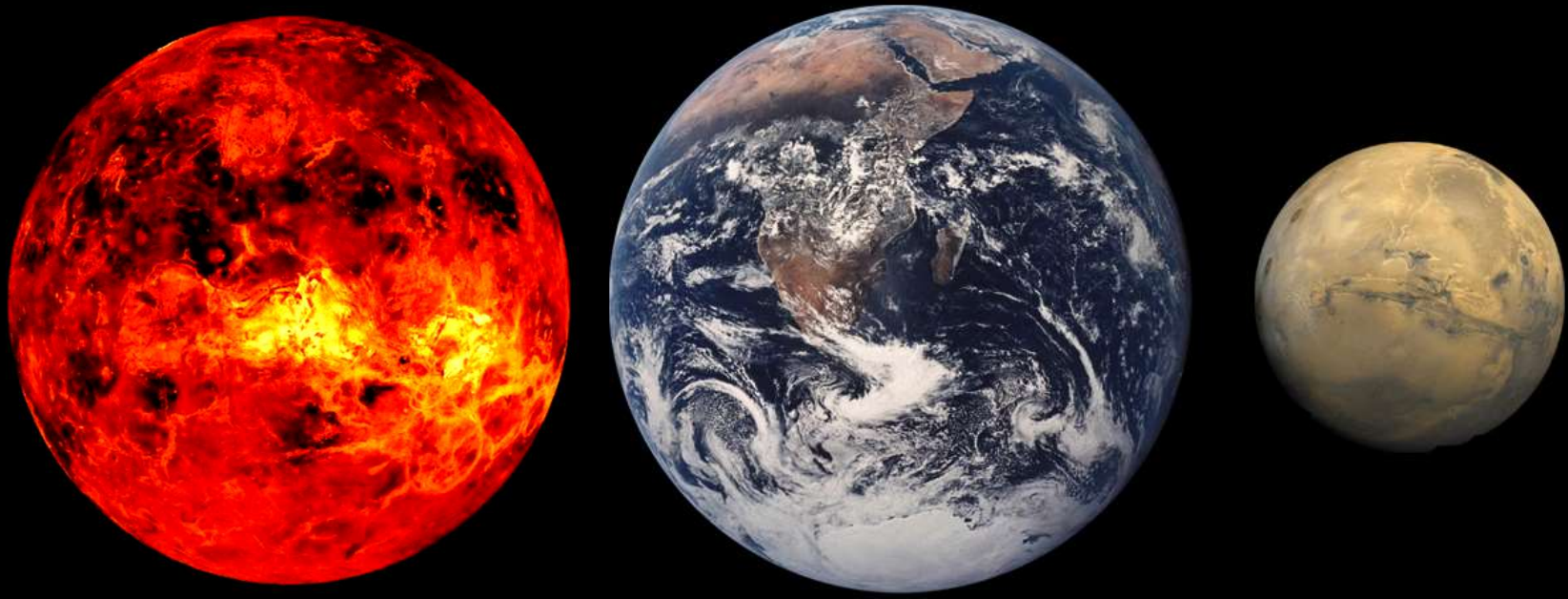
Speaker Bio

- BS, MS, PhD in Aerospace Engineering
- 15 years as a NASA Engineer sending things to other planets
- 3 years Professor of Astronautics at USC
- Spare Time: Pilot, Motorcyclist, World Traveler, Snow Boarder, Speaker

“VIDEO”
Seven Minutes of Terror
(Downloadable On YouTube)



The Terrestrial Planets Look Very Different, but what about at the beginning

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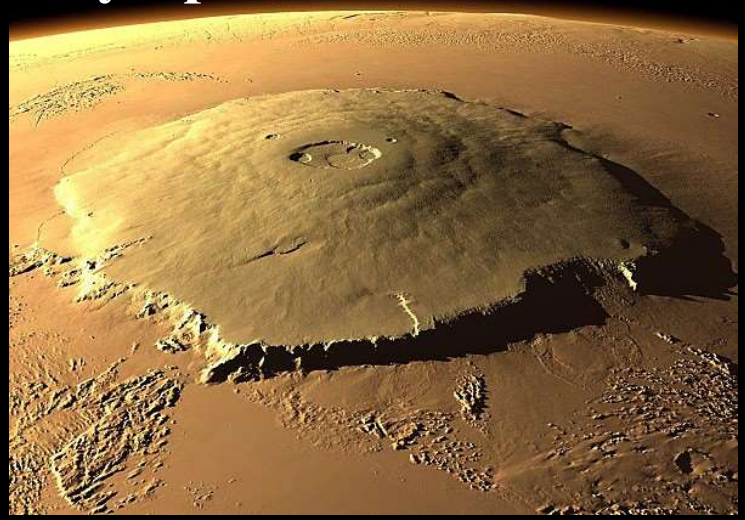
Olympus Mons



Valles Marineres

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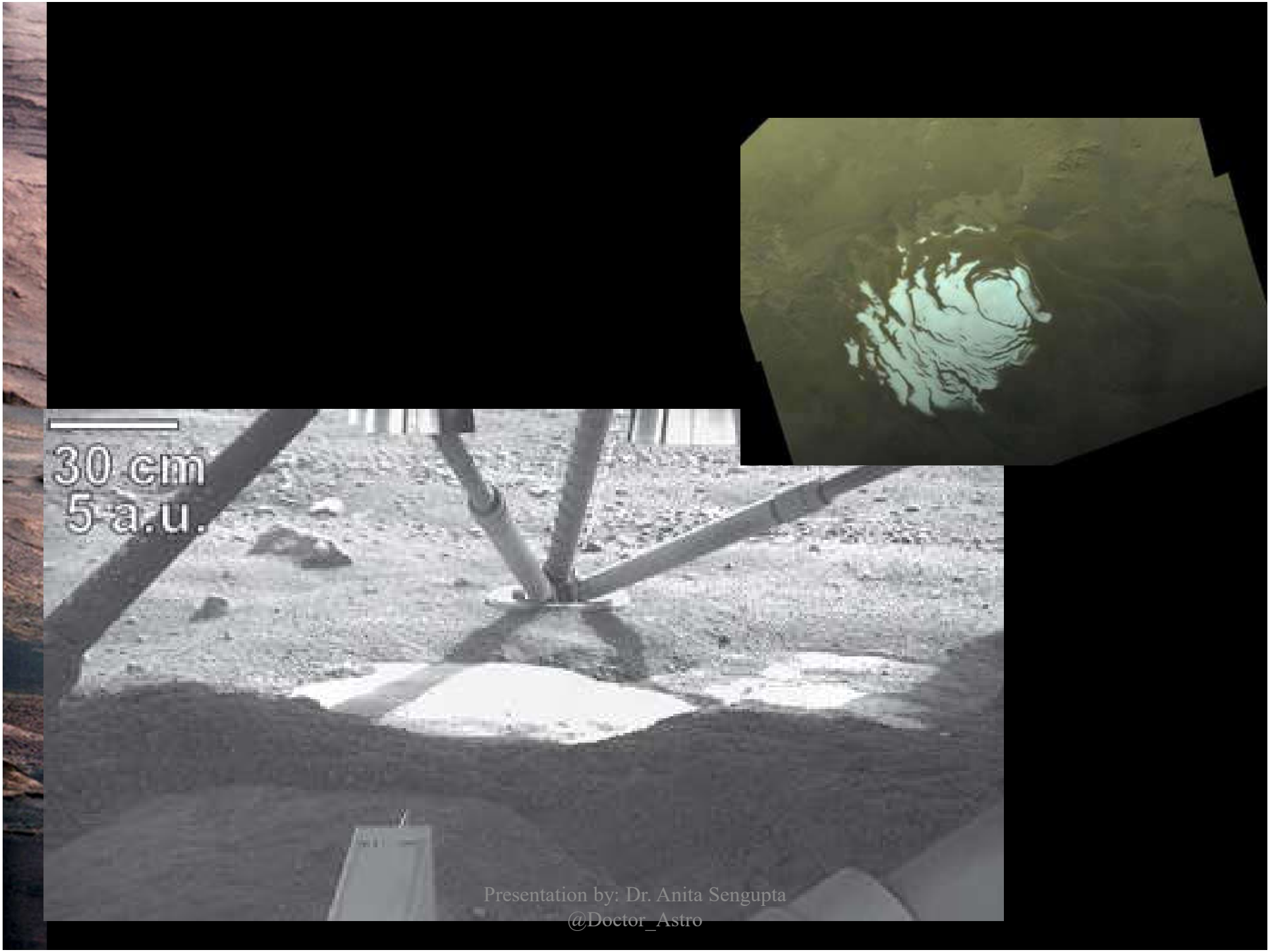

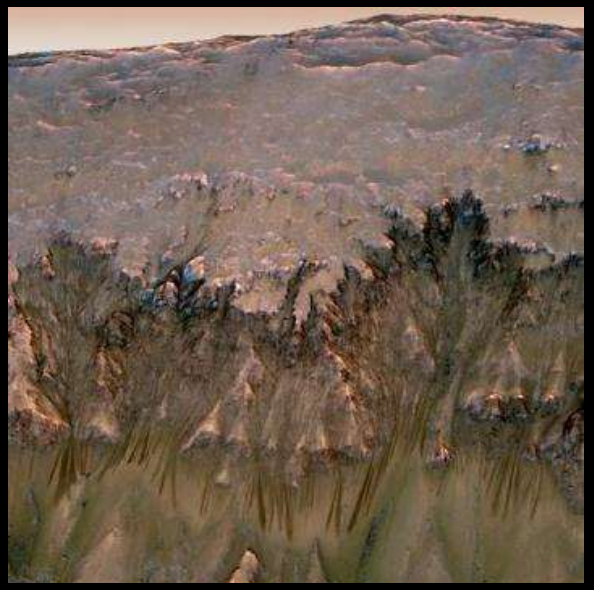

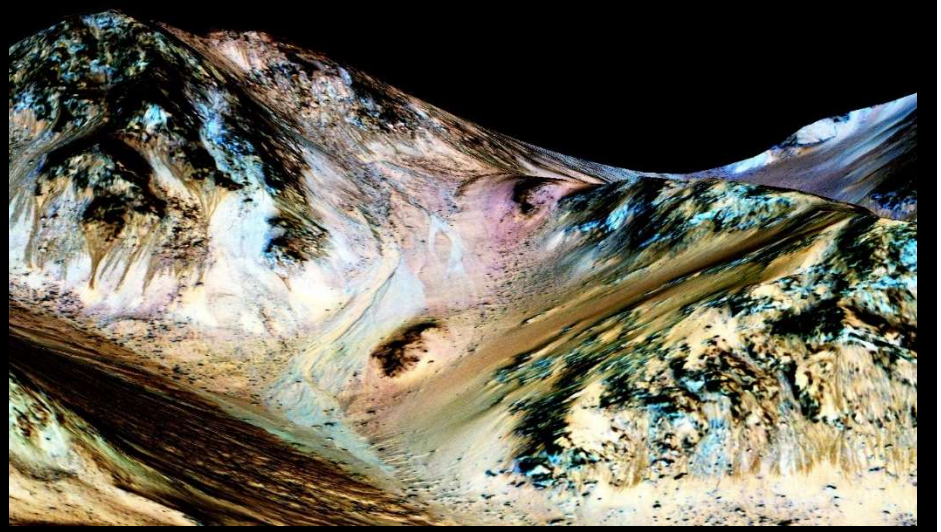

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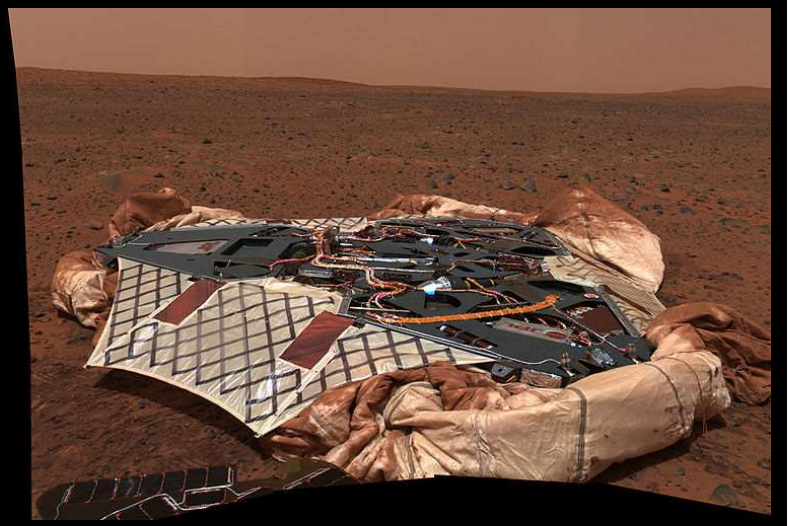
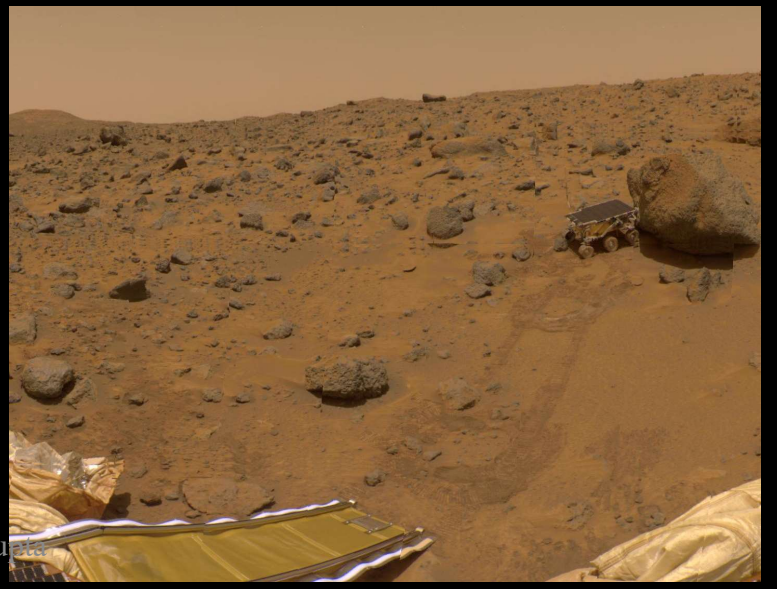
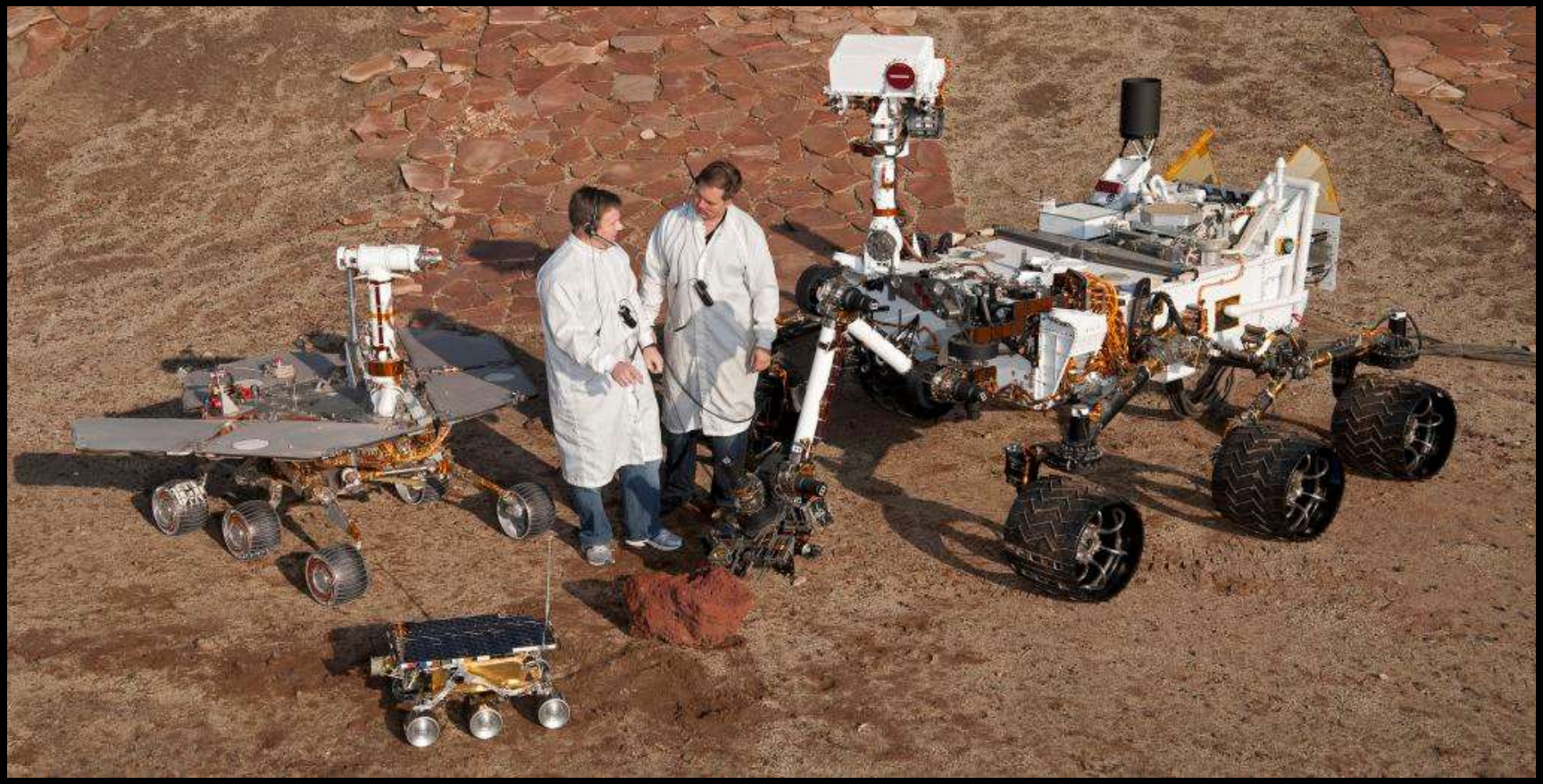
Landing on Mars

- How many times have we landed on mars?
- 7 times
  - Viking Landers (2)
  - Pathfinder Sojourner
  - Spirit and Opportunity (2)
  - Phoenix Lander
  - Curiosity: Aug 2012
  - Next: Insight (2018) and Mars 2020





Learning from Past and Building the Future
Evolution of Technology, Complexity and Size



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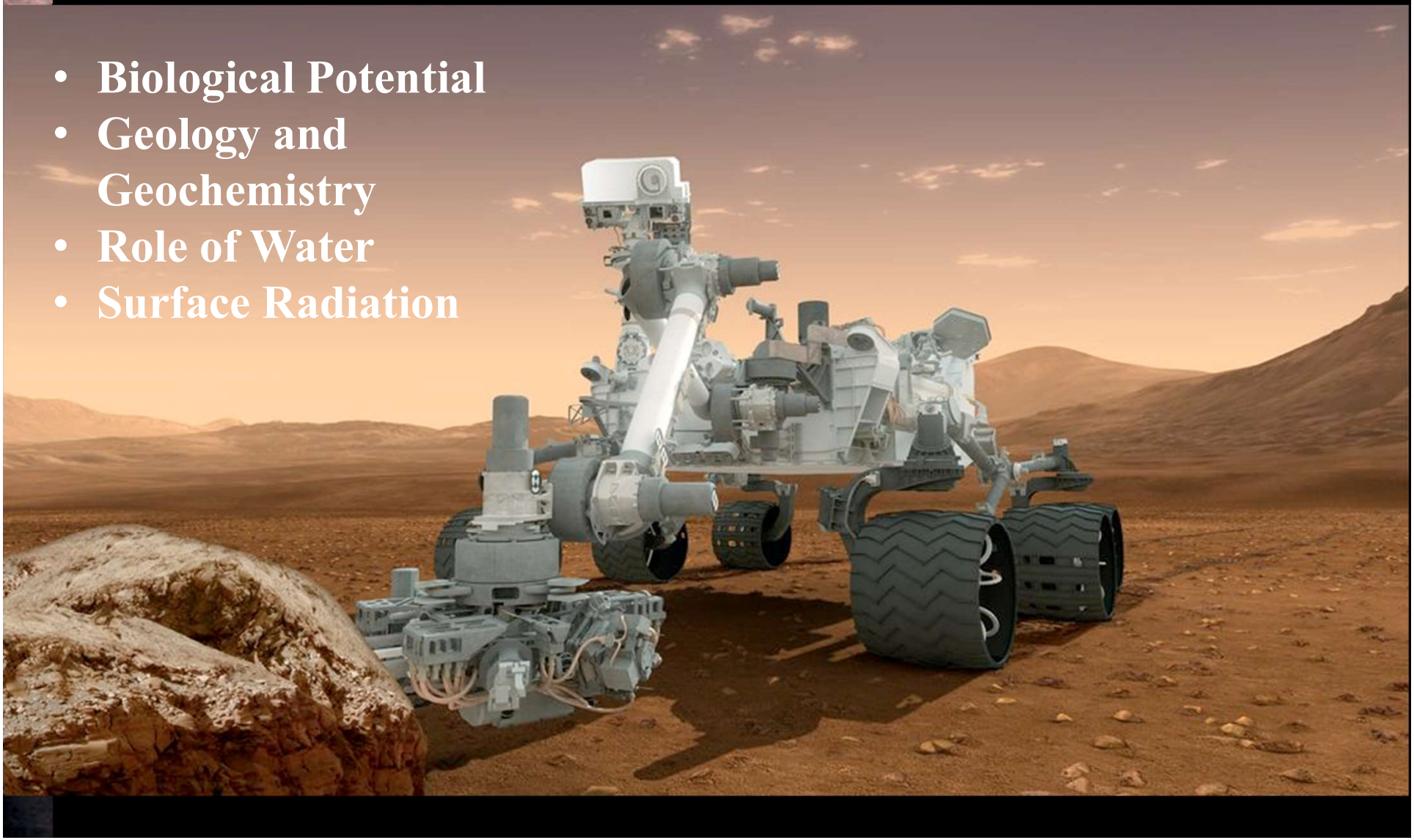
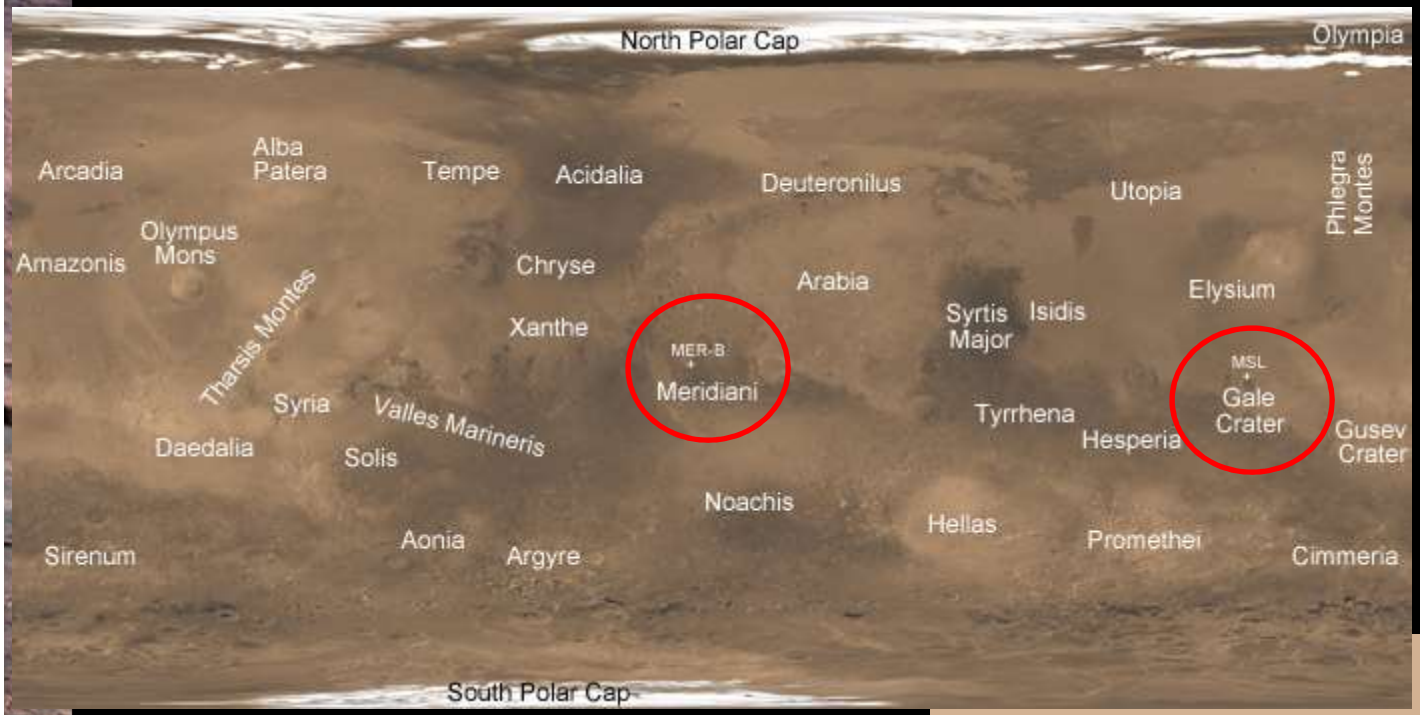
Did Mars Once Support Life?



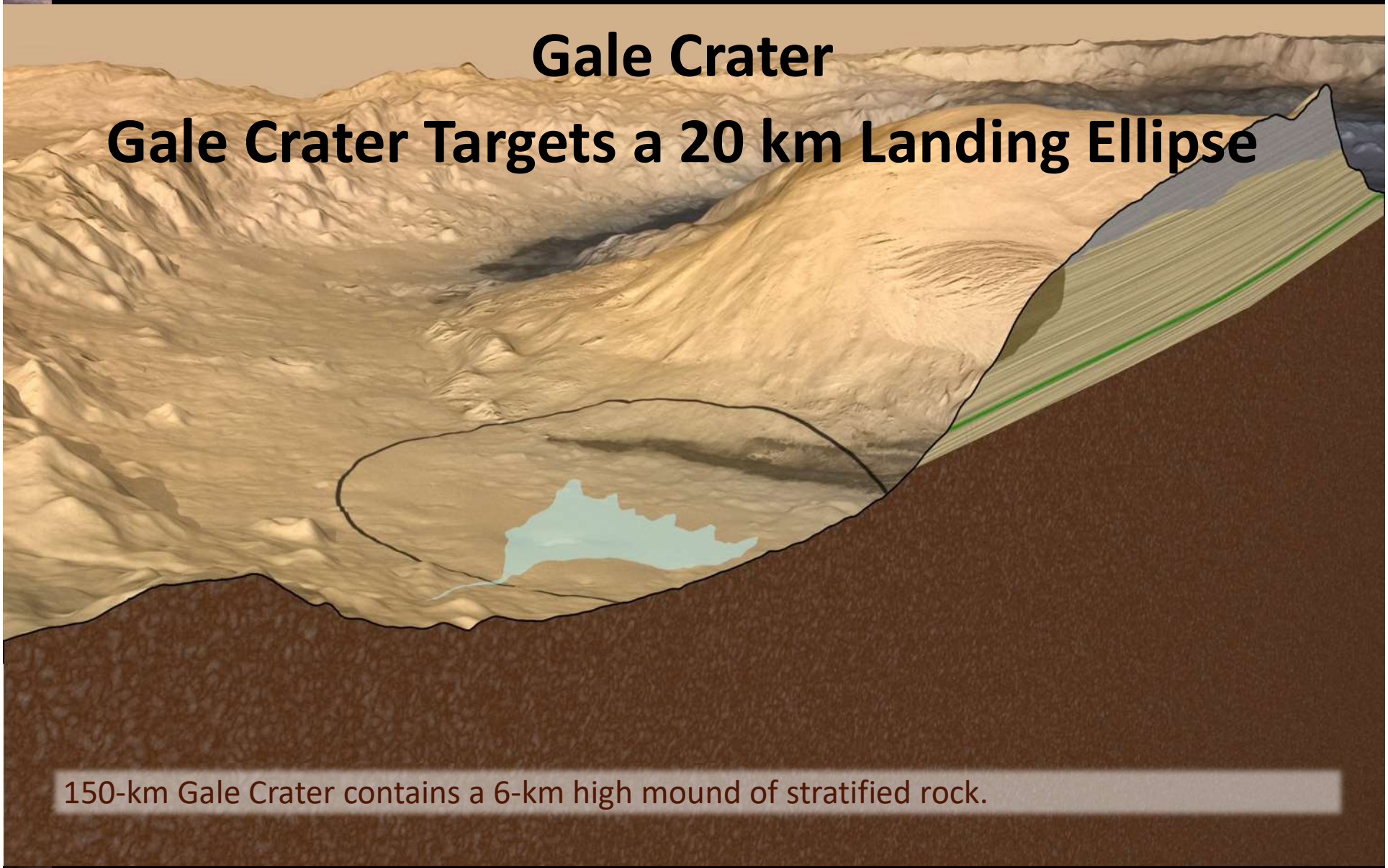
- Biological Potential
- Geology and Geochemistry
- Role of Water
- Surface Radiation

Picking a Landing Site: Gale Crater



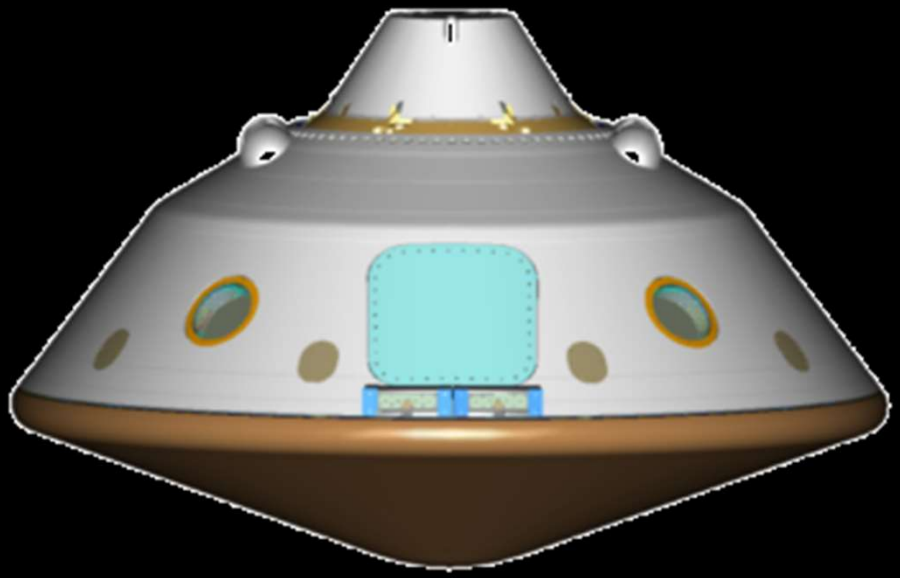
Gale Crater

Gale Crater Targets a 20 km Landing Ellipse



150-km Gale Crater contains a 6-km high mound of stratified rock.

It’s a Bird, It’s a Plane?



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Parachute Testing On Earth

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Advanced Power Systems

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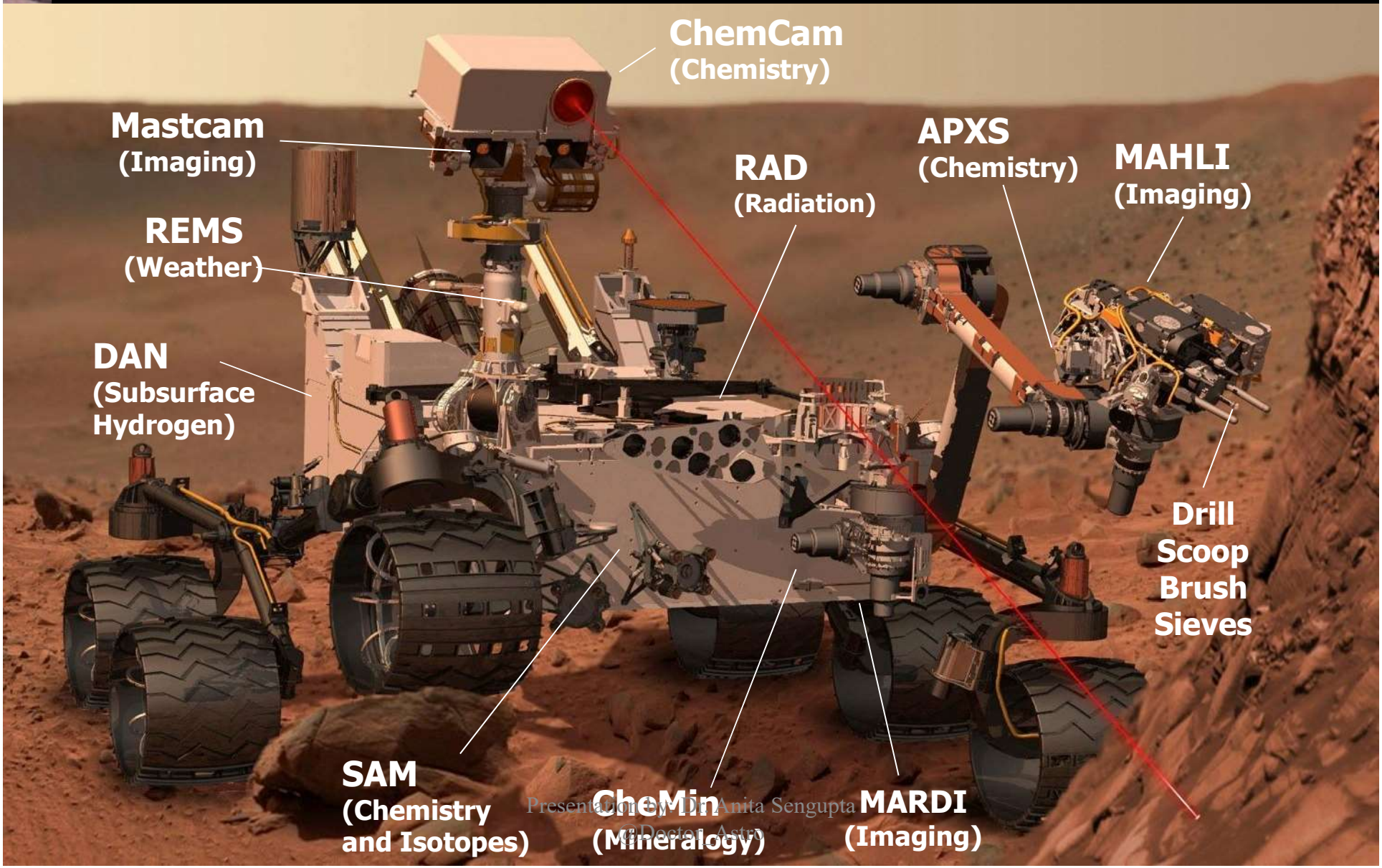
Mars Essentials



How long does it take to get to Mars?

7 - 9 months

November 2011

Curiosity landed in an ancient lake on Mars

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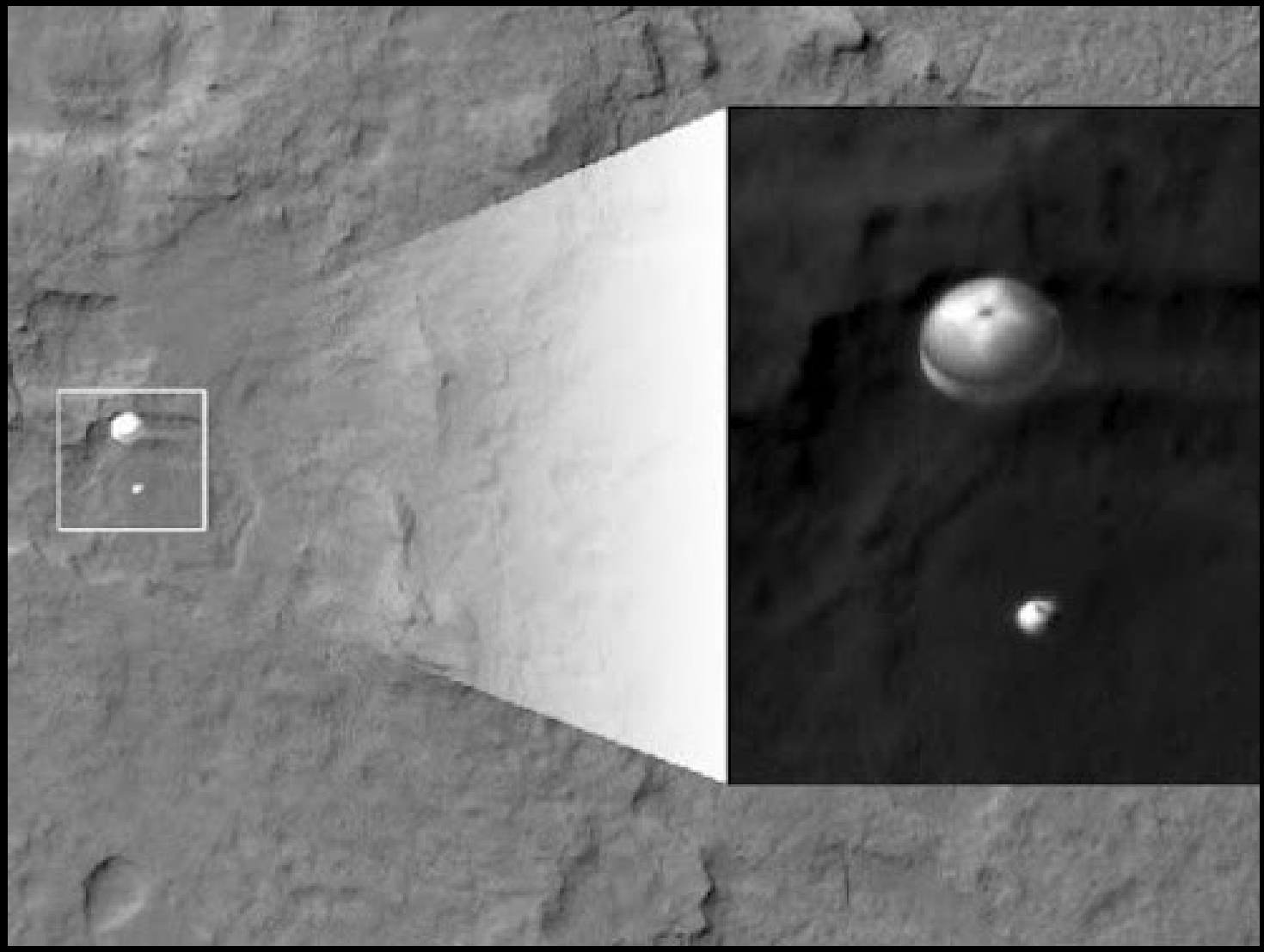
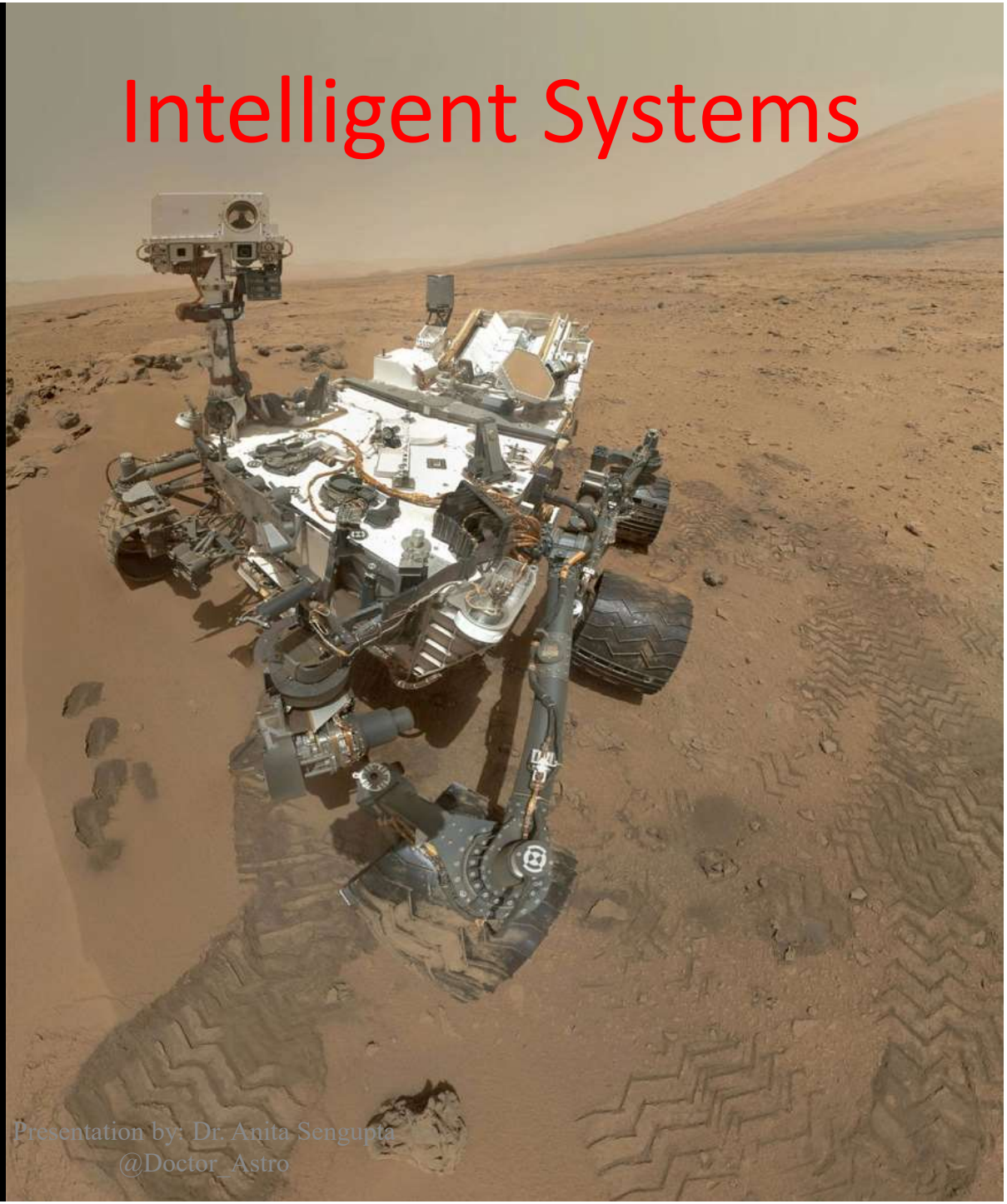
Post Landing Assessment



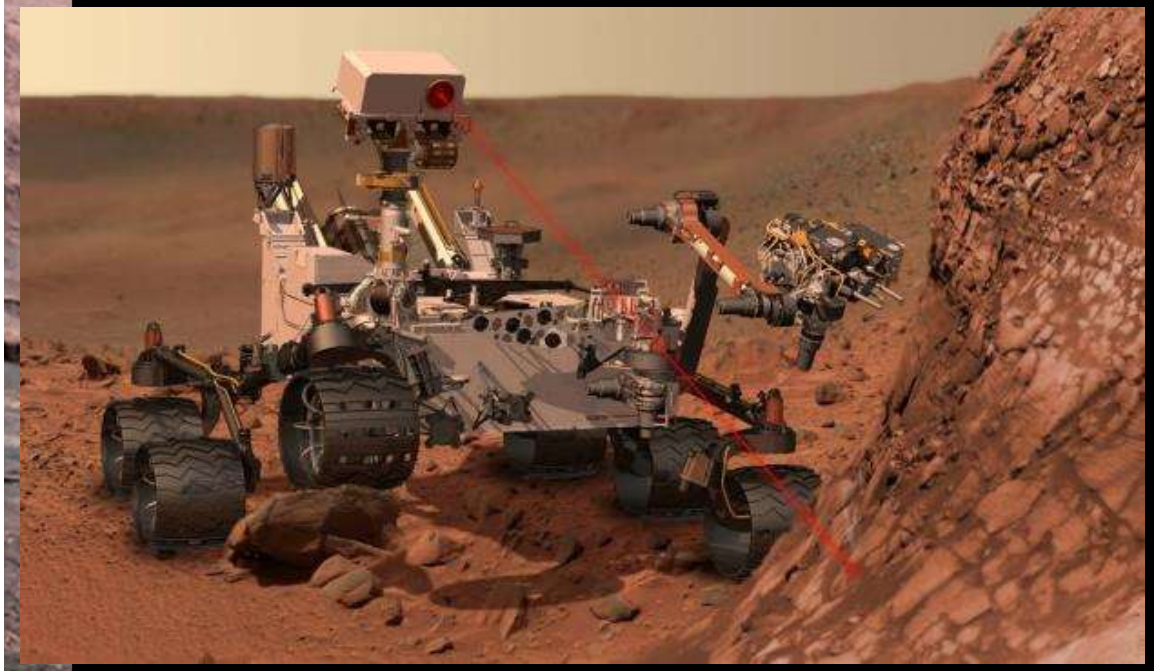
Autonomous Systems

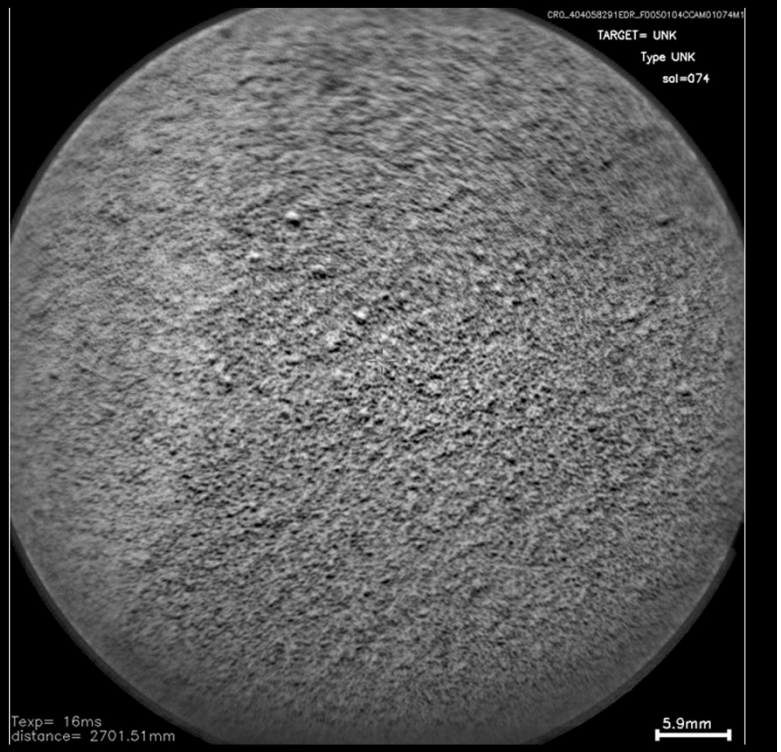
Intelligent Systems

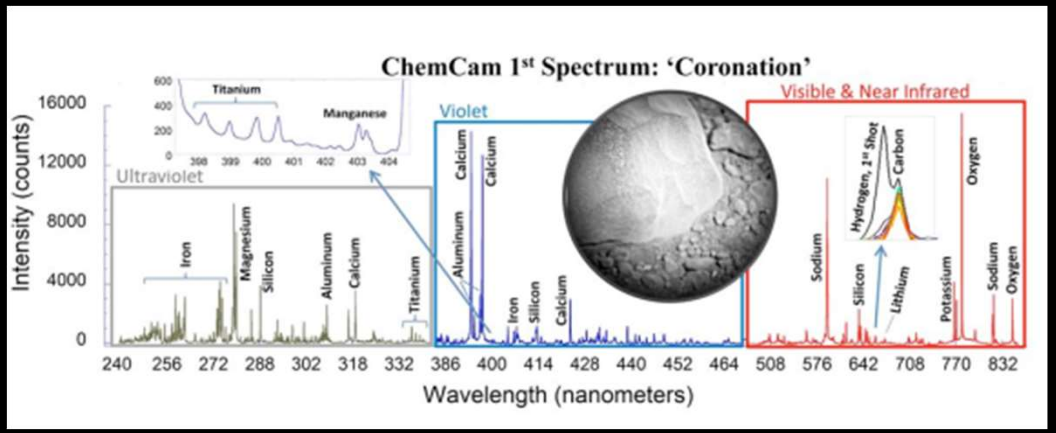
Curiosity took a ‘selfie’ made from 55 images taken with camera on its arm.



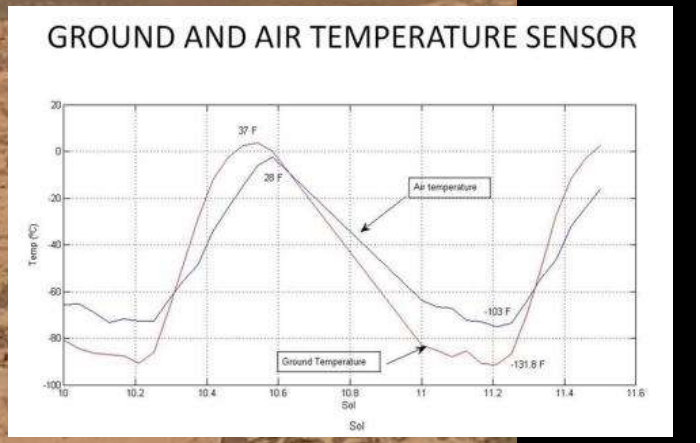
Future Landing Site Assessment



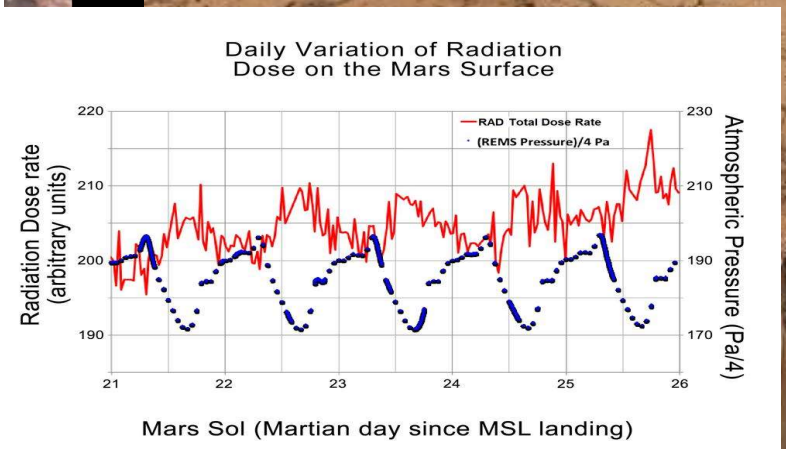




Understanding the Environment



NASA/JPL-Caltech/SwRI



Mars Weather @MarsWxReport 5h

Sol 76 (Oct 23, 2012): Sunny, high -1C/30F, low -72C/-97F, pressure higher at 7.91 hPa, wind E at 7.2kmh/4.5mph, daylight 6am-5pm

Expand

What is the Future?

Getting Larger Payloads to the surface

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What is the Future?

Habitats

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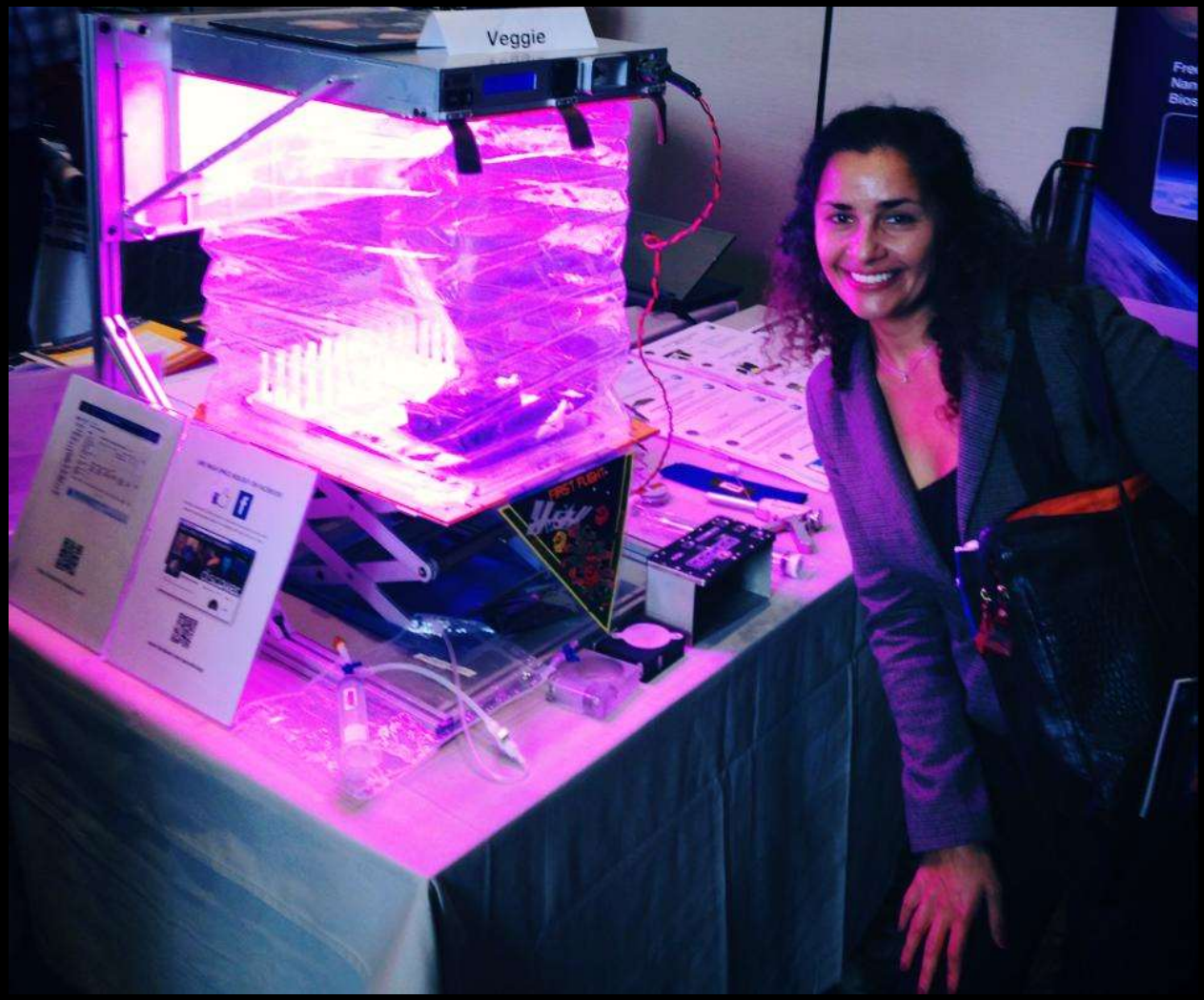
Growing Food (and being vegetarian)



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The Future is Mars

Engineers and scientists make Mars exploration a reality

Space Agencies from around the world are going to Mars

All data are returned to Earth are publically available minutes after they arrive ***because this is our future***

http://facebook.com/DrAnitaSengupta

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Acknowledgements

Images Courtesy of NASA, ESA

“Galaxy of Her Own” Image Courtesy of Cornerstone