



Unit 4: History of the Earth

Lesson 14: History of Earth through Geologic Time Scale



Introduction

The nature of our Earth—its materials and processes—has been a focus of study for centuries. However, the late 1700s is generally regarded as the beginning of modern geology. It was during this time that James Hutton published his important work *Theory of the Earth*. Prior to that time, a great many explanations about Earth history relied on supernatural events.

Like the pages in a long and complicated history book, rocks record the geologic events and changing life-forms of the past. The book, however, is not complete. Many pages, especially in the early chapters, are missing. Others are tattered, torn, or smudged. Yet enough of the book remains to allow much of the story to be deciphered. Interpreting Earth history is a prime goal of the science of geology. Like a modern-day sleuth, a geologist must interpret the clues found preserved in the rocks. By studying rocks and the features they contain, geologists can unravel the complexities of the past. Geologic events by themselves, however, have little meaning until they are put into a time perspective. Studying history, whether it is the Civil War or the age of dinosaurs, requires a calendar. Among geology's major contributions to human knowledge are the geologic time scale and the discovery that Earth history is exceedingly long. This module will discuss the history of the Earth through geologic time.



Learning Objectives

After studying this module, you should be able to:

- Describe how index fossils (also known as guide fossils) are used to define and identify subdivisions of the geologic time scale; and
- Describe the history of the Earth through geologic time.



Pre-requisite Skills / Review

REVIEW: Formation and Dating of Rocks

- ❖ Stratification is the general term for layering of sedimentary rocks. It serves as a reflection of changing conditions during deposition where every strata or layer represents an interval of time where conditions have remained uniform. A change in color can reflect differences in grain size and/or composition.
- ❖ Geological specimens that are unearthed need to be assigned an appropriate age. To find their age, two major geological dating methods are used. These are called relative and absolute dating techniques. Absolute dating, also called numerical dating, arranges the historical remains in order of their ages. Whereas relative dating arranges them in the geological order of their formation.
- ❖ To establish a relative time scale, a few basic principles or rules had to be discovered and applied. These are: Principle of Superposition, Principle of Original Horizontality, Principle of Lateral Continuity, Principle of Cross-Cutting Relationship, Principle of Inclusions, and Unconformities.
- ❖ Absolute Dating determines the age of a rock/object using radiometric techniques and is quantitative. The dating is based on atomic structure, radioactivity, and half-life.
- ❖ The different methods used in absolute dating are Radiocarbon Dating, Potassium-Argon Dating and Uranium-Lead Dating.

MOTIVATION:

Directions: Read the [Fossils, Rocks, and Time](#) by Lucy E. Edwards and John Pojeta, Jr.

- Explain the difference between "relative time" and "numerical time."
- Explain the overarching structure of the geologic time scale (i.e., the placement of eons, eras, periods, and epochs).
- What is a paleontologist?
- Why do the authors say that the layers of rocks are the pages in Earth's history book?
- What is the Law of Superposition and why is it critical to our interpretation of earth's history?
- What is the Law of Original Horizontality and what does it help us understand about sedimentary rocks that are no longer horizontal?

Atrip Through Geologic Time Study Guide

Yi-Tong Ma



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