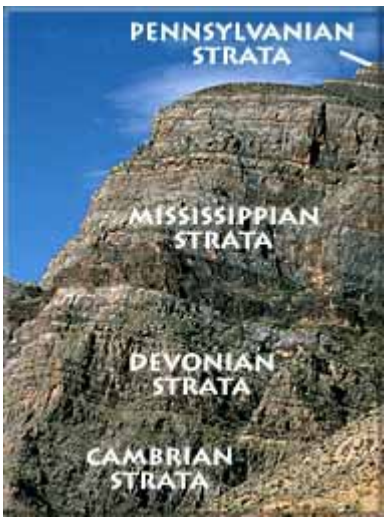

# What is Geologic Time?

Concealed within the rocks that make up the Earth's crust lies evidence of over 4.5 **billion** years of time. The written record of human history, measured in decades and centuries, is but a blink of an eye when compared with this vast span of time. In fact, until the eighteenth century, it was commonly believed that the Earth was no older than a few thousand, or at most, million, years old. Scientific detective work and modern **radiometric** technology have only recently unlocked the clues that reveal the ancient age of our planet.

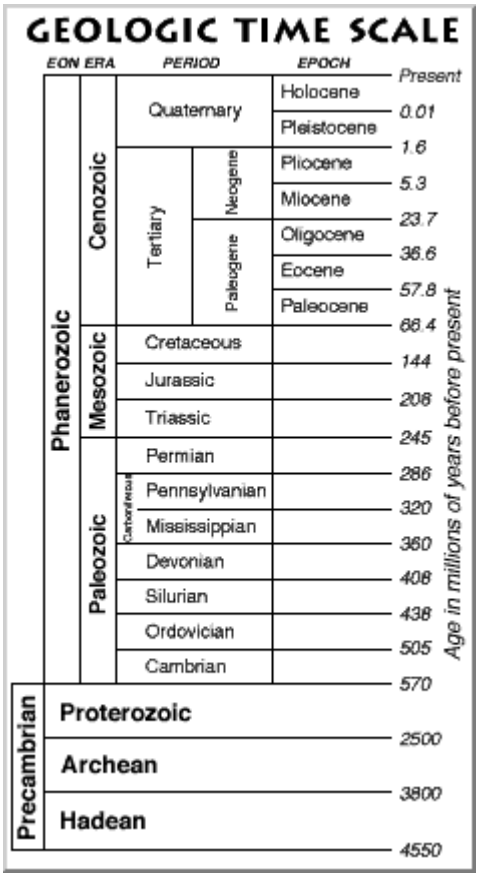



*This image from **Lake Mead NRA** shows a sequence of sedimentary rock layers. The oldest layers, Cambrian (570-505 million years ago) are at the base, with younger layers piled on top. The older layers are lower 'relative' to the younger layers.*

## Evidence for an Ancient Earth

Long before scientists had developed the technology necessary to assign ages in terms of number of years before the present, they were able to develop a '**relative**' geologic time scale. They had no way of knowing the ages of individual rock layers in years (**radiometric dates**), but they could often tell the correct sequence of their formation by using **relative dating** principles and fossils. Geologists studied the rates of processes they could observe first hand, such as filling of lakes and ponds by **sediment**, to estimate the time it took to deposit sedimentary rock layers. They quickly realized that millions of years were necessary to accumulate the rock layers we see today. As the amount of evidence grew, scientists were able to push the age of the Earth farther and farther back in time. Piece by piece, geologists constructed a geologic time scale, using increasingly more sophisticated methods for dating rock formations.

Early geologists used the relative positions of rock layers as clues to begin to unravel the complex history of our planet. However, it was not until this century that nuclear age technology was developed that uses measurements of radioactivity in certain types of rocks to give us ages in numbers of years. These ages, usually called **radiometric ages**, are used in conjunction with relative dating principles to determine at least an approximate age for most of the world 's major rock formations.




## *The Geologic Time Scale*

The 4.55 **billion**-year geologic time scale is subdivided into different time periods of varying lengths. All of Earth history is divided into two great expanses of time. The **Precambrian** began when Earth first formed 4.55 billion years ago and ended about 570 million years ago. The **Phanerozoic Eon** began 570 million years ago and continues today.

This time scale, from the Decade of North American Geology, is widely used in North America. As we improve our ability to date rocks using radiometric dating methods, the time scale is amended. The time scale is constantly being refined, so don't be surprised to see continuing revisions as our technology and understanding of the Earth improves!

The time scale on the right shows the subdivisions of geologic time in a form that will fit on a single page. This format is useful, but it tends to conceal the immense span of time, over 85 percent of Earth's history, within the Precambrian.

To see the entire geologic time scale drawn to scale so you can see the divisions of time in their correct proportions, **click here**.

**Next: Putting time into proportion**