

LEARNING OBJECTIVES

- 1) Explain why liquid water is not presently stable on Mars's surface. Describe the required difference in Mars's past condition compared to now which allowed liquid surface water to have been stable.
- 2) Evidence of *current* liquid water on the surface has appeared from orbiter images. Describe a scenario where this might be possible on the present surface. Explain how and where Mars might presently support liquid water.
- 3) Explain the role of Mars's small size in relation first to the loss of its warm and wet climate and then second to its eventual loss of surface water. Provide an argument for life having developed on Mars based on its similarity to Earth the first 2 billion years.

Required Textbook readings before class: pages 272-283 (end of 8.2, 8.3, start of 8.4)

1. How old are the channels which indicated a time when there was sustained surface water on Mars?
2. Where can water be presently found on Mars? In what phase is it here?
3. How might Mars's surface have been warmer and wetter in the past?
4. Why would evidence of past volcanism and greater geological activity support the idea of a denser atmosphere in Mars's past?
5. Does Mars have a greenhouse effect today? How might it have been much greater in the past? Where did the additional CO₂ come from? Can CO₂ do it alone to allow for liquid water at Mars's surface?
6. Why did Mars change? What changed at Mars's center and how did that affect Mars atmosphere?
7. How did Mars lose some of its water? How is water vapor on Earth protected?
8. Why is Mars's axis tilt so unstable, where Earth's is stable? How might this affect life on Mars?
9. What was Viking and what did its experiments find on Mars? Which experiment strongly indicates all other Viking tests are moot and life is not on Mars?
10. Why would Methane in the Mars atmosphere indicate possible current life on Mars?