

Comparison of the Time Ranges for Dating Methods

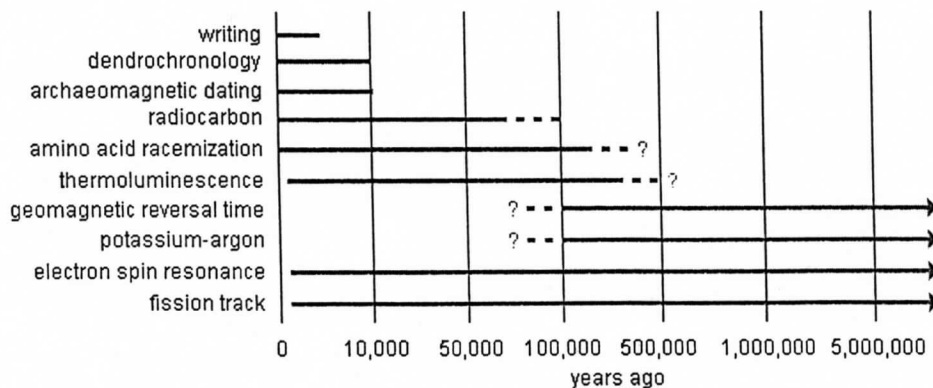
In this overview of chronometric dating methods, we have seen that it is possible to get quite accurate dates going back to nearly 10,000 years ago. Four methods are most commonly used for sites from this recent time range:

1. written records back to about 5,000 B.P.
2. dendrochronology back to nearly 10,000 B.P. (in at least one region)
3. radiocarbon (C-14) dates from about 7,500 B.P. to nearly the present (corrected by cross-dating with tree-rings)
4. archaeomagnetic dates from about 10,000 B.P. to nearly the present (based on the wandering of magnetic north around the rotational north pole)

Dating events that occurred in the time range of 10,000 to 70,000 B.P. is most often done with the radiocarbon method. These older dates are less reliable because they are not corrected for cosmic radiation rates varying through time. Keep in mind also that radiocarbon dating of samples older than 40,000 B.P. is usually done with the far more costly accelerator mass spectrometry method.

Amino acid racemization, thermoluminescence, electron spin resonance, and fission track dating are used occasionally as well for materials from the 10,000 to 100,000 B.P. time range. These latter four techniques are still considered by some researchers to be experimental. However, when several different dating methods produce roughly the same date for an event, there is greater confidence that they are correct.

For sites that are older than 100,000 years, potassium-argon and fission track have been the most commonly used dating techniques. However, refinements in the amino acid racemization, thermoluminescence, and electron spin resonance dating methods have made them more useful for this early time range as well. Geomagnetic reversal time scale dating has been less often used.



In addition to the likely time range, paleoanthropologists and archaeologists have to select dating techniques based on the kinds of datable materials available. Any organic substances can be used for radiocarbon and amino acid racemization dating. Coral, bones, teeth, and shell can also be dated with the electron spin resonance technique. Dendrochronology, of course, can only date tree-rings. Burned clay and lava flows are materials used for archaeomagnetic dating. Glassy minerals, such as mica and obsidian, are datable with the fission track method. Pottery and other similar materials containing crystalline solids are usually dated with the thermoluminescence technique. Finally, the potassium-argon method is used to date volcanic rock and ash.

Name: _____

Date: _____ Period: _____

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Article questions

1. What are two methods of determining age up to 10,000 years ago?
2. Electron spin resonance may be used to determine age in what time frame?
3. What methods may be used for organic substances?
4. What substances may be dated with electron spin resonance?
5. What substances may be dated with the fission track method?
6. What method may be used to date volcanic rock and ash?