

# Trapped Charge Dating

*Mark Bergemann*

Most people know something about carbon dating and some are aware of rock dating using other radiometric dating methods, but few in the general public have heard about any of the many other dating techniques. One very popular type is *trapped charge dating*. Just like radiometric dating, trapped charge dating is based on *unprovable* assumptions. If any of those assumptions are false, then dates calculated using trapped charge dating are invalid. That is because conclusions based on a false assumption are invalid conclusions.

It is claimed that trapped charge dating can measure ages up to 300,000 years and maybe older.<sup>1</sup> God created the universe thousands of years ago, so we can be certain that dates older than that are wrong, even if those false dates come from otherwise respected sources such as science. Science is often wrong, as evidenced by the fact that it often rejects its own cherished theories and laws, replacing them with new theories and laws.<sup>2</sup>

There are three trapped charge dating methods: Thermoluminescence (TL), Optically Stimulated Luminescence (OSL), and Electron Spin Resonance (ESR). These methods were rarely used in the 1970s and 80s, but have become increasingly common since then. Trapped charge dating is considered less accurate than carbon dating. Labs using trapped charge dating methods assign much larger age ranges to samples they date compared to the ranges assigned to samples dated using carbon-14 dating.

A college textbook explains the procedure [*italics and bold in original*],

The same principle underlies all three techniques. Over time, background radiation (generated primarily by uranium, thorium, and a radioactive isotope of potassium) in sediment caus-

---

<sup>1</sup> David Hurst Thomas and Robert L. Kelly, *Archaeology*, 4th ed., (Belmont, CA: Thompson, 2006), 192.

<sup>2</sup> For more on laws and theories of science often being wrong, see: Mark Bergemann, "How Can A Lie Like Evolution Have Scientific Evidence?", *LSI Journal* vol. 29 no. 1 (2015) [www.LutheranScience.org/2015lie](http://www.LutheranScience.org/2015lie) (accessed May 16, 2019)

es some electrons of the atoms of certain minerals, notably quartz and feldspar, to move to a different energy state. When this happens, some electrons are “trapped” in atomic imperfections in the minerals’ crystal lattices. ...Assuming that the radiation dose is constant over time, electrons become trapped at a constant rate. If we could somehow measure the number of electrons trapped in the crystal lattice, we would have an estimate of the *total* radiation dose the specimen has received over time. If we knew the *annual* background radiation dose, we could calculate a specimen’s age simply by dividing the first measure by the second. ...We figure the annual dose by burying a radiation-measuring device, called a **dosimeter**, in an archaeological site and retrieving it a year later. ...The three techniques are partially distinguished by the methods used to determine the total radiation dose, as well as the kinds of materials they date. ...The important thing to know is that electrons which are moved *out* of their orbits (that is, trapped) by background radiation are *returned* to their orbits by sufficient heat (500 °C) or by exposure to even a few minutes of sunlight. ...So, strictly speaking, *trapped charge dating identifies the last time a specimen had its electron traps emptied*.<sup>3</sup>

## Thermoluminescence

Thermoluminescence (TL) attempts to calculate how long ago a mineral was heated to at least 932 °F (500 °C). Ceramics and burnt stone are often dated with this method. Ceramic pots contain grains of quartz or feldspar in the sand which was added to clay to make the pot. Grains of quartz or feldspar are removed from the sample, and it is those grains which are dated.<sup>4</sup>

## Optically Stimulated Luminescence

Optically stimulated luminescence (OSL) attempts to calculate how long ago the sample was exposed to sunlight.<sup>5</sup> This technique is used to date dirt, which often contains quartz or feldspars.

---

<sup>3</sup> Thomas and Kelly, 192.

<sup>4</sup> Thomas and Kelly, 193-194, 197.

<sup>5</sup> Thomas and Kelly, 194-195, 197.

## Electron Spin Resonance

Electron spin resonance (ESR) attempts to date “tooth enamel, burned stone tools, corals, [and] shells.”<sup>6</sup> A college textbook describes ESR,

Like thermoluminescence, ESR is a “trapped charge” dating method, but it is applied to different kinds of samples, and the method of measurement is also different. ESR does not release trapped electrons, but subjects them to electromagnetic radiation in a magnetic field, which causes electrons to resonate and absorb electromagnetic power. The strength of resonance reflects the number of electrons that have become trapped since the crystals were formed. As with TL, age is estimated by relating the amount of resonance to the radioactive content of samples, combined with any external radiation that they have received, and calculating how long it would have taken for that amount of radiation to produce the level of resonance recorded.<sup>7</sup>

The Joukowsky Institute for Archaeology & the Ancient World at Brown University lists several assumptions and difficulties with thermoluminescence, which also happen to apply to optically stimulated luminescence and electron spin resonance [words in brackets were added],

If the specimen’s sensitivity to ionizing radiation is known [*includes assumption #5 below*], as is the annual influx of radiation experienced by the specimen [*assumptions #1-4 below*], the released thermoluminescence can be translated into a specific amount of time since the formation of the crystal structure. Because this accumulation of trapped electrons begins with the formation of the crystal structure, thermoluminescence can date crystalline materials to their date of formation; for ceramics, this is the moment they are fired. The major source of error in establishing dates from thermoluminescence is a consequence of inaccurate measurements of the radiation acting on a specimen. The complex history of radio-

---

<sup>6</sup> Thomas and Kelly, 195, 197.

<sup>7</sup> Kevin Greene and Tom Moore, *Archaeology: An Introduction*, 4th ed. (New York: Routledge, 2002), 182.

active force on a sample can be difficult to estimate [*assumptions #1-4 below*]. However, thermoluminescence has proven acceptable in providing approximate dates in the absence of more exact measures.<sup>8</sup>

## Unprovable Assumptions

Just like radiometric dating methods, trapped charge dating methods rest on multiple *unprovable* assumptions. Here are some of the assumptions evolutionists make when using trapped charge dating:

1. It is assumed that the annual radiation dose the sample received, over a claimed period of up to 300,000 years or more, is the same as the dose measured over a recent 1-year period at the location the sample was found. (In some cases, the annual dose is estimated by measuring over a 10-30 minute period<sup>9</sup>).
2. It is assumed that the sample did not receive a large dose of radiation before being buried in the location it was found.
3. It is assumed that the sample has always been buried in the exact conditions it was found—that its immediate surroundings were not disturbed over a claimed period of up to 300,000 years or more. This means the amount and type of radioactive isotopes within about a foot (about 30 cm.) of the sample, and the density of that dirt including its water content, have remained fairly constant over that long period. [“In a 2.5 density sediment, alpha particles have a range of 20-30  $\mu\text{m}$ , beta particles, around 2-3 mm and gamma rays up to 30 cm.”<sup>10</sup>]
4. It is assumed that the intensity of cosmic rays received by the sample can be correctly estimated.<sup>11</sup>

---

<sup>8</sup> Joukowsky Institute for Archaeology & the Ancient World, Thermoluminescence Dating, in *Archaeologies of the Greek Past*, October 2007.

[www.LutheranScience.org/JI-TL](http://www.LutheranScience.org/JI-TL) (accessed May 16, 2019)

<sup>9</sup> Mäilys Richard et al., “Electron spin resonance dating of fossil teeth: some basic guidelines to ensure optimal sampling conditions,” *Quaternaire* 28, no. 2 (2017): 157 (page 4 in pdf reprint).

<https://journals.openedition.org/quaternaire/8003> (accessed May 16, 2019)

<sup>10</sup> Richard, 157 (pages 4 in pdf).

<sup>11</sup> “In the case of ‘young’ samples (e.g., from Upper Pleistocene deposits), and/or in a very low radioactive context, the contribution of the cosmic dose rate has

5. It is assumed that the crystal sample dated (quartz/feldspar/hydroxy-apatite/etc.) had no impurities which could affect its rate of trapping electrons.<sup>12</sup>
6. It is assumed that radioactive decay has continued at a constant rate in the past.

The International Journal of the French Quaternary Association, the *Quaternaire*, is a peer-reviewed journal devoted to study of the geologic column's top layer—the Quaternary layer, supposedly documenting the most recent 2.6 million years. The *Quaternaire* recently published an article to teach archaeologists how to properly gather information for having fossil teeth dated with electron spin resonance. This article shows the great difficulty of attempting to “reconstruct” how much radiation a sample received, even when using evolutionist assumptions like “no Flood” and “deep time.” When using creationist assumptions (such as a planet-wide flood several thousand years ago), that reconstruction becomes impossible if the sample was from the pre-Flood world or from the centuries immediately after the Flood.

The *Quaternaire* article begins with these words [underline not in original],  
The application of radiation exposure dating methods (OSL, TL, ESR) requires the acquisition of data from the sample itself, in addition to those related with its surrounding environment. Indeed, for Electron Spin Resonance (ESR) dating of tooth enamel, the origin of the sample as well as its sedimentary context must be well known to ensure an accurate dose rate reconstruction. ...the reliability of the age result depends on the accuracy of the dose rate reconstruction.<sup>13</sup>

## Effects of the Flood

All three trapped charge dating methods –OSL, TL, and ESR– require that we accurately know the amount of radiation a sample has re-

---

*proven to be significant.*” Richard, 157 (pages 4 in pdf).

<sup>12</sup> Andrew A. Snelling, “How Reliable Are Dates for Human Fossils?,” *Answers Magazine*, September 1, 2018

[www.LutheranScience.org/AIG-FossilDate](http://www.LutheranScience.org/AIG-FossilDate) (accessed May 16, 2019)

<sup>13</sup> Richard, 155, 157 (pages 2, 4 in pdf).

ceived over a claimed period of up to 300,000 years or more. We can *measure* the radiation that sample is being exposed to *today*, but we must *guess* the exposure it received in the *past*. To make that guess of past exposure, the *Quaternaire* quote above says “the origin of the sample as well as its sedimentary context must be well known.” Evolutionists reject the possibility of the Flood, therefore they will never know “the origin of the sample,” if that sample was from a time near or before the Flood. *The exact effects of the Flood on the sample are unknown, but from modern scientific knowledge it appears that the Flood may have subjected that sample to large doses of radiation, making it appear to evolutionists that the sample is much older than it actually is.*

For many decades, museums and art auction houses have been using trapped charge dating to detect modern forgeries of ancient and period ceramics. As a result, some forgers now subject their forgeries to radiation to simulate “age.”<sup>14</sup> What if fossils originating from thousands of years B.C. received far more radiation than evolutionists assume they received? That would, in the eyes of evolutionists, simulate “age” which in reality never existed. Could that simulated “age” be a result of Noah’s Flood?

Measurements of the earth’s magnetic field over the past 100 years have shown that, “The intensity of Earth’s magnetic field varies continuously, and it has decreased by ~10% over the past century.”<sup>15</sup> The effect of the earth’s magnetic field on rocks as they formed in the past (such as magma solidifying), and on sea-floor sediment as it formed in the past, has led scientists to believe that the earth’s magnetic field has temporarily weakened multiple times in the past and has even reversed polarity multiple times in the past.<sup>16</sup> The earth’s magnetic field would be very weak

---

<sup>14</sup> “To outsmart TL, forgers artificially irradiate items.” Dina Modianot-Fox, “Forensic Science for Antiques Revealing art secrets—and exposing forgeries,” *Smithsonian.com*, May 14, 2008. [www.LutheranScience.org/smithTL](http://www.LutheranScience.org/smithTL) (accessed May 16, 2019)

<sup>15</sup> Yu-Min Chou et al., “Multidecadally resolved polarity oscillations during a geomagnetic excursion,” *PNAS* (Proceedings of the National Academy of Sciences) 115, no. 36 (September 4, 2018): 8916 (pdf page 4). <https://www.pnas.org/content/115/36/8913> (accessed May 16, 2019)

<sup>16</sup> “Geomagnetic polarity reversals have occurred irregularly throughout Earth history. ... Polarity reversals and excursions occur during periods with low geomagnetic field intensities. ...The contemporary geomagnetic field intensity is de-

during the time prior to and immediately after a reversal of that field. The earth's magnetic field "shields Earth from direct impact of solar wind and cosmic radiation."<sup>17</sup> During periods when the magnetic field is weaker, many more cosmic rays reach earth, as it is the earth's magnetic field that shields the earth from cosmic rays.

Using evolutionist assumptions, "the most recent polarity reversal ...is astronomically dated at  $773 \pm 1$  thousand years ago."<sup>18</sup> A new stalagmite-based estimate of the most recent reversal, also using evolutionist assumptions, shows a recent reversal at 100 thousand years ago.<sup>19</sup> Creationists associate these magnetic reversals with the Flood, which occurred only a few thousand years ago. Creationist Russ Humphreys (PhD in physics) developed a scientific model which has the earth's magnetic field at the time of the Flood temporarily weaker than today and quickly reversing multiple times. After these reversals the field became much stronger and then steadily reduced to today's level. His 1983 model has stood the test of time and still provides a solid explanation for the magnetic field on earth and other planets.<sup>20, 21, 22</sup>

We know for certain that there was a planetary flood on earth several thousand years before Christ, because God reveals that to us in Scripture. It seems likely that during and shortly after the Flood the earth's magnetic field was very weak, resulting in many more cosmic rays reaching the surface of the earth. The *Quaternaire* article requires that the effect

---

*creasing, and it has been suggested that a field reversal is impending ...Since the discovery of geomagnetic reversals in igneous rocks in the 1920s (13), diverse geological archives, such as lava flows, sedimentary rocks, and marine/lacustrine sediments, have been studied over recent decades."* Chou, 8913 (pdf page 1).

17 Chou, 8913 (pdf page 1).

18 Chou, 8913 (pdf page 1).

19 Chou, 8913 (pdf page 1).

20 Andrew A. Snelling, "More Evidence of Rapid Geomagnetic Reversals Confirms a Young Earth," *Answers in Depth*, vol. 10 (January 8, 2015).

[www.LutheranScience.org/AIGmagRev](http://www.LutheranScience.org/AIGmagRev) (accessed May 16, 2019)

21 Russell Humphreys, "Reversals of the Earth's Magnetic Field During the Genesis Flood," *Proceedings of the First International Conference on Creationism*, ed. R. E. Walsh, C. L. Brooks, & R. S. Crowell, 1986, 113–123.

[www.LutheranScience.org/RH1986](http://www.LutheranScience.org/RH1986) (accessed May 17, 2019)

22 Russell Humphreys, "The Earth's Magnetic Field Is Young." *Acts & Facts*, 22, no. 8 (August 1993). <https://www.icr.org/article/earths-magnetic-field-young> (accessed May 17, 2019)

of cosmic rays on the sample be taken into account.<sup>23</sup> If they are not, the calculated age of the sample may be far greater than its actual age.

So, significantly stronger radiation from cosmic rays during and after the Flood may be an additional factor in explaining why the three trapped charge dating techniques –OSL, TL, and ESR– sometimes result in ages of tens and hundreds of thousands of years. Evolutionists assume that the intensity of cosmic rays received by the sample fit evolutionary assumptions. They reject the possibility of a planetary flood thousands of years ago, and in doing so, grossly overestimate the age of samples which originated from the time before and shortly after Noah’s Flood.

**By faith we know that the universe  
was created by God’s word, so that what  
is seen did not come from visible things.**

Hebrews 11:3 (EHV)

We accept articles of faith —such as creation, the Flood, the forgiveness of sins, and the resurrection to eternal life— *by faith*, even if our sin darkened human reason (including science) wants to deny these truths. That said, modern dating techniques like radiometric dating and trapped charge dating are all based on unprovable godless assumptions. When we realize that evolutionary claims of millions of years are actually weak claims, the temptation to accept evolutionary timescales disappears.

---

<sup>23</sup> “By definition, the cosmic rays are attenuated by the rock and sediment covering the tooth. Consequently, the true cosmic dose rate received by the sample decreases according to the thickness of these deposits. In the case of ‘young’ samples (e.g., from Upper Pleistocene deposits), and/or in a very low radioactive context, the contribution of the cosmic dose rate has proven to be significant: for instance, in the case of a cave, the roof thickness and the proximity of the sample from the cave entrance should be recorded and taken into account for cosmic dose rate estimation. Other parameters such as the altitude above sea level and latitude may also affect the intensity of the cosmic rays.” Richard, 157 (pages 4 in pdf).