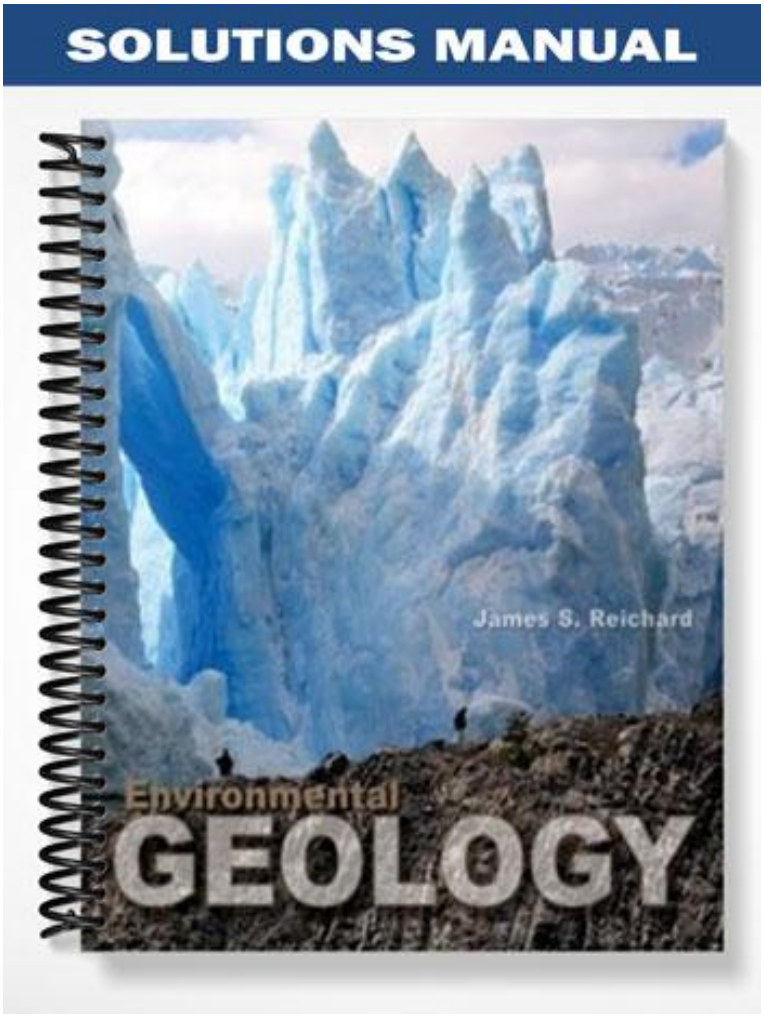
SOLUTIONS MANUAL



CHAPTER 2
EARTH FROM A LARGER PERSPECTIVE

Chapter Outline

Introduction
Our Solar System
- The Sun
- The Planets
- Comets and Asteroids
- The Moon

Origin of the Solar System
- The Nebular Hypothesis
- How Reliable Is the Nebular Hypothesis?

Other Stars in the Universe
Does Life Exist Beyond Earth?
- Life on Earth
- Habitable Zones
- Possible Intelligent Life

Solar System Hazards
- Electromagnetic Radiation
- Asteroid and Comet Impacts

Box Readings:
- *Case Study 2.1: Search for Life on Mars*

Student Learning Outcomes

1. Understand how the nebular hypothesis explains the formation of the solar system and how it accounts for the orbital characteristics of the planets and moons.

2. Describe our solar system and the size of the Earth relative to the size of our galaxy and the universe.

3. Explain how extremophile bacteria are related to the origin of life on Earth and how they relate to the extraterrestrial search for life.

4. Understand the concept of habitable zones and why complex animal life that may exist elsewhere will likely be restricted to such zones.

5. Know what mass extinctions are and be able to name some of their possible triggering mechanisms.

6. Understand how scientists came to appreciate the serious nature of comet and asteroid impacts and the steps being taken to reduce the risk.

Chapter Summary

Knowledge of the solar system and universe gives students a larger perspective from which to view environmental geology. Students are encouraged to consider astronomical inputs to our earth system, such as electromagnetic radiation from the sun, the significance of the moon and its gravitational impact, and astronomical dangers, which include asteroid and comet impacts capable of triggering mass extinction events like the one that ended the age of the dinosaurs.

Students are taken on a tour of the solar system that involves a description of the sun, the inner and outer planets, the moon, and comets and asteroids. The formation of the solar system is explained and the nebular hypothesis is presented along with evidence to support it. A discussion of other stars in the galaxy and universe leads to an explanation of the habitable zone around a star, the origins of life on earth, and the possibility of life existing elsewhere in the universe.

A boxed essay discusses the search for life on Mars, which includes a description of evidence collected by the rover to support the existence of liquid water on the planet's surface in the past.

Contemporary Topics for Discussion

- Based on the information presented in this chapter, do you think it is likely that life exists on other planets? Why?
- In the unlikely event of a major meteorite impact, how do you think this would impact your life? Our society? The global environment?
- What do you think about a manned mission to Mars? What are the pros and cons?

Additional Student Activities

- As the author mentions in this chapter, the size of the universe, galaxy, and solar system can be difficult to comprehend. Using an analogy of your choice, compare the distances and sizes of planets to gain an appreciation for how immense space really is.
- Explore NASA's webpage (http://www.nasa.gov/). What interests you about their current research? Which images impress, inspire, amaze or surprise you? Why?