A MATHEMATICAL FORMULATION OF A CREATIONIST-FLOOD INTERPRETATION OF RADIOCARBON DATING

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Introduction

At various times the author has seen attempts to reconcile the creation-flood view of earth origins, on the one hand, and the results of C^{14} dating, on the other.[1,2] These attempts have been more or less qualitative, the idea being that the C^{14} ages are in error due to (1) there having been a smaller production rate of the radioisotope before the flood, and/or (2) there having been a larger amount of C^{12} in the biosphere before the flood, and/or (3) there having been some sort of variation in the decay constant of C^{14} at the time of the flood.

This author is not attempting to investigate the validity of these concepts, nor to study the intricacies of the C^{14} dating method; but he does feel that the concepts merit *mathematical expression* so that they can be subjected to more rigorous testing. One such expression, for a different model, appears in reference 3.

This paper, then, simply develops a mathematical statement of the C^{14}/C^{12} ratio under a specific, simple, creation-flood model. Parameters are defined which allow for possible checking against data.

Theoretical Equations

1. General equation

The general equation describing the net rate of increase of C^{14} is

$$\frac{dN}{dt} = -\lambda N + C \,, \tag{1}$$

Where N is the number of nuclei, λ is the decay constant, and C is the rate at which nuclei are being formed (in the atmosphere, through cosmic ray bombardment). The solution to this equation is

$$N = N_o e^{-\lambda t} + \frac{C}{\lambda}(1-e^{-\lambda t}) \tag{2}$$

if the production rate C is constant during this time.

2. Model for earth's origins

It is necessary now to postulate a model for the earths origins. It is hoped that this model is sufficiently flexible to allow for different understandings of the available data. Time is counted from creation (t=0), to the "beginning" of the flood (t_f). During this period (#l) it is assumed that the C^{14} count rose, as described by Equation (2), from nothing:

$$N_1 = \frac{C_1}{\lambda_1}(1 - e^{-\lambda_1 t}). \tag{3}$$

During this first period it is assumed that there existed a certain total number, M_1, of C^{12} nuclei in the biosphere, and hence it follows that the ratio of C^{14} to C^{12} is Equation (3) divided by M_1 (not constant in time but well mixed in biosphere at any time).

When period #l was over, at the "beginning" of the flood, a new period (#2) began during which, by hypothesis, there was the possibility of a different production rate and/or of a different decay rate. Hence the number of C^{14} nuclei will be described by Equation (2) with subscripts appropriate for period #2 and with, for N_0, the entire right-hand side of Equation (3) evaluated at t_f:

$$N_2 = \left[\frac{C_1}{\lambda_1}(1 - e^{-\lambda_1 t_f})\right] e^{-\lambda_2 (t-t_f)} + \frac{C_2}{\lambda_2}(1 - e^{-\lambda_2 (t-t_f)}). \tag{4}$$

During this period, by hypothesis, there was a certain number of inert carbon nuclei in the biosphere, namely M_2. Note that this does not allow for *progressive* burial of biological material. Also, by hypothesis, the C^{14}/C^{12} ratio would be given by Equation (4) divided by M_2 (not constant in time but well mixed at any time).

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When period #2 was over, at the "end" of the flood, the number of C^{14} nuclei in existence would be given by Equation (4) with t_e substituted for t. This time t_e was the beginning of period #3, the post-flood era in which we now live. To make a first approximation, it will be assumed that N_2 at t_e *exactly* equals N_3. In other words, the events during period #2 exactly put us on the equilibrium asymptote of the curve whose earlier, rising, parts are accepted by uniformitarianism (Equation (2) with $N_0 = 0$, $C = C_3$, $\lambda = \lambda_3$). It is as if one turns on a cold stove to "Heat #l," and then, before equilibrium is attained, pushes "Heat #2," and then, at the precise instant when the stove has attained the temperature which "Heat #3" is supposed to reach in equilibrium, pushes the "Heat #3" switch. And so we have

$$N_3 = \frac{C_3}{\lambda_3} = \left[\frac{C_1}{\lambda_1}(1 - e^{-\lambda_1 t_f}) \right] e^{-\lambda_2 (t_e - t_f)} + \frac{C_2}{\lambda_2}(1 - e^{-\lambda_2 (t_e - t_f)}) \qquad (5)$$

It is assumed that there is no change whatsoever in the production rate (C_3) of carbon-14, or of the number (M_3) of ordinary carbon, since the flood. The ratio if radioisotopic carbon to ordinary carbon is then Equation (5) divided by M_3.

This first approximation is very restrictive. The obvious generalization would be to say that N_3 is given by Equation (2) with N_0 given by Equation (5) and with C = C3 and $\lambda = \lambda_3$. This generalization will result in such severe complication of the already taxing results [Equations (13) and (14)] that in this tutorial-type paper it would be best not to exhibit it. Those who advance the work will, furthermore, wish to include such effects as the rapid burning of fossil material in recent centuries.

3. The C^{14} age-dating procedure

The entire C^{14} dating procedure begins with the measurement of the disintegration rate of C^{14} in a sample. We argue, from Equation (1), that the disintegration rate gives us the desired knowledge of how many radionuclei there are in the sample:

$$n = \frac{-1}{\lambda_3} \frac{dn}{dt} \; ; \qquad (6)$$

where n is the number now in the sample; the subscript indicates that we are doing our measurement in period #3 (the present). The next step in the procedure is to assume that we have exactly n nuclei because of uniformitarian decay from some initial number, n_o, which the organic matter had in it when it "died," time T ago:

$$n = n_o e^{-\lambda_3 T} \; . \qquad (7)$$

Next we measure the amount of nuclei of C^{12} present, m, divide, and assume that the C^{14}/C^{12} ratio has always remained unchanged:

$$\frac{n}{m} = \frac{n_o}{m} e^{-\lambda_3 T} = \frac{N_3}{M_3} e^{-\lambda_3 T} = \frac{C_3}{\lambda_3 M_3} e^{-\lambda_3 T} \; . \qquad (8)$$

The radio carbon age is obtained from Equation (8) and is

$$T = -\frac{1}{\lambda_3} \ln\left[\frac{(n/m)}{(N_3/M_3)}\right] = -\frac{1}{\lambda_3} \ln\left[\frac{(n/m)}{(C_3/\lambda_3 M_3)}\right] . \qquad (9)$$

4. Relating radiocarbon age to actual age

We now wish to derive expressions giving the relation between a radio carbon age (based on the uniformitarian assumption) and the actual age (according to our model). Suppose that the organic matter "died" during period #2; then the number of radionuclei divided by the number of ordinary carbon nuclei at the time, t', of death was

$$\frac{n_o}{m} = \frac{N_2}{M_2} = \left[\frac{C_1}{\lambda_1 M_2}(1 - e^{-\lambda_1 t_f}) \right] e^{-\lambda_2 (t' - t_f)} + \frac{C_2}{\lambda_2 M_2}(1 - e^{-\lambda_2 (t' - t_f)}) . \qquad (10)$$

according to Equation (4). Now this number of radionuclei had, at time t_e, decayed to

$$\frac{n_o}{m} e^{-\lambda 2(t_e-t')} ; \qquad (11)$$

and by now, at time t, this number had further decayed to

$$\frac{n}{m} = \frac{n_o}{m} e^{-\lambda 2(t_e-t')} e^{-\lambda 3(t-t_e)} . \qquad (12)$$

We set this ratio equal to that which the uniformitarian method predicts on the basis of the present carbon ratio and a longer age (Equation (8)):

$$\frac{C_3}{\lambda_3 M_3} e^{-\lambda 3T} = \{ [\frac{C_1}{\lambda_1 M_1} (1-e^{-\lambda 1tf})] e^{-\lambda 2(t'-tf)} + \frac{C_2}{\lambda_2 M_2} (1-e^{-\lambda_2(t'-tf)}) \}$$

$$e^{-\lambda 2(t_e-t')} e^{-\lambda 3(t-t_e)}$$

$$= \frac{C_1}{\lambda_1 M_1}(1-e^{-\lambda 1tf}) e^{-\lambda 2(t_e-t_f)} e^{-\lambda 3(t-t_e)}$$

$$+ \frac{C}{\lambda_2 M_2} e^{-\lambda 2(t_e-t')} e^{-\lambda 3(t-t_e)}$$

$$- \frac{C}{\lambda_2 M_2} e^{-\lambda 2(t_e-t_f)} e^{-\lambda 3(t-t_e)} . \qquad (13)$$

Study of Equation (13) reveals that it is possible to write an expression for the radiodated age, T, as a function of numerous variables, but that it is not possible to arrange the t's so that the actual age, t-t', appears explicitly. In other words, it is impossible to obtain an equation for t-t' in terms of T.

Suppose that the organic matter "died" during period #l; a very similar derivation shows that the ages are related by the equality

$$\frac{N_3}{M_3} e^{-\lambda 3T} = \frac{C_1}{\lambda_1 M_1} e^{t_f(\lambda_2-\lambda_1)} e^{t_e(\lambda 3-\lambda 2)} e^{t(-\lambda 3)} e^{t'(\lambda 1)} . \qquad (14)$$

This equation is analogous to Equation (13), even though the arguments of the exponentials have been arranged somewhat differently.

5. Limiting cases and checks

Equation (13) ($t_f \leq t' \leq t_e$) has the property that T is larger as the amount of C^{12} in the biosphere is imagined to have been larger (M_1/M_3 larger) and/or as the production rate of C^{14} is imagined to have been smaller (C_1/C_3 smaller). Simplification of the formula can be made if it is considered permissible to let t_e-t' and t'-t_f be small (letting the time of the flood be short). By expanding the exponentials with small argument, keeping only the largest term in the expansion, and letting $t_f = t_e = t'$, we have

$$\frac{C_3}{\lambda_3 M_3} e^{-\lambda 3T} = \{\frac{C_1}{\lambda_1 M_1} (1-e^{-\lambda_1 t'}) + \frac{C_2}{\lambda_2 M_2} [\lambda_2(t-t')]\} e^{-\lambda 3(t-t')} . \qquad (15)$$

If $\lambda_1 = \lambda_3$, then

$$\frac{C_3}{\lambda_3 M_3} e^{-\lambda_3 T} = \frac{C_1}{\lambda_3 M_1} \left(e^{-\lambda_3(t-t')} - e^{-\lambda_3 t}\right) + \frac{C_2}{\lambda_2 M_2} \lambda_2 (t-t') e^{-\lambda_3(t-t')}. \quad (16)$$

Finally, if we could ignore the term containing only t (time from creation to the present), we would obtain

$$\frac{C_3}{\lambda_3 M_3} e^{-\lambda_3 T} = \frac{C_1}{\lambda_1 M_1} e^{-\lambda_3(t-t')} + \frac{C_2}{\lambda_2 M_2} \lambda_2 (t-t') e^{-\lambda_3(t-t')} \quad (17)$$

in which the real age, t-t', does explicitly, and uniquely, but transcendentally, appear in the formula.

Equation (14) ($0 \leq t' \leq t_f$) has the same properties as Equation (13) as far as M_1/M_3 and C_1/C_3 are concerned. It has also the property that if we simply assume $\lambda_1 = \lambda_3$, then it reduces down to

$$\frac{C_3}{\lambda_3 M_3} e^{-\lambda_3 T} = \frac{C_1}{\lambda_1 M_1} e^{-(\lambda_2-\lambda_3)(t_e-t_f)} e^{-\lambda_3(t-t')} \quad (18)$$

so that in this case the real age, t-t', does explicitly and uniquely show in the equation,

Conclusion

Equations for carbon ages, as compared to real ages, have been presented for a specific model of the earths origins. It is clearly evident that the useful application of the equations would be to determine C_1, C_2, M_1, etc., from samples wherein radiocarbon age and real age are both known.

Acknowledgements

The author acknowledges that the idea for this work came from discussions with Dr. Robert Brown of Union College, Mr. Robert Gentry of Columbia Union College, and Mr. Henry Pearl of Glendale City College.

References

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COMMENTS ON SCIENTIFIC NEWS AND VIEWS

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Lines of Sight

We have often had occasion to notice some of the special features of various living creatures—features which are useful to them in their way of life. Another such feature has been mentioned recently: the fact that certain predators have marks which appear to be sighting marks to help them in catching their prey. These marks are typically lines along the bill or snout, and such marks are found in many kinds of creatures.[1,2]

Sometimes there may be extra refinements; the heron's sights, e.g., it is suggested, may be set at an angle to correct for the refraction caused by the water. The heron sights on the fish at its apparent depth under water, but the compensation introduced by the sights causes it to strike at the real depth.

Other markings around the eyes, especially dull ones, may, it is suggested, help to reduce glare. So many creatures have not only "gun sights," but also "sun glasses."

The significant question to this is apparent: how could such things as the sights have "evolved." For, like so many other features, they needed to be about perfect before they would be of any use at all.

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