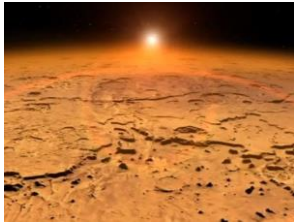


Today's Class: Exploring Mars

Reading for next class on Earth as a Planet: Sections 9.6 and 10.6 of Cosmic Perspective.



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1

Last Class

- Goals for Mars
- Search for Water & Life
- The Curiosity Rover
 - Goals
 - The Gale Crater
 - Results so far

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2

Class Exercise

Do you think Curiosity is paving the way for Human Exploration of Mars? Why or why not?



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3


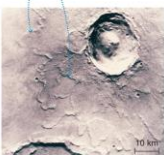
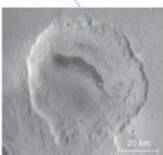
Today's Class

- Impact Craters & Wind Erosion on Mars
- Role of the distance from the Sun
- Geological processes that shaped Mars
 - Volcanism
 - Erosion
 - Water
- Polar Ice Caps

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4

Impact Craters on Mars

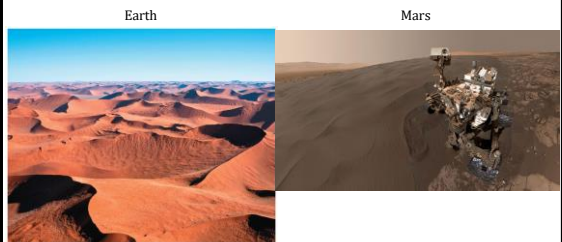
<p>A simple bowl-shaped crater, allowing a steep rim... and a ring of ejected debris.</p>  <p>1 km</p> <p>a A crater with a typical bowl shape. "Standard" crater</p>	<p>Unusual ridges suggest the impact debris was mostly... impact into icy ground.</p>  <p>10 km</p> <p>b This crater was probably made by an impact into icy ground. Impact into icy ground</p>	<p>This crater rim looks like it was eroded by windfall.</p>  <p>20 km</p> <p>c This crater shows evidence of erosion. Eroded crater</p>
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6

Erosion by Wind

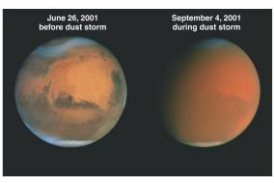

- Wind wears away rock and builds up sand dunes.



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7

Dust Storms on Mars

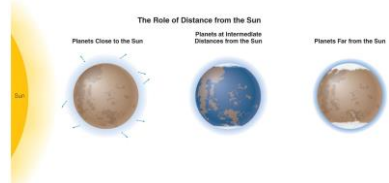



- Seasonal winds can drive dust storms on Mars.
- Dust in the atmosphere absorbs blue light, sometimes making the sky look brownish-pink.

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Role of Distance from Sun

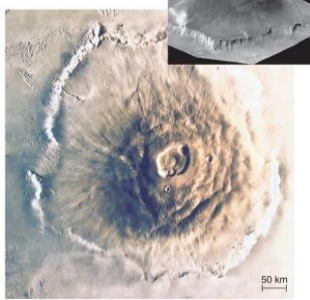


- Planets close to the Sun are too hot for rain, snow, ice and so have less erosion.
- Hot planets have more difficulty retaining an atmosphere.
- Planets far from the Sun are too cold for rain, limiting erosion.
- Planets with liquid water have the most erosion.

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Volcanism on Mars




- Mars has many large shield volcanoes with more on northern plains.
- Olympus Mons is largest volcano in solar system.

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14

Tectonics on Mars



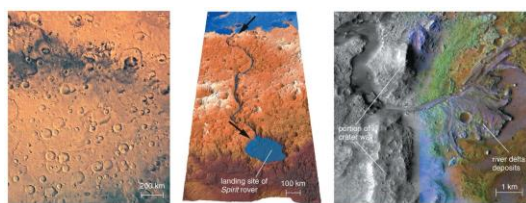
- The system of valleys known as Valles Marineris is thought to originate from tectonics.

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Erosion of Craters

- Details of some craters suggest they were once filled with water.



a This photo shows a broad region of the southern highlands on Mars. The eroded rims of large craters and the relative lack of small craters suggest erosion by rainfall.

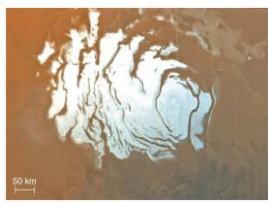
b This computer-generated perspective view shows how a Martian valley forms a natural passage between two possible ancient lakes (shaded blue). Vertical relief is exaggerated 14 times to reveal the topography.

c Combined visiblinfrared image of an ancient river delta that formed where water flowing down a valley emptied into a lake filling a large crater (portions of the crater wall are identified). Clay minerals are identified in green.

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Polar Ice Caps of Mars



- Residual ice of the south polar cap remaining during summer is primarily water ice.
- Carbon dioxide ice of polar cap sublimates as summer approaches and condenses at opposite pole.

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17

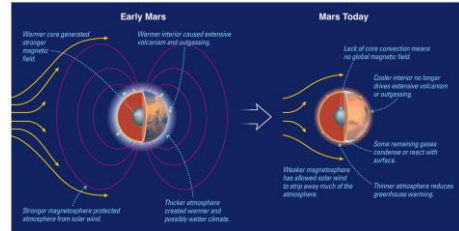
Climate Change on Mars

- Mars has not had widespread surface water for 3 billion years.
- Greenhouse effect probably kept the surface warmer before that.
- Somehow Mars lost most of its atmosphere.

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Climate Change on Mars



- Magnetic field may have preserved early Martian atmosphere.
- Solar wind may have stripped atmosphere after field decreased because of interior cooling.

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20