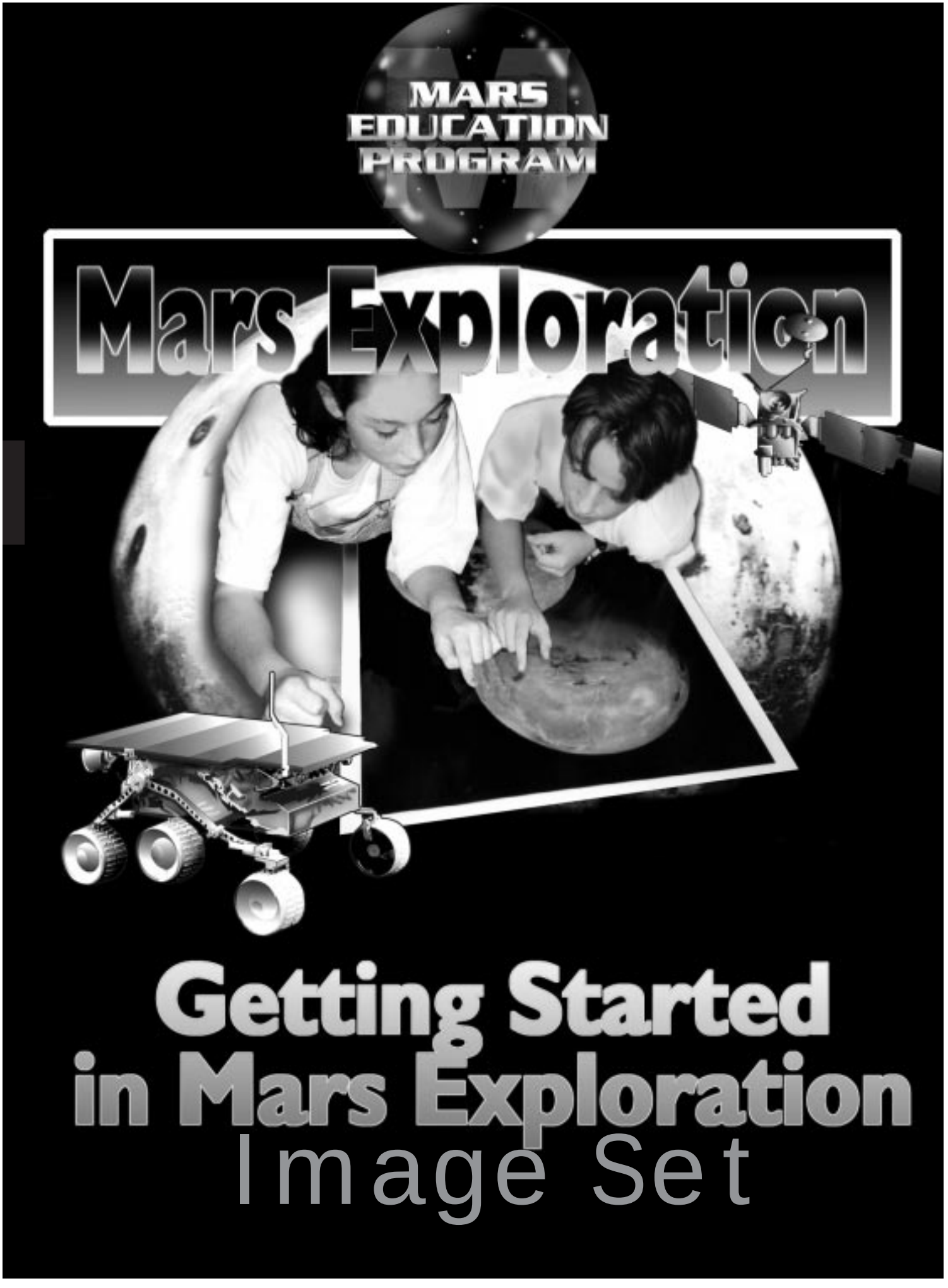
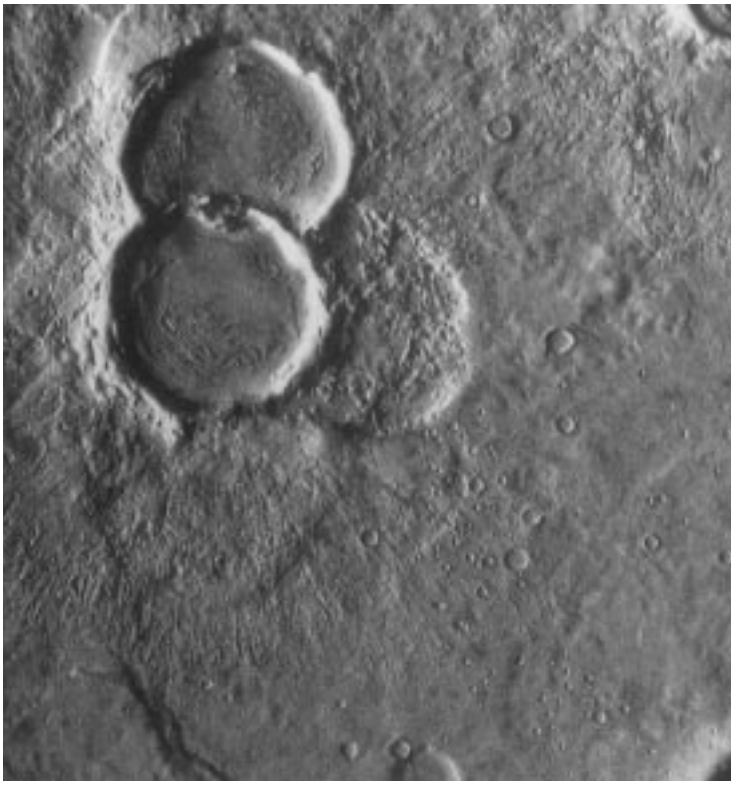

MARS
EDUCATION
PROGRAM
Mars Exploration
Getting Started
in Mars Exploration
Image Set

Scale: Mars is 6,787 km in diameter.

Image 1

- What is the feature across the middle?
- What do you think the circles on the left side are?



15 km Scale: Top crater is 15 km across.

Image 2

- On Earth, what are some things about the size of these craters?
- Why do some of the craters overlap?
- In what order were the craters formed?
- What do the patterns around the craters reveal about the nature of the surface?
- Have you ever seen an impact crater?

30 km Scale: Large crater is 30 km across.

Image 3

- What do you think caused the shape around these craters?
- Were these craters formed at the same or at different times?

Image 4

- What might this feature be?
- How big is the feature in this image?

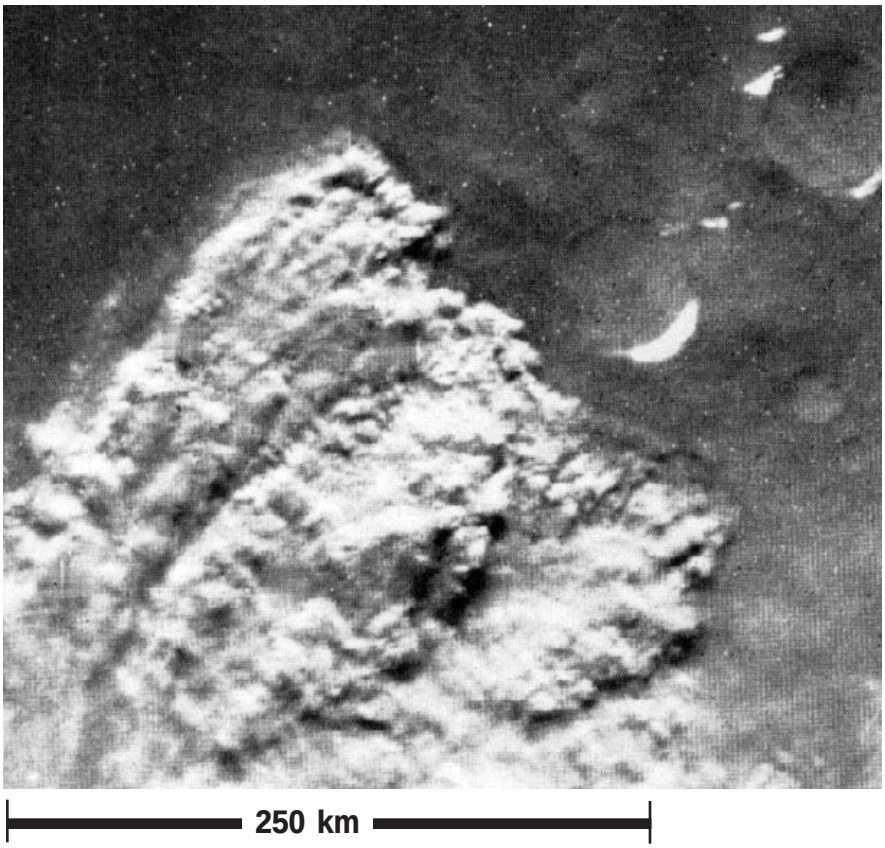
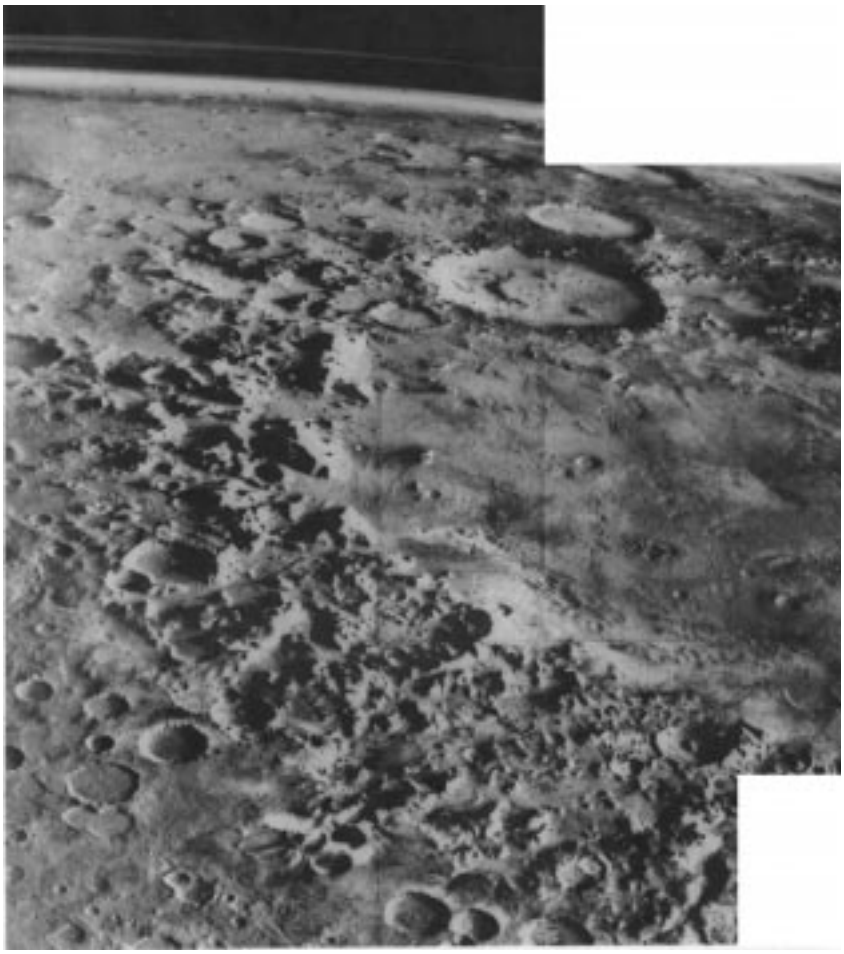
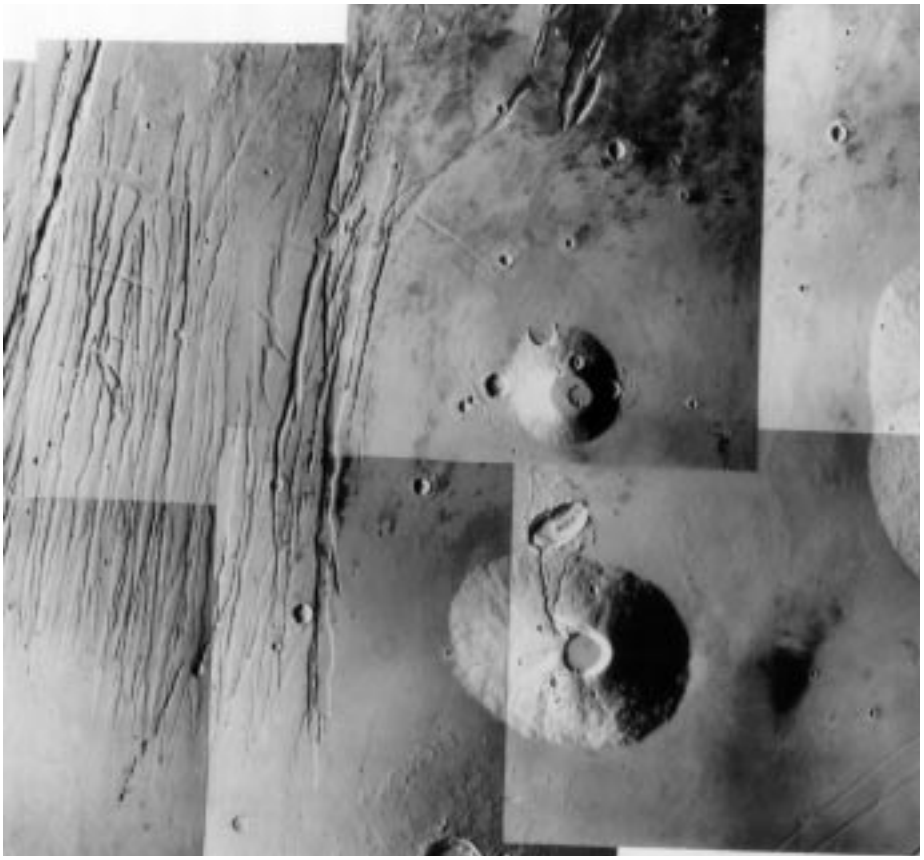


Image 5

- What is the line on the horizon above the Martian surface?
- How high above the surface is it?
- What causes it to be visible?



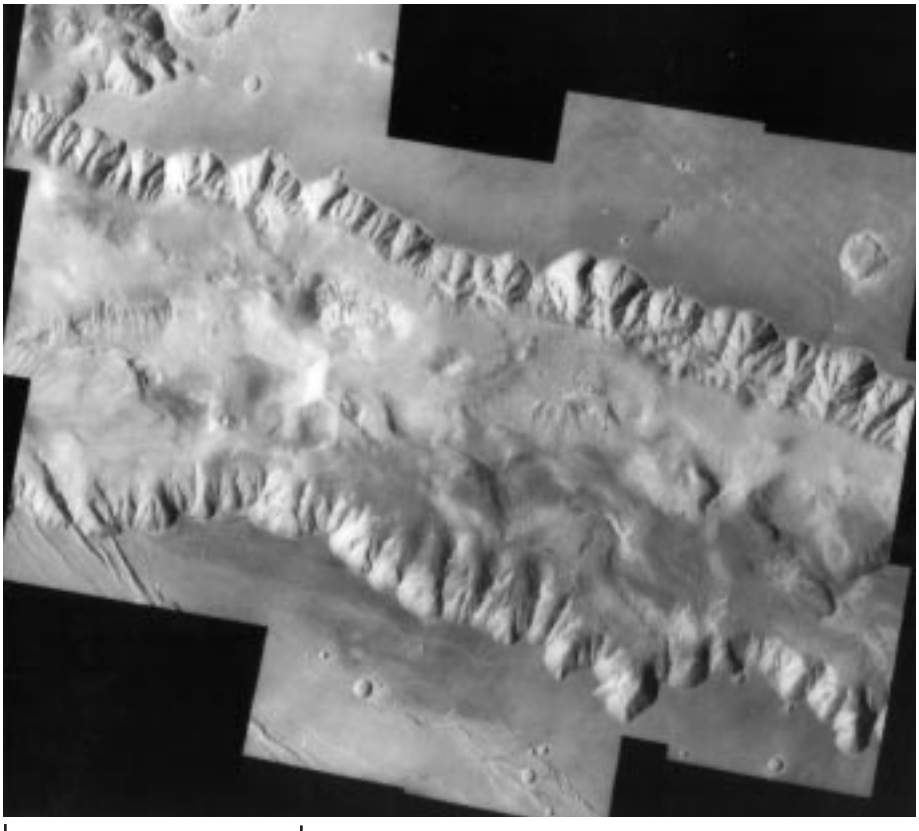
Scale: The large crater in the upper right is 200 km in diameter.



100 km Scale: Lower volcano is 90 x 130 km.

Image 6

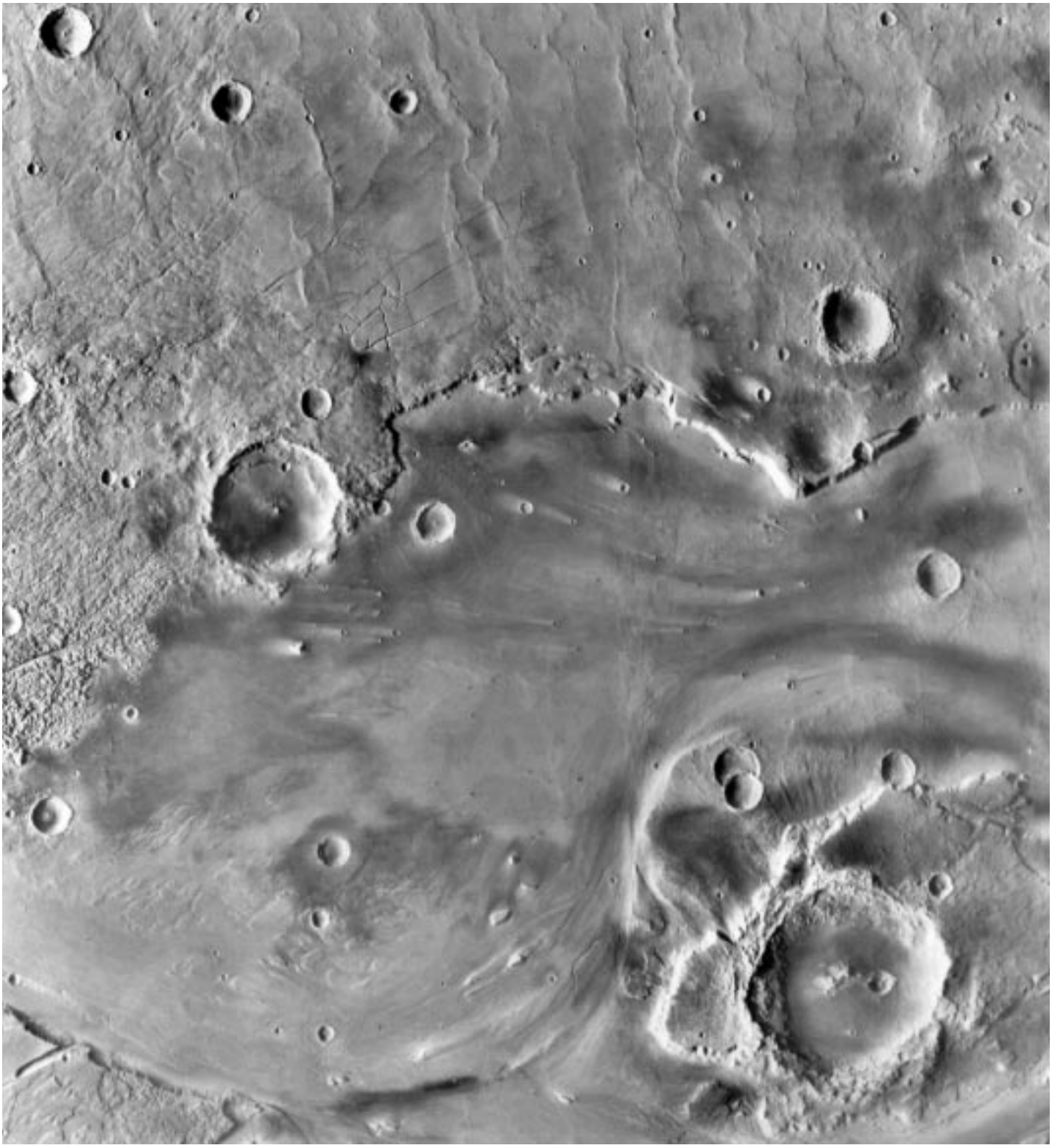
- Which came first, the volcano or the impact craters? How can you tell?
- What might have caused the channels on the side of the volcano?
- What do you think the lines are? What might have caused them?



100 km

Image 7

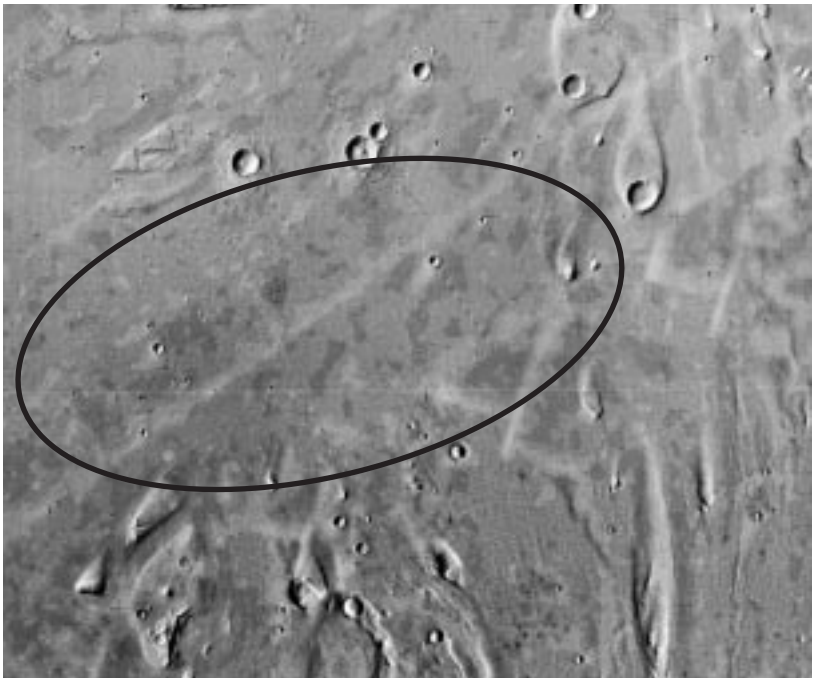
- What do you think caused the canyon?
- What do you think shaped the cliffs on the edges of the canyon?
- How did this canyon get so wide?



100 km Scale: The crater in the lower right is about 100 km across.

Image 8

- Which came first, the fractures or the large crater left of center?
- Which came first, the crater in the lower right or the channel?
- Which direction did the fluid flow? Is any fluid apparent now?
- What caused the “tails” behind the small craters in the channel?
- What sequence of events and processes makes most sense in explaining all these features?



100 km Scale: Ellipse is 100 x 200 km.

Image 9

- What is this ellipse?
- How would you describe this region?
- How might the teardrop-shaped landforms have formed?
- What might make this a desirable landing site?

Scale: Crater is 1.2 km in diameter.

Image 10

- What planet is this crater on? How can you tell?
- Is this crater more like the one in Image 2 or the one in Image 3? Why?
- Is this a fresh or an aged crater?
- How does this crater compare in size to those in Images 2 and 3?

Scale: The view east of Viking 1's landing site. The furthest point of the right-hand most trench is 3 m away from the lander. The smaller trenches are about 10 cm wide.

Image 11

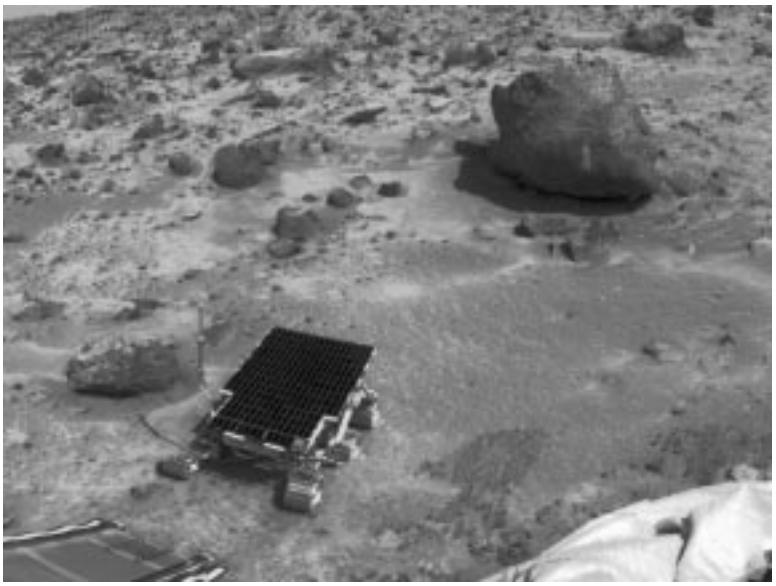
On July 20, 1976, Viking I landed in the *Chryse Planitia* (i.e., the Chryse Plain) and was the first spacecraft to land successfully on Mars. Scientists think the Chryse Planitia is an out-wash plain, and one reason they chose to land there is that it is relatively flat, increasing the chances of a safe landing. Viking I's robotic arm dug the trenches in the foreground to reveal the soil just below the surface and to collect soil for several experiments. Note the wind-deposited dust behind some of the rocks. As measured by Viking, temperatures on a typical day ranged from -85^{o}C to -30^{o}C and wind speeds were around five meters per second with gusts up to 25 meters per second. Pathfinder also landed in the Chryse Planitia, roughly 850 km east of this site.

- How big are the largest rocks?
- Does this look like any place on Earth? If so, where?
- Can you tell if it is hot or cold?
- What might scientists learn from sampling in a place like this?
- How does this scene compare to the one around Pathfinder's landing site?

200 km Scale: Ellipse is 100 x 200 km.

Image 12

- What information does this wide-area view add to your understanding of Image 9?
- Do you see anything that might make this an interesting area to explore?

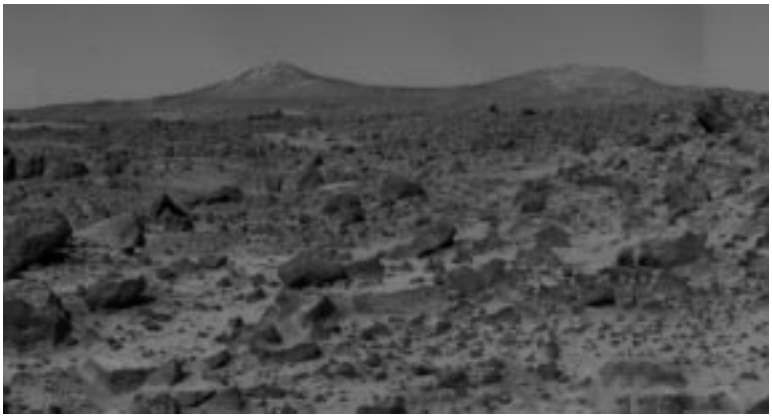


Scale: Rover is 65 cm long, 48 cm wide, and 30 cm tall.

Image 13

This image was taken on Pathfinder's third day. Here, Sojourner approaches "Barnacle Bill," the small rock on the left, and "Yogi," the large rock in the upper right-hand corner. Sojourner used its Alpha Proton X-ray Spectrometer (APXS) and cameras to determine the mineral composition of rocks and soil around the landing site. The lander's ramp and part of a deflated airbag are visible.

- How many different general rock shapes can you see?
- What causes rocks to be different shapes?
- Is the surface of Mars dusty? How can you tell?

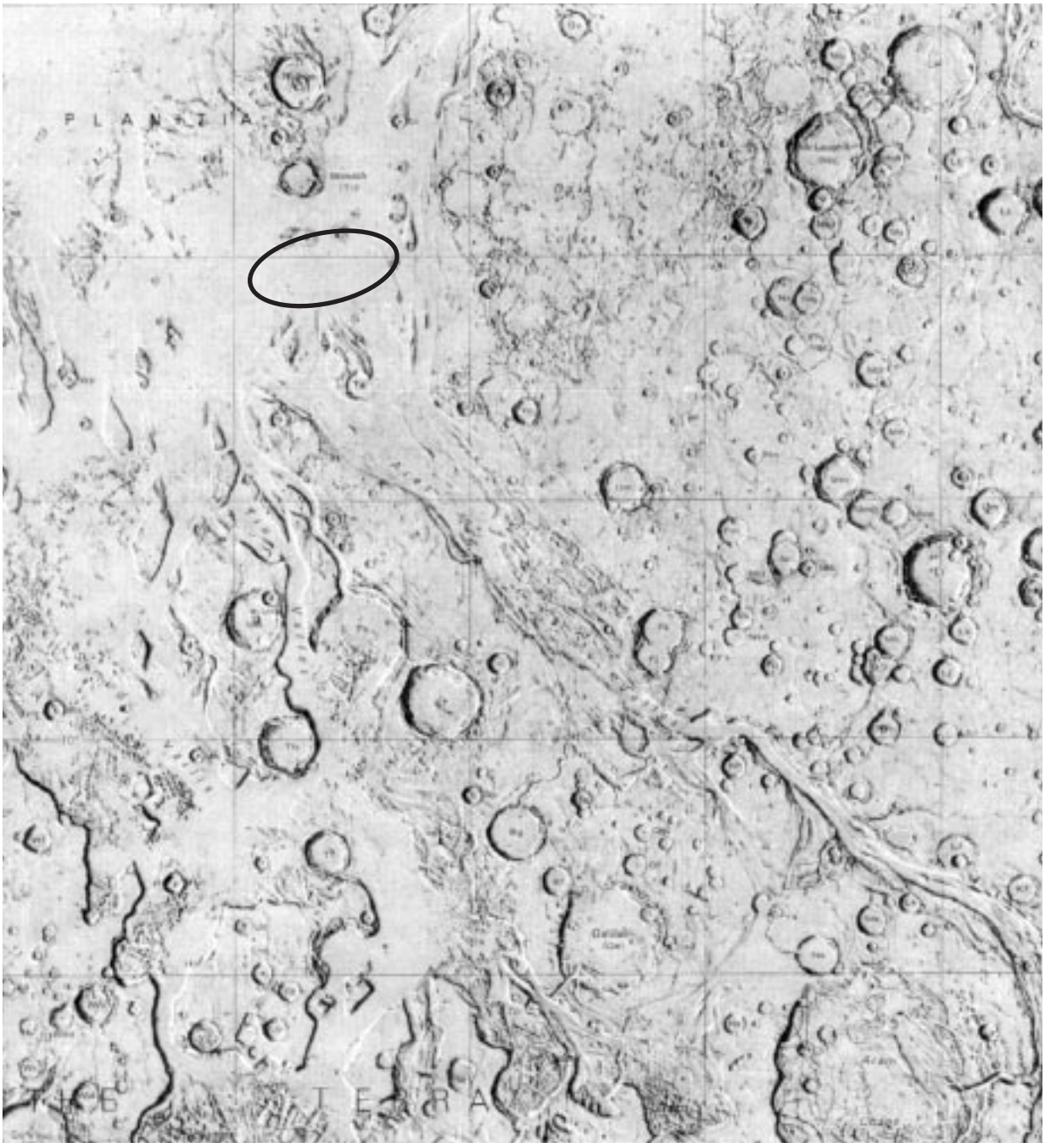


Scale: The Twin Peaks are approximately 1 km away and 50 m tall.

Image 14

This image was taken on Pathfinder's fourth day and shows "Twin Peaks," the two hills about one kilometer away from the landing site.

- Does this look like any place on Earth?
- Why did the landing site look so smooth when it is really full of boulders?
- What are some ways a plain like this can become littered with rocks?



500 km

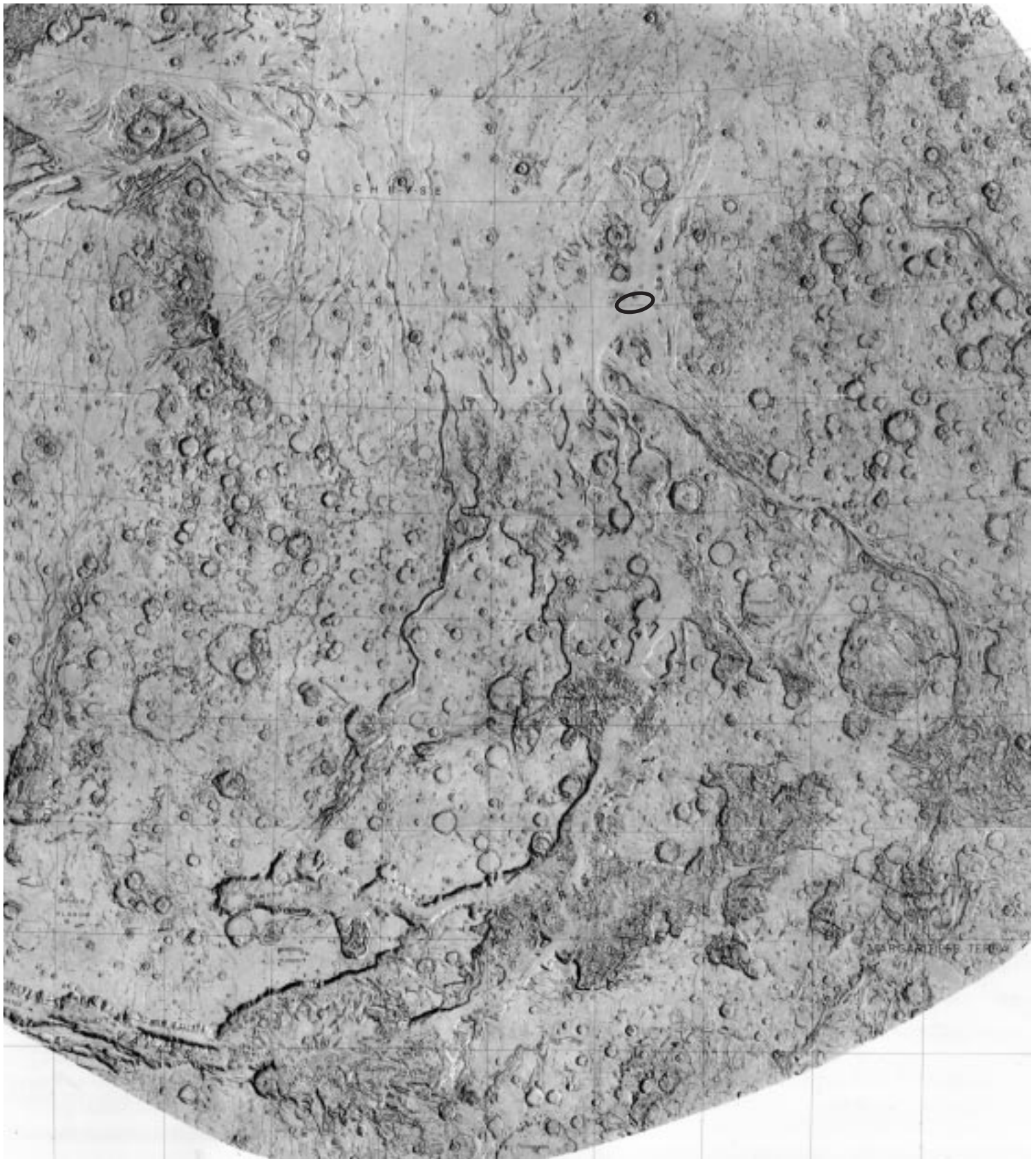
Scale: Ares Vallis is about 1,500 km long.

Image 15

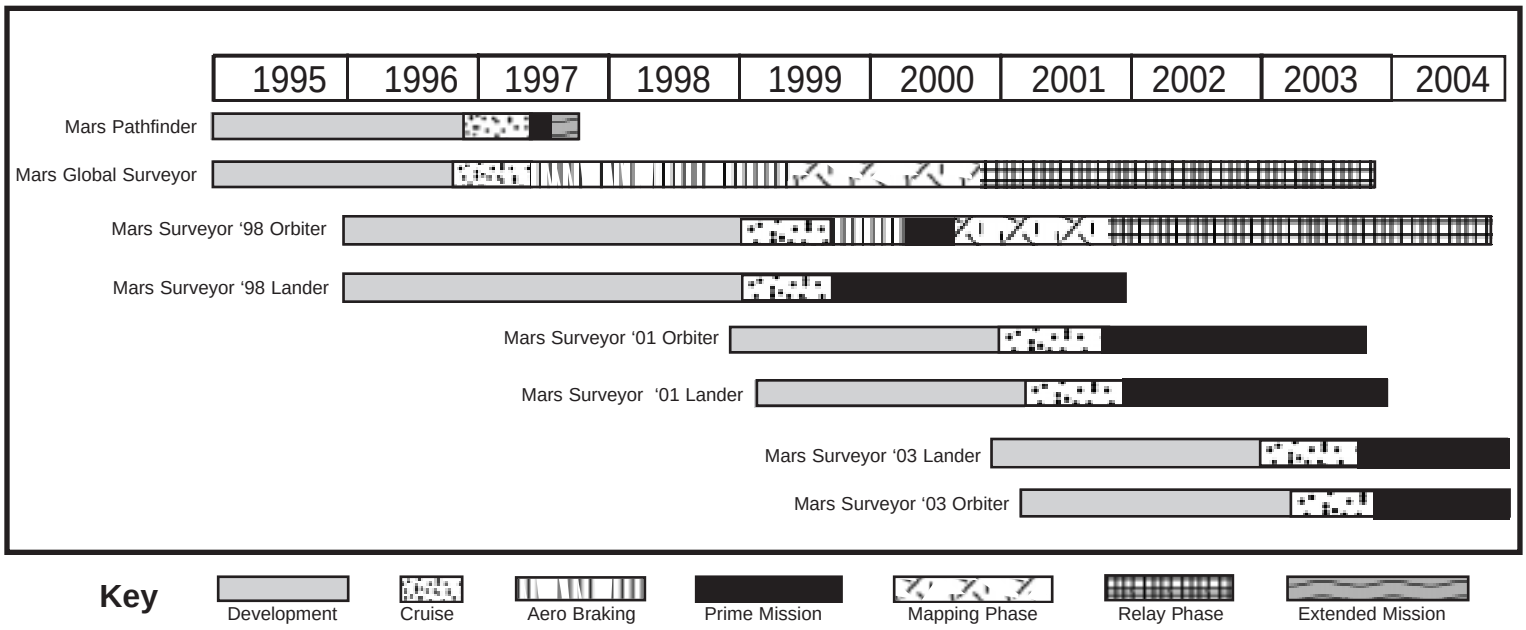
- What information does this wide-area view add to your understanding of Image 12?
- How much water flowed in this region, a little or a lot?
- Do you see any sources for water?
- Why is the area at the end of the channel so smooth?

Image 16

- How big is this area?
- Is Ares Vallis the only place water flowed?
- Which direction is uphill?
- What is the general topography of this region?
- Where might the water that flowed in these channels have come from?
- Describe the distribution of craters in this region.
- What might explain this pattern of distribution?
- What are some differences between the craters on the plain and in the highlands?
- What might explain the differences between the craters in these two areas?
- What do you think the Chryse Planitia looked like when water flowed in the channels?


1000 km

Mars Exploration Timeline



Every two years, Mars and Earth align so that a spacecraft can travel efficiently between the two planets. Over the next decade, NASA plans to launch new missions each time Earth and Mars are in a position for efficient travel.

- Mars Global Surveyor (1997) The orbiter will map the planet's atmosphere and surface. It will look for evidence of surface water, study the surface geology and structure, and examine changes in Martian weather for at least one Martian year (about two Earth years).
- Mars Surveyor `98 (1998-99) The lander will land near the edge of Mars' south polar cap and focus on studies of geology, weather, and past and present water resources. Before touchdown, it will release two microprobes that will drop into the soil to search for the presence of subsurface water. The orbiter will examine the atmosphere and changes in water vapor during the Martian seasons.
- Mars Surveyor `01 (2001) The lander will carry a rover capable of traveling dozens of kilometers to gather surface dust and soil samples. There will also be a test of our ability to produce rocket propellant using Martian rocks and soil as raw materials. The orbiter will study the mineralogy and chemistry of the surface, including the identification of water resources just below the Martian surface.
- Mars Surveyor `03 (2003) This lander will carry a wide-ranging rover to collect samples from a different part of the planet. The orbiter will provide the complex links needed for communication and navigation for this and future surface missions.

NASA scientists are waiting to see what this current set of missions will reveal about Mars before deciding where to send the 2005 and 2007 missions and what data they should collect.