Accelerated Nuclear Decay Difficulties Solved?

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One of the major challenges confronting the young earth view has been the supposed ages of millions of years for the earth and dinosaurs—even billions for the age of the earth. One proposal that has been made by creation scientists to account for this seeming discrepancy between secular science view and the creationist view is accelerated nuclear decay (abbreviated herein as ACCND).

What is ACCND? I will explain this by analogy. Think of an hourglass. It is used to tell time based on an assumed rate at which the sand moves through the neck of the hourglass. The movement of sand is analogous to the decay of radioisotopes. If the rate at which sand moves through the hourglass were accelerated by temporarily widening the neck, allowing more sand to fall through faster, we would have a lot more sand in the bottom half. Someone might look at the hourglass and conclude, based on the large amount of sand in the bottom part (or the amount of radioisotope decay products in a specimen), that a long time had passed. Actually, only a short time would have passed.

But what caused the ACCND? One mechanism that has been proposed is that the strength of the strong nuclear force changed, but this brings up the question: what caused the change in the strength of the strong nuclear force? 1 Thus, a scientific explanation is needed for the ultimate cause of ACCND.

There is another problem with the ACCND hypothesis. Those creation scientists advocating ACCND often express concern about this problem—the heat problem. (Barry Setterfield has proposed ACCND in the early universe due to changing properties of the vacuum, which avoids this heat problem. Setterfield's process is outside the scope of this article, however; but see https://www.barrysetterfield.org/ for more information on this mechanism.) They say ACCND would have produced enough heat that it would have melted much of the earth! ACCND involves millions and even billions of years worth of such heat-generating decay (based on today’s decay rate), taking place in a short time. 2 , 3 Fortunately, there is a scientific mechanism that not only explains the reason for the accelerated decay but also

provides the solution for the heat problem. That mechanism is the subject of this article, with special emphasis on the problem of the heat produced.

Why Accelerated Nuclear Decay?

A research program was initiated to look into the issues of radiometric dating. The project was called RATE, for Radioisotopes and the Age of the Earth. [4] The RATE Group noted that some discrepancies among the radiometric dates obtained by different dating methods might be explained by ACCND.

One method dated a zircon crystal as over a billion years old, while another method dated it as only thousands of years old. The 1.5 billion year date is based on the amount of lead found in the crystal, assumed to have been formed from decayed uranium. The other, much younger, date was based on the amount of helium in the crystal. The decay of uranium to lead releases helium nuclei, which just need to grab a couple of electrons to become a helium atom. Therefore, helium is produced inside the crystal by the decay of the uranium inside the crystal. But, unlike the lead produced from the decay of uranium, helium can diffuse out of the crystal, and the scientists applied this in dating the zircon crystal.

Having measured the amount of uranium that had decayed, the scientists knew the amount of helium that had been produced, and having measured the amount of helium in the crystal and the rate at which helium diffused out of the crystal, they came to a couple of remarkable conclusions. The amount of helium remaining in the crystal could only be explained by the uranium decay (and helium's production) having occurred relatively recently (compared to the millions of years originally assumed) and by the uranium decay rate to have been much greater than the rate measured today. For high amounts of helium and lead to exist in the crystal at the same time, ACCND of the uranium must have occurred, and it must have occurred within the last several thousand years. ACCND explains seeming discrepancies between biblical dates and conventional radiometric dates.

One of the RATE Group experimenters, who still holds to a long age for the earth, after five years has not come up with a different interpretation of the data according to Dr. Russell Humphreys. [2]

Problems with ACCND

Heat

The heat problem is addressed in a paper written by an undergraduate honor student, Matthew Rognstadt, for a seminar on the age of the earth at the University of South Dakota. Rognstadt points out that the amount of heat produced as a result of ACCND would have been enough to cause serious problems.

> There are, however, a number of serious difficulties with RATE's hypothesis of accelerated decay. The RATE creationists acknowledge two of the most fundamental side effects of any such acceleration: heat and radiation. Aggregated over the 4.5 billion year history of Earth, radioactive decay has produced tremendous amounts of both. The acceleration of 4 billion years of decay into the first two days of the creation week and squeezing 500 million years into the year of the Flood is rather problematic. The Flood acceleration alone would have released enough energy to heat the Earth to a temperature of more than 22,000°C, which is roughly four times the temperature of the surface of the sun. That amount of energy would have caused rocks, and presumably the entire crust of the Earth, to vaporize. Aside from the fact that the planet would no longer exist, the geologic evidence RATE cites in support of acceleration would certainly have been obliterated.
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> The RATE team certainly brings a new level of professional qualifications and technical detail to creationist arguments. The helium accumulation in zircon crystals and residual carbon-14 they documented are definitely interesting findings. It is, however, far from clear that they actually support the idea of accelerated decay, especially when the heat generated would have erased all the evidence they found. 5

Radiation

In addition to the heat produced by ACCND, we ought to not overlook the obvious; this is accelerated nuclear decay, after all, and as such, there would be radiation produced. Again, this would be lots of radiation crammed into a small period of time; millions of years worth in fact, crammed into less than a single year. It has been argued that the radiation produced from the ACCND would have been sufficient to kill all human life on the earth, which raises the question of when did ACCND occur.

Again from Rognstadt, who addresses this and RATE's idea that ACCND may have occurred during creation week and at the time of Noah's Flood:

> The other major problem RATE acknowledges is that the massive amounts of radiation released by large-scale acceleration of radioisotope decay would have killed everything on the planet, including the people and animals on the ark. The lethal effect of radiation appears to be the primary reason RATE concluded that most accelerated decay occurred during the first two days of creation, before life existed, and for rejecting an episode of acceleration during the Fall and Judgment. But the acceleration during Noah's Flood is more vexing:
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> > There is the obvious issue of protecting the precious animal and human life on board the ark. The water barrier between the ark and the earth's rock layers could have played a major role along with divine intervention. 6
>
> On face, the argument that water could shield the ark from such radiation seems dubious, but actually it is rather reasonable given that open water or pool-type nuclear reactors use water for exactly that purpose. The real problem is that the human body itself contains enough 40K and 14C that acceleration on the scale proposed by RATE would be fatal. Since the RATE team believes that the people on the ark must have survived for any humans to exist today, they concluded that people at the time of the Flood must have contained fewer unstable isotopes. 7

So we have two problems: heat and radiation! Now let's look at ACCND more deeply, and look for a solution to these problems.

Proposed Mechanisms for Accelerated Nuclear Decay

Strength of Strong Nuclear Force

The RATE Group suggested a change in the strength of the strong nuclear force as a possible mechanism or cause of decay rate change. 8 This article will not focus on this proposed mechanism, but on another mechanism that also resolves the heat

problem.

Strong Nuclear Force Alteration

The strong nuclear force holds the nucleus together, and altering it could obviously affect how easily that nucleus falls apart (decays). So a change in the strong nuclear force seems to be a plausible mechanism for ACCND, but we lack a cause for the change of the strong nuclear force, and ultimately, this requires miraculous changes to a physical constant. This solution also offers no remedy for the heat problem, nor for the radiation problem. So, while plausible, this solution has problems.

Proposed Solutions to the Heat and/or Radiation Problems

Volumetric Expansion of the Universe Explanation

Dr. Russell Humphreys's idea that the universe expanded at the time of creation and at the time of the Genesis flood may provide a mechanism for the volumetric cooling needed during ACCND suggested in the RATE project. 9 Humphreys explains that it is not clear where the energy goes as a result of expansion, and even relativistic experts may not know:

> The mechanism causes photons and moving material particles in an expanding cosmos to lose energy. The equations clearly show the loss of energy, but where and how the energy goes is less clear. 10

While these mechanisms (alteration of the strong nuclear force for ACCND and volumetric expansion of the universe for cooling) do have a scientific basis, they also invoke miracles to change the strong coupling constant and again to rapidly expand the universe. There is no physical mechanism that would explain their occurrence at just the right time, other than a miracle.

Is there any explanation for ACCND that does not invoke miracles and that also does not suffer from the heat and radiation problems? Amazingly, the answer is yes!

Proposed Mechanism to Explain ACCND Without Heat or Radiation Problems

In a nutshell, ACCND is explained by the following proposed mechanism:

The earth contained water under the crust. After weakening due to tidal forces of the moon over centuries, the crust cracked, the water escaped, and forces were set in motion. These mechanical forces led to electrical forces and ultimately to ACCND.

To fully understand this mechanism, it helps to have a bit of background of the Hydroplate Theory model: 11

Fountains of the great deep opened up as part of the flood of Noah, which led to movement of continental plates producing mechanical stresses, which, due to piezoelectric and other mechanisms, produced electrical effects in the granite of the crust, which accelerated the nuclear decay rates. As you can see, there are a lot of causal links in the chain of processes, one leading to the other.

The Hydroplate Theory not only can explain the cause of the ACCND but also solves the heat and radiation problems. This unexpected result obviously tends to support the likelihood of the theory's veracity. The events of the flood according to this model also result in the removal of excess heat, as well as the production of less heat than might be expected. We will explore how the events of the flood combined in a way that solves the heat problem.

Heat Energy Was Carried Out to Space, by Water

Niagara Falls is eroding rock, measurably. Let us consider the measurable erosion there and then consider the force of the eruption of the fountains of the great deep. If we consider the weight of miles of rock pressing down on the water in the underground chambers, then we might compare this with the force of the water plunging across the falls at Niagara. There, the force is due to the weight of the water. Which force do you think would be greater: the weight of the water or the weight of miles of rock?

Calculations show that the subcrustal water would have been super-critical water, one factor contributing to the explosive energy of this water. This is water that is very hot and under a lot of pressure; a quart of it would have the energy of approximately a stick of dynamite.

This force would have been great enough to force water out in the eruption of the fountains of the great deep. Dr. Brown has studied this event for years and done

many calculations related to the flood, incorporating the energies involved, the velocities involved, and the temperatures involved. As the man selected to be the director of the Air Force Geophysics laboratory and a personal associate of one of the founders of Plate Tectonics (meeting one-on-one with him on a regular basis), we must not lightly discount his scientific expertise in this area. The eruption carried the water out into space, where some of it fell back to earth, and some of it continued on outward. Water is known for its capacity to absorb much heat; once absorbed, water may carry the heat away. Also, expansion of water can have a cooling effect. The water that erupted into the atmosphere traveled on into space, where the pressure was much reduced from the pressure exerted by the miles of rock above it before it erupted. This cooling of the water could remove more of the heat from ACCND.

Image

Figure 1 - Electronic heat sink

But the question might arise: how much heat could the water absorb? We know that heat should be transferred more quickly across a larger surface area, which is the reason that the heat sinks used in electronic devices typically are made of heat-conduction material with a very large surface area (Fig. 1). The same principal applies to the shape of structures for dissipating heat in automobile radiators and in

air conditioners. The surface area of contact between the rocky crust (in which radioactive decay was accelerated) and the water beneath the crust in the great deep would have been large; but this surface was increased much more by virtue of numerous pores and cracks, due to the dissolving away of some of the minerals in the crustal rock. This porosity of the crust would have increased the surface area of contact between the water and the rock greatly, thus aiding the transfer of heat away from the crust to the water, to be carried away by the water.

Even water that fell back to earth as rain could have released heat into space, away from earth, before the water returned to earth. We might wonder, what in empty space could the heat be transferred to? But think of the examples of which many of us have heard: of hot planets that cool (such as earth). Where does their heat go? What material in the vacuum of space absorbs their heat? Radiation is one way heat can be carried even through a vacuum, as heat we receive from the sun.

Instead of Heat, Some ACCND Energy Was Converted into Kinetic and Electrical Energy

Heat is not the only form of energy. Some of the energy released by nuclear decay can be ultimately transformed into other types of energy, such as kinetic energy and electrical energy. The kinetic energy is obvious since nuclear energy has been transformed into kinetic energy in explosions. Due to limitations on the length of this article, we will not go into the details of conversion of kinetic energy to electrical energy, but to establish the possibility, think of what happens when one moves a comb through hair, feet across a carpet, etc.; the energy of motion results in electrical effects, including sparks! So, since nuclear energy can be transformed into energy of motion, and energy of motion can be transformed into those sparks, we see it is possible.

Instead of Heat, Some ACCND Energy Was Absorbed by Other Nuclear Reactions

The mechanism for ACCND involves fusion of lighter elements into larger nuclei which then decay by fission into smaller nuclei; the combination of fusion and fission allows the absorption of energy as well as the release of energy by different processes; thus some of the energy released by ACCND would have been absorbed by other co-occurring nuclear reactions, removing some of the energy from ACCND.

This was found to be the case, not just in theory, but in lab experiments:

> Fusion occurred, and even superheavy elements formed. Thousands of experiments at the Proton-21 Laboratory have demonstrated this phenomenon. Because superheavy elements are so unstable, they quickly fission (split) or decay.
>
> Although fusion of nuclei lighter than iron released large amounts of nuclear energy (heat), the fusion of nuclei heavier than iron absorbed most of that heat and the heat released by fission and decay. 12

Rognstad says that even with the ocean, enough radioactive material was present in organic life, that if radioactive decay had been accelerated, the radioactive material in organic life would have killed that life: 7

> The real problem is that the human body itself contains enough 40K and 14C that acceleration on the scale proposed by RATE would be fatal. Since the RATE team believes that the people on the ark must have survived for any humans to exist today, they concluded that people at the time of the Flood must have contained fewer unstable isotopes 13 , 14

This is not a problem for the Hydroplate explanation since only atoms exposed to the extreme electrical and mechanical forces inside the crust of the earth would be accelerated in their decay, which would not include atoms in people on the ark.

Less Heat to Remove With No Catastrophic Plate Tectonics

The father, of catastrophic plate tectonics, John Baumgardner, says that catastrophic plate tectonics would have produced a large amount of heat to be removed from the earth, in addition to the heat from ACCND:

> Considering the volume of oceanic lithosphere to be layered 80 km thick covering 60% of the earth’s surface, we obtain a value of 3.4 × 1028 J for the amount of associated gravitational potential energy. If released near the earth’s surface, this amount of energy is sufficient to melt a layer of silicate rock 12 km thick or to boil away a layer of water 25 km deep over the entire earth. 15

The Hydroplate Theory does not involve catastrophic plate tectonics and thus does not have the problem of the additional heat created from that model. The Hydroplate explanation not only contains mechanisms to remove the heat, but there is less heat to be removed than in other models.

ACCND Occurred Only in the Crust, Not Throughout the Entire Earth's Deep Interior

There is an assumption of radioactivity throughout the earth as a major source of the earth's heat. The problem of the heat from ACCND becomes less of a problem if the assumption of radioactivity throughout the interior of the earth is not valid. This notion is based on the assumption that the earth formed by accretion of material that was itself formed in the interior of stars and that this material included heavy elements from supernovae. However, both of these assumptions are questionable; there is evidence contrary to the supernovae origin of heavy elements. NASA supercomputer models of supernovae fail to explode. 16

Also, if the earth did not form by accretion, then we would not need to assume that heavy elements, including radioactive elements, over long time periods would have migrated to the core of the planet. If we consider the possibility of a younger earth, along with the problems of supernovae generating heavy elements and if we question the accretion method of planet formation, then we need not surmise that the earth contains radioactive material throughout its interior; we can limit radioactivity, and ACCND, to the crust only. This vastly reduces the amount of radioactive decay and thereby vastly reduces the heat to be removed.

Additionally, it is obvious that there is less radiation produced in this model, as well as less heat produced. So this model goes a long way towards resolving the radiation problem as well.

> The distribution of radioactive material with depth is unknown, but amounts of the order of those observed at the surface must be confined to a relatively thin layer below the Earth's surface of the order of a few tens of kilometers in thickness; otherwise more heat would be generated than can be accounted for by the observed loss from the surface." 17

The Earth's Core Was Not Hot Before the Flood

Another source of heat that makes the problem of removal of the heat from AACND worse is the assumed heat throughout the interior of the earth existing at the time of the flood. The previous point was the reduced amount of heat throughout the earth's interior due to the removal of the requirement of radioactive decay throughout the earth's interior; the current point is about the assumed pre-existing heat throughout the earth before the flood, not the additional heat from accelerated nuclear decay at the time of the flood.

According to this model, the earth before the flood was cooler, and thus a large amount of heat is removed from the amount of heat assumed to exist in addition to the heat generated by ACCND.

Again, though, the reasons for the assumptions are somewhat tied together for the assumption of heat throughout the planet is related to the assumption that the heat derives at least partly from radioactive material in the interior of the earth. With less of such material, as argued in the point above, there would obviously be less heat. Then, we might ask, where does the current heat in the interior of the planet come from?

The explanation for this heat is that the material deep in the interior of the earth, migrated due to the events of the flood. As the fountains of the great deep opened, like the inner tube of an old tire bursting through a crack in the tire, the inner earth material beneath the chamber of water, bulged upward through the crack. This resulted in the formation of the mid-Atlantic ridge, and as this material bulged upwards through the crack in the crust, the crust on both sides of that crack slid downhill away from the bulge, lubricated by the water underneath those sliding continental hydroplates. This movement of earth's interior material upward in the Atlantic resulted in a corresponding depression in the Pacific, where today we find very deep areas such as the Marianas Trench.

When we consider that on opposite sides of the planet there was migration of the earth's material, then it is reasonable to assume that the material between those two regions, contiguous through the earth's interior, was also moving. This material was under great pressure—now we are not talking about only 10 miles or so of rock exerting pressure, but thousands of miles. The resulting friction from this movement produced the heat we find today still present in the earth's interior.

Therefore, this model does not require the current large amount of heat in the earth's interior to have existed before the flood. This model thereby further eases the solution of the heat problem.

Summary

We have a model that accomplishes the following and/or has the following characteristics:

- Does not require miraculous changes of nuclear forces
- Does not require miraculous accelerated expansion of the universe at just the right time
- Explains what happened to the heat of ACCND
- Explains what happened to the radioactivity of ACCND, i.e., there just wasn't that much of it
- The one and the same mechanism explains both ACCND as well as the attendant problem of the heat ACCND brings (while other solutions attempting to solve these problems are less integrated)

The Conclusion

Science does not show the flood to have been impossible. Far from it, the flood can explain the ACCND we see. The flood events, cracking the crust, etc. led to the mechanical forces that led to the electrical forces that led to the nuclear reactions that led to the appearance of ACCND. All of this stems from the flood itself, without invoking an ad hoc miraculous expansion of space and a similar unexplained change of the strong coupling constant. The chain of events in this model requires no ad-hoc miracles (think of Occam's Razor). Thus this model explains not only how the flood worked but also seeming problems related to radiometric dating and is worthy of serious consideration.

Acknowledgements

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