A SIMPLE GEOMETRICAL MODEL FOR COMPARING PRE-FLOOD AND POST-FLOOD GEOMORPHOLOGY

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A simple model, based on Gen 1:9, Ps 104:6-8, Gen 7:11 et al., for comparing the geometric disposition of land and sea of the pre-Flood, Flood time and post-Flood worlds, is developed and evaluated. Numerical evaluation of this model provides estimates of: the energies associated with the Flood and "the fountains of the great deep," the change in the earth's radius, and the changes of the depth of the ocean and heights of the continents. A discussion follows, on the application to: global ice formation, continent building, the frozen mammoths, the rotation of the earth on its axis and the accuracy of the King James Version translation of Ps 104:8.

Introduction

Scriptures contain many references to the physical characteristics of the Flood, as well as to its spiritual import. (Gen 6:1-7, 1 Pet 3:19-20, Mt 24:37.) This paper will only attempt, on the basis of selected verses, to study the geometry of this global catastrophe. This study should provide, then, a basis for further work on the subject, and may throw light onto several diverse problems which, in recent years, have been associated with or explained in terms of the Flood.[1]

The Biblical Evidence

Before the Flood, it will be supposed here, the world had one ocean and one continent; and, of course, it was spherical then as now. The first point seems to follow from Genesis 1:9:

> Gen 1:9. And God said, Let the waters under the heaven be gathered together unto one place, and let the dry land appear: and it was so.

That the "waters . . . be . . . unto one place" bespeaks of a single ocean; and if so, there must have been just one continent. Hence Gen 1:9, theorematically states that at Creation there was an island continent on a spherical earth. The fact of a spherical earth is not only common knowledge but follows from Biblical revelation (e.g. Isa 40:22, Prov 8:27, Job 38:14, Job 22:14, Eccl 1:5, 6). For purposes of simplicity the demarcation between land and sea shall be assumed to be circular; this does not affect the argument much. Several other verses relate to Gen 1:9, for example, Ps 95:5 and Prov 8:29. All Bible citations will be from the King James Version.

The water of the Flood, in my opinion, was supplied by a great upwelling of deep ocean water and of subterranean water beneath the pre-Flood ocean floor. This follows from Gen 7:11,

> Gen 7:11. . . ., the same day were all the fountains of the great deep broken up, and the windows of heaven were opened.

and several related verses, for example Job 38:8, Ps 33:7 and 2 Pet 3:5, to list but a few. The magnitude of this catastrophe cannot be overstated, for "all" sources of oceanic water commenced to give forth water from the "same day." "Fountains of the great deep" and "broken up" mean that God brought forth the water of Gen 1:2 which was stored at Gen 1:9 (Ps 33:7), once again to immerse and cleanse the world. This might be pictured as many local heapings-up throughout the ocean contributing to a global rise of the water level. The heapings occurred above the places where the ocean floor was rent (i.e. "broken up") and which gave rise to great elevations ("fountains") of masses of water tens or hundreds of miles in radius. For example, consider Psalm 33:7,

> Ps 33:7. He gatherth the waters of the sea together as an heap: he layeth up the depth in store-houses.

It is interesting to note that the KJV translators have used "waters" as opposed to "water" in Genesis 7 (:6, 7, 17, 18, 19, 20, 24) to indicate the plurality of water sources, i.e. from the "deep" ocean and subterranean ocean "fountains" as well as from "the windows of heaven" of the atmosphere. In fact, in Genesis 1 and in the Flood chapters Genesis 6 through 9, they used 'water' only in the plural where as elsewhere in Genesis it occurs exclusively in the singular.

Flood Geometry

From the description developed, a geometrical model for comparing the pre-Flood with the post-Flood world will be mathematically defined. The total volume of the earth will be conserved from which changes in the earth radius, ocean depth, and land elevation can be derived in terms of the pre-Flood conditions and change in water budget. A change in water budget corresponds a releasing of encapsulated subterranean water during the Flood. The potential energy change of the water mass due to the Flood, as defined by a pre-Flood and post-Flood geometry, will be derived along with other kinematical and dynamical quantities.

These results, equally, apply to "heap"-ing up (Ps 33:7) of the water "above" (Ps 104:6) their usual level and provide some appreciation of the violence ensuing from the formation of such enormous water columns. More generally, these results apply to local phenomena and to the comparison and change of any set of earth geometries and not just to the comparison of pre-Flood and post-Flood geomorphologies.

In Figure 1, h_3 is the height of the land above (below if $h_3 < 0$), h_2 is the depth of the ocean and the radius of the dry earth is $R = h_1 + h_2 + h_3$. The ocean is assumed to be bound by spheres of radii h_1 and $h_1 + h_2$ and by the cone with apex angle 2ψ. Further let the total volume of the earth (solid matter plus water) be a constant given by $V = (4/3)\pi R_0^3$ where, for simplicity $R_0 \equiv 1$, i.e. use the earth's radius as a unit. Also define $f_v = V_w/V$ as the fraction of the total volume that is in the

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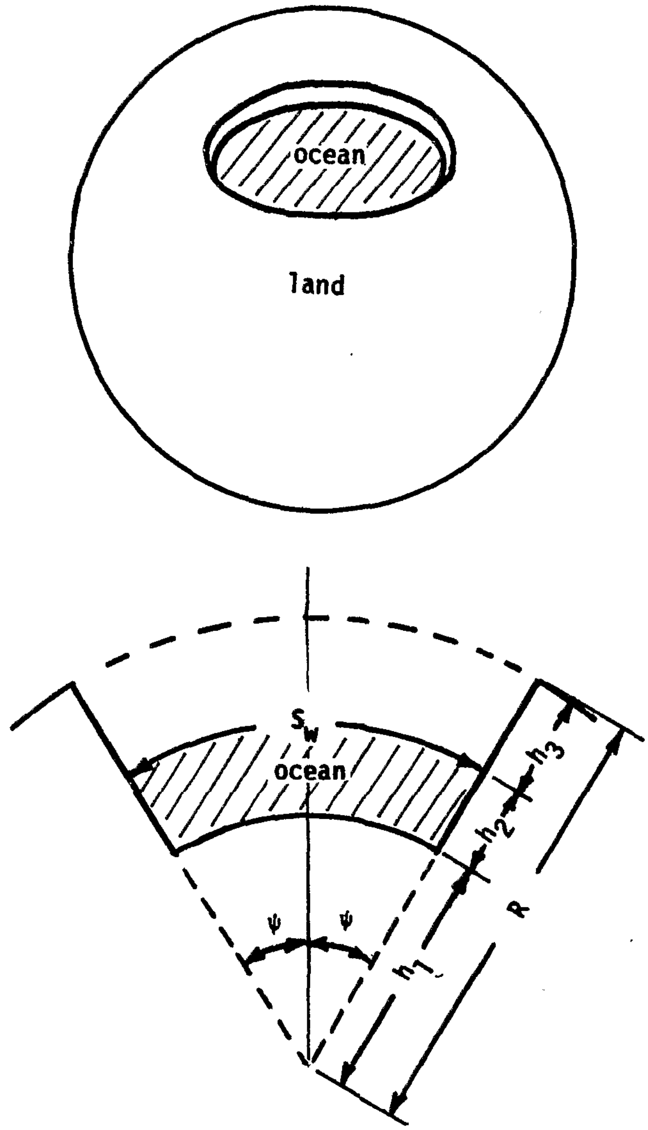


Figure 1. This shows the geometry assumed for the world before the Flood. Above is a general view; below, a cross-section through the earth. The proportion of land to water in this drawing is arbitrary; it is not assumed that it necessarily represents what actually existed.

ocean, where $V = V_w + V_e$ and V_w, V_e are the components of the total volume in water and in solid earth.

From the geometry of the sphere it follows that the area subtended on the surface of a sphere of arbitrary radius ϱ by an arbitrary central one cone of apex angle 2ϕ is

$$A_\phi = 2\pi\varrho^2(1 - \cos\phi) \qquad (1)$$

and the corresponding volume is

$$V_\phi = 2\,\pi\varrho^3(1 - \cos\phi) \qquad (2)$$

Choosing h_2, h_3 and f_v as independent variables, and now using ψ as the angle, gives

$$V_w = \frac{2}{3}\pi(1 - \cos\psi)[(R - h_3)^3 - (R - h_2 - h_3)^3] \qquad (3)$$

$$V_e = \frac{4}{3}\pi R^3 - \frac{2}{3}\pi(1 - \cos\psi)[R^3 - (R - h_2 - h_3)^3]$$

from which result two equations in R and ψ,

$$V = V_w + V_e = \frac{4}{3}\pi R^3 + \frac{2}{3}\pi(1 - \cos\psi)[(R - h_3)^3 - R^3]$$

$$f_vV = V_w = \frac{2}{3}\pi(1 - \cos\psi)[(R - h_3)^3 - (R - h_2 - h_3)^3] \qquad (4)$$

eliminating ψ gives a fifth order polynomial in R

$$O = (V - \frac{4}{3}\pi R^3)[(R - h_3)^3 - (R - h_2 - h_3)^3] \qquad (5)$$
$$- f_vV[(R - h_3)^3 - R^3] = -4\pi h_2R^5 + 4\pi h_2(2h_3 + h_2)R^4$$
$$- 4\pi h_2(h_2h_3 + h_3^2 + \frac{h_2^2}{3})R^3 + 4\pi(h_3f_v + h_2)R^2$$
$$- 4\pi(h_3^2f_v + 2h_2h_3 + h_2^2)R + (\frac{4}{3}\pi)(h_3^3f_v + 3h_2^2h_3$$
$$+ 3h_2h_3^2 + h_2^3)$$

R obtained ψ may be computed from,

$$\cos\psi = 1 - \frac{3}{2\pi}\, f_vV[(R - h_3)^3 - (R - h_2 - h_3)^3]^{-1} \qquad (6)$$

$$\psi = \begin{cases} tan^{-1}\left|\dfrac{(1 - \cos^2\psi)^{1/2}}{\cos\psi}\right|, \cos\psi \geq O \\ \pi - \tan^{-1}\left|\dfrac{(1 - \cos^2\psi)^{1/2}}{\cos\psi}\right|, \cos\psi < O \end{cases}$$

This permits computation of the areas of land, water, total area, and ocean diameter,

$$A_e = 2\pi R^2[1 - \cos(\pi - \psi)] = 2\pi R^2(1 + \cos\psi) \qquad (7)$$
$$A_w = 2\pi(R - h_3)^2(1 - \cos\psi)$$
$$A_T = A_e + A_w$$
$$S_w = 2\psi(h_1 + h_2)$$

Define f_A as the fractional area of water and δR as the change in radius

$$f_A = A_w/A_T,\ \delta R = R - R_o \qquad (8)$$

These equations apply for $\cos\psi \geq -1$ (i.e. $\psi \leq \pi$). Hence the expression for $\cos\psi$ yields permissible values only for $f_v < f_v'$, where

$$f_v' \equiv (R - h_2)^3 - (R - h_2 - h_3)^3 \qquad (9)$$
$$\approx 3h_2(1 - h_2 - 2h_3), R \approx 1, |h_3 + h_2| \ll |$$
$$\approx 3h_2$$

is the limiting value of f_v obtained by assigning $\psi = \pi$ in the expression for $\cos\psi$. Notice that $\psi = \pi$ corresponds to the entire earth being covered by the water.

Kinematical Relationships

If h_3 is permitted to become negative then the standing or heaping of the water may be included in the model. Figure 2 illustrates this. Figure 2(a) shows the stable configuration corresponding to $h_3 \geq 0$ while figures 2(b, c) show the two unstable cases corresponding to $h_3 < 0$. In figure 2(b) $h_3 < 0$ and $h_3 > h_2$ which puts the ocean floor as well as the ocean above dry land. In *figures 2(b, c) the shaded area above radius R represent*

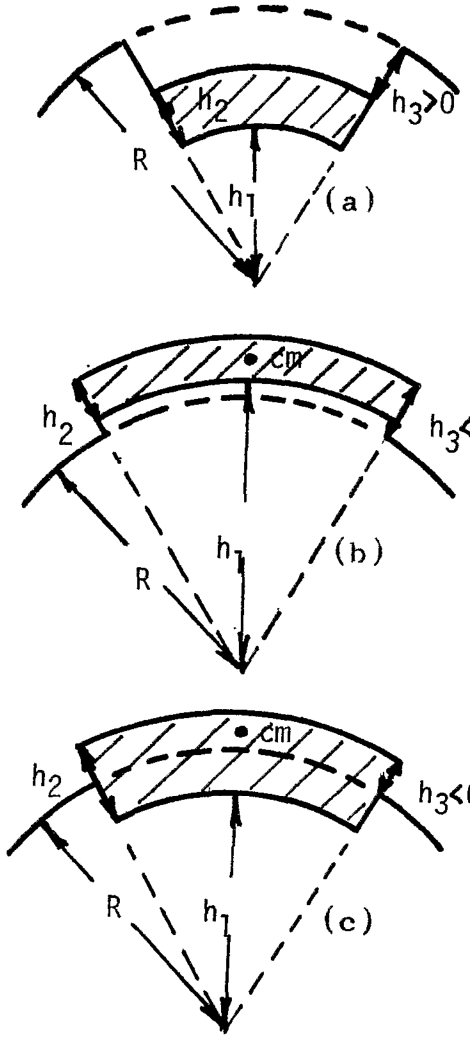


Figure 2. This shows the comparitive geometries at various possible stages of the Flood, it being assumed that the water could rise above the land. (a), equilibrium, $h_3 \geq 0$; the ocean is below the land. (b), $h_3 < 0$, $|h_3| > h_2$; the ocean is completely above the land. (c), $h_3 < 0$, $|h_3| < h_2$; the ocean is partly above the land.

waters that were quickly welled up by the "fountains" and which will immediately fall to their level with devastating force and violence.

In reference to Figures 3(b, c) define; X_1 to be the depth of the global ocean after the suspended water falls, X_2 as the height of the land above the land in case (b), X_3 to be the height through which the water falls in order to establish equilibrium, and P_e as the potential energy in ergs corresponding to the fall of water through height X_3. Uniform gravity will be assumed and X_3 is defined as the difference between the radii of the center of mass of the suspended water and that of the resultant equivalent mass spread out over the globe. The height of the water (surface) above the land is $-h_3$.

In the derivation of the X_i and P_e it will be convenient to define the logical function,

$$(P) = \begin{cases} 1, \text{P is true} \\ 0, \text{P is false} \end{cases} \qquad (10)$$

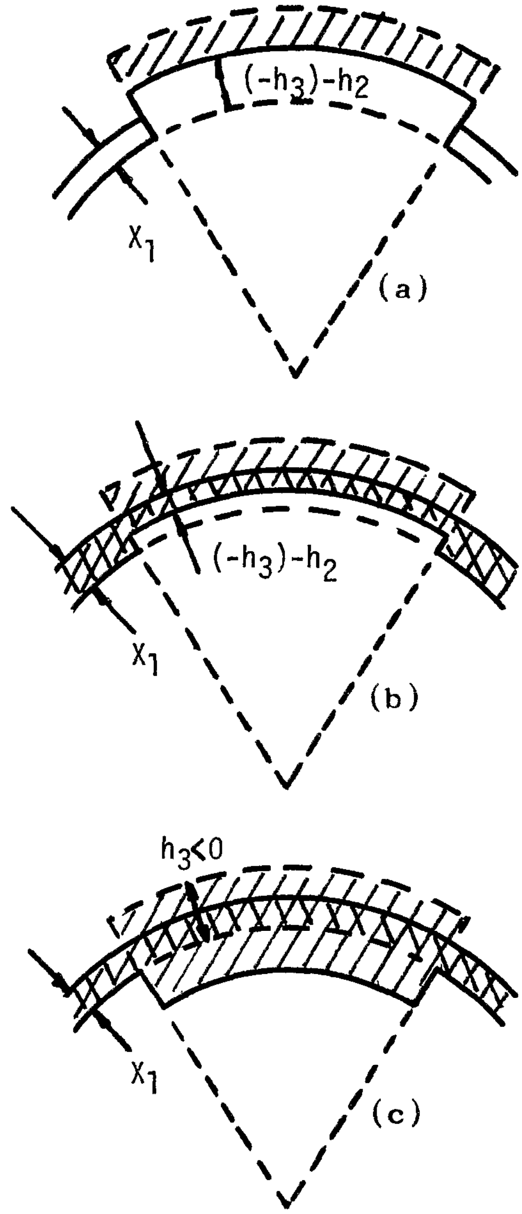


Figure 3. This shows how X_1 is defined. The shaded areas indicate suspended water, the doubly shaded its fallen configuration. (a), $h_3 < 0$, $|h_3| > h_2$, $-h_3 - h_2 \geq V_w/A_e$. The ocean floor is above the fallen water level. (b), $h_3 < 0$, $|h_3| > h_2$, $-h_3 - h_2 < V_w/A_e$. The ocean floor is within the fallen water limits. (c), $h_3 < 0$, $|h_3| < h_2$. The fallen water limits lie within the previous water limits.

e.g. $(\sin x/\cos x = \tan x)(x + y) + (2 > 3)(y) = 1(x + y) + 0y = x + y$.

Figure 3 defines the three distinct cases for defining x_1. In case (a) it follows that, since x_1 is small, $V_w \cong A_e X_1$ and therefore

$$X_1 \approx V_w/A_e, \text{(a)} \qquad (11)$$

Similarly for case (b) it follows that $V_w \cong AX_1 + A_w[X_1 - (-h_3 - h_2)]$ from which

$$X_1 \approx [V_w - A_w(h_2 + h_3)]/(A_e + A_w), \text{(b)} \qquad (12)$$

For case (c), $(-h_3)S_w \cong 4\pi R^2 X_1$ and hence

$$X_1 = -S_w h_3/(4\pi R^3), \text{(c)} \qquad (13)$$

These approximations can be further simplified by noting that $R \cong 1$ and $A_e + A_w \cong 4\pi$. Combining these three cases into one expression gives

$$X_1 \approx (h_3 < 0)(|h_3| \geq h_2)[(-h_3 - h_2 \geq f_v V/A_e) f_v V/A_e$$
$$+ (-h_3 - h_2 < f_v V/A_e)[f_v V - A_w(h_2 + h_3)]/(A_e + A_w)$$
$$+ (|h_3| < h_2)(-S_w h_3/4\pi R^3) \quad (14)$$

The exact formulae for X_1 are easily derived and are

$$(15)$$

$$X_1 = \begin{cases} (\frac{3}{2\pi} V_w[(1 + \cos\psi)^{-1} + R^3]^{1/3} - R, \text{(a)} \\ (\frac{3}{4\pi} V_w(1 + \cos\psi)^{-1} + R^3 + [R - h_2 - h_3)^3]^{1/3} - R, \text{(b)} \\ \frac{1}{6}[(R - h_3)^3 - R^3(1 - \cos\psi) + R^2]^{1/2} - R, \text{(c)} \end{cases}$$

Only for very large f_v would the above approximations depart sensible from the exact formulae.

Again, in reference to Figures 2(b,c) and by virtue of having determined X_1,

$$X_2 = (h_3 < 0)(-h_3 - h_2) \quad (16)$$

$$X_3 = (h_3 < 0)[(|h_3| \geq h_2)(-h_3 - h_2 \geq V_w/A_e)$$
$$(-h_3 - h_2/2 - X_1/2) + (-h_3 - h_2 < V_w/A_e)$$
$$(-h_3 - h_2/2 - X_1/2)] + (|h_3| < h_2)(-h_3/2 - X_1/2)$$
$$= (h_3 < 0)[(|h_3| \geq h_2)(-h_3 - h_2/2 - X_1/2)$$
$$+ (|h_3| < h_2)(-h_3/2 - X_1/2)]$$

where X_3 has been approximated in reference to Figure 3. Figure 3 shows the water before and after it is spread out into an equilibrium configuration, whereby X_3 is taken as the radial difference between the center of mass of the two shaded areas in the three cases shown. An estimate of the potential energy of the water stored and then released is given by

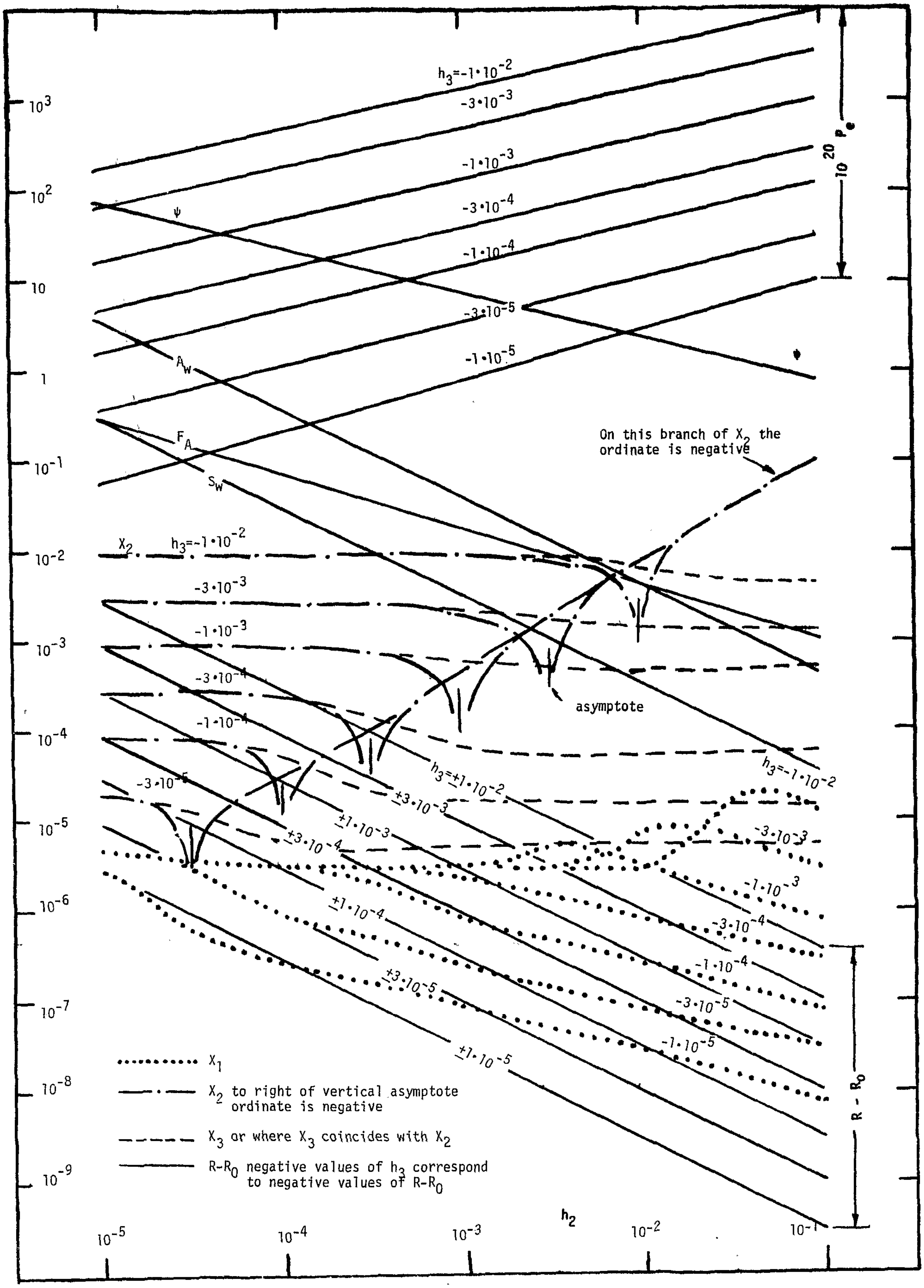
$$P_e \approx [h_2(|h_3| \geq h_2) + (-h_3)(|h_3| < h_2)]A_w P_w g X_3 \quad (17)$$
$$\sim 8 \bullet 5 \bullet 10^{28} h_2 P_w X_3 \text{ergs}, \ -h_3 \sim h_2$$

where a value of the acceleration due to gravity of $g \cong 980$ cgs is sufficiently representative for these purposes and where p_w is the total mass of the earth if it were totally water, i.e. had a specific density of 1 cgs. An earth radius of $6.4 = 10^8$ cm gives $p_w g \pi(4/3) = (6.4 = 10^8)^3 = 980 \cong 8.5 = 10^{28}$. This estimate follows from Figure 3(a, b) in which the volume of water for which every particle falls is $V_w \cong A_w h_2$ and from 3(c) in which

Figure 4. (On the facing page.) This chart gives $R - R_o$, A_w, F_A, ψ, S_w, X_1, X_2, X_3, P_e vs. h_2 for $f_v = 1.10^{-5}$ parametric in h_3.

	f_v	h_2	h_3	$R-R_0$	A_w	A_e	F_A	ψ	S_w	X_1	X_2	X_3	P_e
1	1.0E-05	1.0E-05	-1.0E-01	-3.1E-02	4.19	8.35	0.33	65	1.2	5.0E-06	1.0E-01	1.0E-01	3.6E+23
2	1.0E-05	1.0E-05	-1.0E-03	-3.3E-04	4.19	8.38	0.33	70	1.2	5.0E-06	9.9E-04	9.9E-04	3.5E+21
3	1.0E-05	1.0E-05	-1.0E-05	-3.3E-06	4.19	8.38	0.33	71	1.2	3.3E-06	0.0E+00	3.3E-06	1.2E+19
4	1.0E-05	1.0E-05	1.0E-05	3.3E-06	4.19	8.38	0.33	71	1.2	0.0E+06	0.0E+00	0.0E+00	0.0E+00
5	1.0E-05	1.0E-05	1.0E-03	3.3E-04	4.19	8.38	0 33	71	1.2	0.0E+00	0.0E+00	0.0E+00	0.0E+00
6	1.0E-05	1.0E-05	1.0E-01	3.6E-02	4.19	8.35	0.33	76	1.2	0.0E+00	0.0E+00	0.0E+00	0.0E+00
7	1.0E-05	1.0E-03	-1.0E-01	-3.0E-04	0.04	12.52	0.00	6	0.1	3.3E-06	9.9E-02	9.9E-02	3.5E+23
8	1.0E-05	1.0E-03	-1.0E-03	-3.3E-06	0.04	12.52	0.00	7	0.1	3.3E-06	0.0E+00	5.0E-04	1.8E+21
9	1.0E-05	1.0E-03	-1.0E-05	-3.3E-08	0.04	12.52	0.00	7	0.1	9.2E-08	-9.9E-04	5.0E-06	1.8E+19
10	1.0E-05	1.0E-03	1.0E-05	3.3E-08	0.04	12.52	0.00	7	0.1	0.0E+00	0.0E+00	0.0E+00	0.0E+00
11	1.0E-05	1.0E-03	1.0E-03	3.3E-06	0.04	12.52	0..00	7	0.1	0.0E+00	0.0E+00	0.0E+00	0.0E+00
12	1.0E-05	1.0E-03	1.0E-01	3.7E-04	0.04	12.52	0.00	7	0.1	0.0E+00	0.0E+00	0.0E+00	0.0E+00
13	1.0E-05	1.0E-01	-1.0E-01	-3.3E-06	0.00	12.57	0.00	1	0.0	3.3E-06	0.0E+00	5.0E-02	2.0E+23
14	1.0E-05	1.0E-01	-1.0E-03	-3.7E-08	0.00	12.57	0.00	1	0.0	9.7E-07	-9.9E-02	5.0E-04	2.0E+21
15	1.0E-05	1.0E-01	-1.0E-05	-3.7E-00	0.00	12.57	0.00	1	0.0	9.7E-09	-1.0E-01	5.0E-06	2.0E+19
16	1.0E-05	1.0E-01	1.0E-05	3.7E-00	0.00	12.57	0.00	1	0.0	0.0E+00	0.0E+00	0.0E+00	0.0E+00
17	1.0E-05	1.0E-01	1.0E-03	3.7E-08	0.00	12.57	0.00	1	0.0	0.0E+00	0.0E+00	0.0E+00	0.0E+00
18	1.0E-05	1.0E-01	1.0E-01	4.2E-06	0.00	12.57	0.00	1	0.0	0.0E+00	0.0E+00	0.0E+00	0.0E+00
19	1.0E-03	1.0E-03	-1.0E-01	-3.1E-02	4.19	8.35	0.33	65	1.2	5.0E-04	9.9E-02	9.9E-02	3.5E+25
20	1.0E-03	1.0E-03	-1.0E-03	-3.3E-04	4.19	8.37	0.33	71	1.2	3.3E-04	0.0E+00	3.3E-04	1.2E+23
21	1.0E-03	1.0E-03	-1.0E-05	-3.3E-06	4.19	8.37	0.33	71	1.2	9.8E-07	-9.9E-04	4.5E-06	1.6E+21
22	1.0E-03	1.0E-03	1.0E-05	3.3E-06	4.19	8.37	0.33	71	1.2	0.0E+00	0.0E+00	0.0E+00	0.0E+00
23	1.0E-03	1.0E-03	1.0E-03	3.3E-04	4.19	8.37	0.33	71	1.2	0.0E+00	0.0E+00	0.0E+00	0.0E+00
24	1.0E-03	1.0E-03	1.0E-01	3.6E-02	4.19	8.34	0.33	76	1.2	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	1.0E-03	1.0E-01	-1.0E-01	-3.3E-04	0.05	12.52	0.00	6	0.1	3.3E-04	0.0E+00	5.0E-02	1.2E+25
26	1.0E-03	1.0E-01	-1.0E-03	-3.7E-06	0.05	12.52	0.00	7	0.1	9.7E-06	-9.9E-02	5.0E-04	2.0E+23
27	1.0E-03	1.0E-01	-1.0E-05	-3.7E-08	0.05	12.52	0.00	7	0.1	9.7E-08	-1.0E-01	5.0E-06	2.0E+21
28	1.0E-03	1.0E-01	1.0E-05	3.7E-08	0.05	12.52	0.00	7	0.1	0.0E+00	0.0E+00	0.0E+00	0.0E+00
29	1.0E-03	1.0E-01	1.0E-03	3.7E-06	0.05	12.52	0.00	7	0.1	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	1.0E-03	1.0E-01	1.0E-01	4.2E-04	0.05	12.52	0.00	8	0.1	0.0E+00	0.0E+00	0.0E+00	0.0E+00
31	1.0E-01	1.0E-01	-1.0E-01	-3.5E-02	4.61	7.93	0.37	69	1.3	3.3E-02	0.0E+00	3.3E-02	1.3E+27
32	1.0E-01	1.0E-01	-1.0E-03	-3.7E-04	4.64	7.93	0.37	75	1.3	1.0E-04	-9.9E-02	4.5E-04	1.8E+25
33	1.0E-01	1.0E-01	-1.0E-05	-3.7E-06	4.64	7.93	0.37	75	1.3	1.0E-06	-1.0E-01	4.5E-06	1.8E+23
34	1.0E-01	1.0E-01	1.0E-05	3.7E-06	4.64	7.93	0.37	75	1.3	1.0E+00	0.0E+00	0.0E+00	0.0E+00
35	1.0E-01	1.0E-01	1.0E-03	3.7E-04	4.64	7.93	0.37	75	1.3	0.0E+00	0.0E+00	0.0E+00	0.0E+00
36	1.0E-01	1.0E-01	1.0E-01	4.0E-02	4.67	7.87	0.37	81	1.3	0.0E+00	0.0E+00	0.0E+00	0.0E+00

Table 1. This gives the Flood parameters as a function of f_v, h_2 and h_3.



$h_3=-1\cdot10^{-2}$
$-3\cdot10^{-3}$
$-1\cdot10^{-3}$
$-3\cdot10^{-4}$
$-1\cdot10^{-4}$
$-3\cdot10^{-5}$
$-1\cdot10^{-5}$
ψ
A_W
F_A
S_W
$10^{20}\,P_e$
On this branch of X_2 the ordinate is negative
X_2
asymptote
$h_3=+1\cdot10^{-2}$
$+3\cdot10^{-3}$
$+1\cdot10^{-3}$
$+3\cdot10^{-4}$
$+1\cdot10^{-4}$
$+3\cdot10^{-5}$
$+1\cdot10^{-5}$
$R - R_0$
X_1
X_2 to right of vertical asymptote ordinate is negative
X_3 or where X_3 coincides with X_2
$R-R_0$ negative values of h_3 correspond to negative values of $R-R_0$
h_2
10^{-5}
10^{-4}
10^{-3}
10^{-2}
10^{-1}
10^3
10^2
10
1
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
10^{-7}
10^{-8}
10^{-9}

this volume is $A_w(-h_3)$. Since $R \cong R_o \equiv 1$ then the mass of the volume is the product of its volume by p_w, i.e. this volume is the fraction of the total.

Numerical Evaluation

Table 1 contains a brief list of the values of the formulae derived. Note that, because of the use of the logical function, a value of zero for the X_i and P_e may indicate that these quantities are not defined for the choice of dependent values. f_v, h_2 and h_3 have been chosen as the independent variables in constructing this table and in subsequent figures. A PL/I Formac listing of a program to produce a more comprehensive table with higher precision is available from the author. Figure 4 gives a detailed graphical representation for $f_v = 10_{-}^{5}$. Figure 5 displays variations with respect to f_v. The solution of the quintic for R has been obtained by Newton's method.

For example if $f_v = 10^{-3}$, $h_2 = 10^{-3}$ and $h_3 = 10^{-3}$ (i.e. 1/10000 of the earth is ocean whose depth is .001 and whose surface is .001 below land) then, from line 23 of Table 1, the ocean will have an area of $A_w = 4.19$, a diameter of $S_w = 1.2$, and will subtend an angle of $2\psi = 142$ degrees as measured from the center of the earth. The area of dry land is $A_e = 8.37$ which comprises $100(1 - f_A) = 67\%$ of the total earth's surface. The radius of the dry earth is $R = R_o + (R - R_o) = 1 + 3.3 \bullet 10^{-4} = 1.0033$, i.e. the radius is $3.3 = 10^{-4}$ larger than that of a reference sphere having the same volume.

The quantities X_1, X_2, X_3, and P_e do not apply in this case for the ocean is below the level of land. Next, let the pre-Flood world be defined by $f_v = 10^{-3}$, $h_2 = 10^{-3}$ and $h_3 = 10^{-5}$ and the post-Flood world by $f_v = 10^{-3}$, $h_2 = 10^{-3}$ and $h_3 = 10^{-5}$ then by comparing lines 10 and 22 of Table 1 it is found that the radius of land has increased from $1 + 3.3 \bullet 10^{-8}$ to $1 + 3.3 \bullet 10^{-6}$, the area of water from .04 to 4.19 corresponding to diameters of 0.1 and 1.2 and central angles of 14° and 142°. In this example the water of the Flood would have been increased an hundredfold.

Now consider the following values which might pertain to the circumstances before and after an upwelling during the Flood year, $f_v = 10^{-5}$, $h_2 = 10^{-5}$, $h_3 = 10^{-5}$ and $f_v = 10^{-5}$, $h_2 = 10^{-5}$, $h_3 = -10^{-3}$. Comparing lines 4 and 2 of Table 1 shows that the radius of land decreases from $1 + 3.3 \bullet 10^{-6}$ to $1 - 3.3 \bullet 10^{-4}$ with no appreciable change in the oceanic geometry but in this case the negative value of h_3 gives $X_1 = 5.0 \bullet 10^{-6}$, $X_2 = 9.9 \bullet 10^{-4}$, $X_3 = 9.9 \bullet 10^{-4}$ and $P_e = 3.5 \bullet 10^{21}$.

A more extensive table could have been used to trace the change in parameters for a given program for the continuous variations of h_2 and h_3. This is an exmple where the ocean floor would become dry land and dry land would become the ocean floor after the water column (as pictured in Figure 3) were to fall.

The concatenation of such events, as in these examples, could be used to profile an hypothetical succession of upheavals during the Flood year. For example after the water fall of the previous example h_2 becomes $h_2 = X_1 = 5.0 \bullet 10^{-6}$ and h_3 becomes $h_3 = X_2 - X_1 \cong 0$. In this manner an ordered record of f_v, h_2 and h_3 can be assembled from assumed f_v, h_2 and h_3.

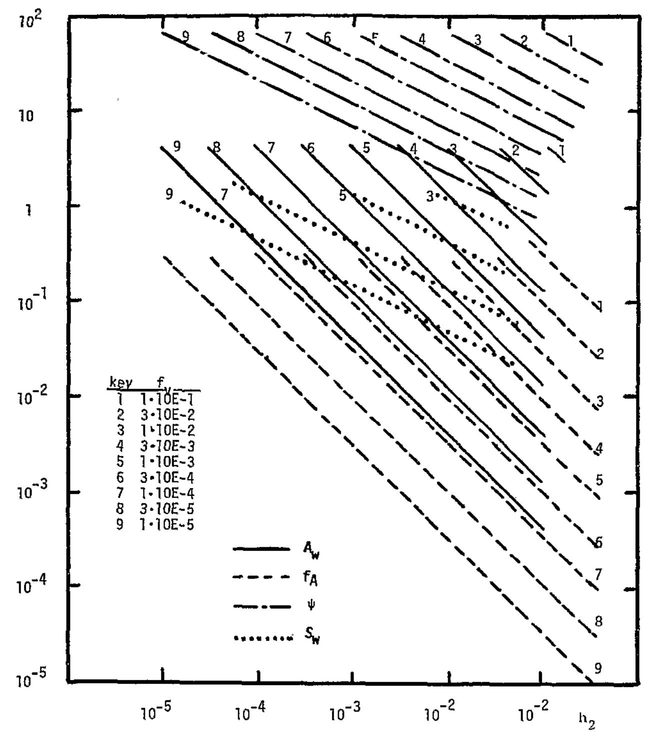


Figure 5. This chart shows A_w, F_A, ψ, S_w, vs. h_2 with parameter f_v. These curves are very nearly straight and independent of h_3.

Before proceeding to specific applications, it is important to realize the generic nature of the assumptions made. Obviously h_2 and h_3 represent average dimenisons. A circular ocean is representative of an ocean of arbitrary shape, not necessarily contiguous, and subtending the same solid angle as viewed from the earth's center, i.e. equal to A_w steradians.

The volume fraction, f_v, has thus far been used to represent the fraction of water, however, mathematically it may represent any material, e.g. a continental uplift with dimensions h_2 and h_3.

Approximations

The logarithmic-linear approximations evident in Figure 4 are shown in Figures 5 and may be represented by,

$$
\begin{aligned}
A_w &\approx 4 \bullet 3 f_v h_2^{-1} \qquad (18)\\
F_A &\approx \bullet 35 f_v h_2^{-1}\\
\psi &\approx 73 f_v^{1/2} h_2^{-1/2}\\
\delta_w &\approx 1 \bullet 25 f_v^{1/2} h_2^{-1/2}\\
R - R_o &\approx \bullet 335 f_v h_2^{-1} h_3
\end{aligned}
$$

These approximations are within about 10% of the correct answer for $0 \leq f_v, h_2, h_3 \leq 10_{-}^{1}$, the accuracy increasing as f_v and h_3 approach zero; however the accuracy of the expression for $R - R_o$ is accurate to within 0.5%. Note that these approximates permit the easy rescaling of Figure 5 so that a similar figure for any f_v results. This rescaling is valid only for relations and parameter ranges where logarithmic-linearity occurs. No such approximations for X_1, X_2, X_3 and P_e are apparent.

Possible Changes in the Earth's Angular Velocity

It frequently has been conjectured that the upheavals during the Flood year altered the earth's rotational velocity. In order to test this conjecture assume that as in ordinary mechanics, angular momentum is conserved during the Flood year, i.e. if subscripts 1 and 2 represent the time before and after an event then

$$I_1\omega_1 = I_2\omega_2 \tag{19}$$

where the earth's moment of inertia will be approximated by $I = (2/5)MR^2$ (the formula for an homogeneous sphere of mass M) and ω is the angular velocity. Then if δR is the departure of R from 1, $\Delta R = \delta R_1 - \delta R_2$ and $\Delta\omega$ the change in ω then,

$$\begin{aligned} \omega_2 &= (R_1/R_2)^2\omega_1 \\ &= [(1 + \delta R_1)/(1 + \delta R_2)]^2\omega_1 \\ &\approx [(1 + \delta R_1)(1 - \delta R_2)]^2\omega_1 \\ &\approx (1 + \delta R_1 - \delta R_2)^2\omega_1 = (1 + 2\Delta R)\omega_1 \end{aligned} \tag{20}$$

hence

$$\Delta\omega = \omega_2 - \omega_1 \approx 2\Delta R\omega_1 \approx 2\Delta R \tag{21}$$

where ω remains very nearly 1 rev/day. For example, once again comparing lines 4 and 2 of Table 1 gives $\Delta R = 1 + 3.3 \cdot 10^{-6} - (1 - 3.3 \cdot 10^{-4}) = 3.3 \cdot 10^{-4}$ which corresponds to an increase of ω, at the column's highest, of $6.6 \cdot 10^{-4}$ rev/day. This, of course, may immediately be followed by an almost equal decrease in angular velocity as the water column falls. In this case ($f_v = 10^{-5}$, $h_2 = 5.0 \cdot 10^{-6}$ and $h_3 = 0$) $\Delta R_3 = 0$ and hence

$$\Delta\omega_{2,3} = 2[(1 - 3 \cdot 3 \cdot 10^{-4} - (1 - 0) = -6 \cdot 6 \cdot 10^{-4} \tag{22}$$

Therefore it seems that ω would fluctuate up and down throughout the Flood year but the net change, if any, would depend only on the pre-Flood and post-Flood values of f_v, h_2 and h_3. If in the pre-Flood world much of the Flood waters were yet subterranean and the land low and mountainless,[1] then $f_v = 10^{-5}$ and $h_2 = h_3 = 10^{-5}$ might apply.

If the circumstances after the Flood are essentially as now, then an average ocean depth of 2 miles covering 80% of the earth and an average land height of 1 mile gives, $f_v = (\cdot 8)(2/4000)(4\pi \cdot 1^2)/[(4\pi/3)1^3] = 1 \cdot 2 \cdot 10^{-3}$, $h_2 = 2/4000 = 5.0 \cdot 10^{-4}$ and $h_3 = 1/4000 = 2.5 \cdot 10^{-4}$ where the radius of the earth is taken as 4000 miles. Putting these values in the approximation gives $\delta R_1 = +3 \cdot 35 \cdot 10^{-6}$ and $\delta R_2 = +2 \cdot 01 \cdot 10^{-4}$ from which $\Delta\omega \approx -1.98 \cdot 10^{-4}$. In this case the available water was increased by a factor of 120. Other plausible values for the pre-Flood world might yield $\Delta\omega$ of about -10^{-3} to $+10^{-3}$.

Possibly the "convenant of night and day" (Jer 31:36, 33:20) may mean that God has preserved the value of ω from the beginning. A much larger change than $-.001$ would be needed in order to substantiate the claim that the pre-Flood year was appreciably shorter than at present. Further, the change would need to be positive, not negative. In conclusion it would seem that the Flood did not appreciably alter the earth's rotational speed.

If, in fact, the net $\Delta\omega$ throughout the Flood is precisely zero, and given that the present values are the post-Flood values, then all permissible pre-Flood values for f_v, h_2 and h_3 can be computed i.e. those for which $\Delta R_1 = \Delta R_2$. Figure 6 shows some of these permissible values within the range where near logarithmic-linearity is displayed. The great amounts of thermal energy dissipated by Flood events will reduce the value of $\Delta\psi^2$.

Also note, in this analysis the earth is not spherical, unless $h_3 = 0$, and hence a more accurate and complicted formula for the moment of inertia should be used which would depend on R, h_2 and h_3 as well as orinetation with respect to the axis of rotation. This more detailed analysis will be performed in the next section and will essentially agree with the results just obtained.

The Earth's Moment of Inertia

In this section a rather precise model for the earth's moment of inertia will be derived and, in the next section, applied to a Flood model. It will first be necessary to obtain the moment of inertia of an arbitrary spherical cone of apex angle ψ and with orientation angle ϕ_0 (note the different meaning from that of the ϕ in Equations 1 and 2) as shown in Figure 7. The moment of inertia of the spherical cone OBC is

$$I(\psi, \phi_o, R) = \int_\phi\int_\theta\int_R dI(\theta, \phi, R) \tag{23}$$

where $\sigma(\Theta, \phi, R)$ is the density and (24)

$$dI(\theta, \phi, R) = r^2 \cdot \sigma\varrho^2\sin\phi d\theta d\phi d\varrho = \sigma\varrho^4\sin^3\phi d\theta d\phi d\varrho$$

Hence define

$$I(\theta, \phi, R) = R^5\sigma H(\psi, \phi_o) \tag{25}$$

where

$$H(\psi, \phi_o) = \frac{1}{5}\int_\phi\int_\theta \sin^3\phi d\theta d\phi \tag{26}$$

For Figure 7(a)

$$\begin{aligned} H(\psi, \phi_o) &= \frac{1}{5}\int_{\phi=0}^{\psi}\int_{\theta=0}^{2\pi}\sin^3\phi d\theta d\phi \\ &= \frac{2}{5}\pi(\frac{2}{3} - \cos\psi + \cos^3\psi/3) \end{aligned} \tag{27}$$

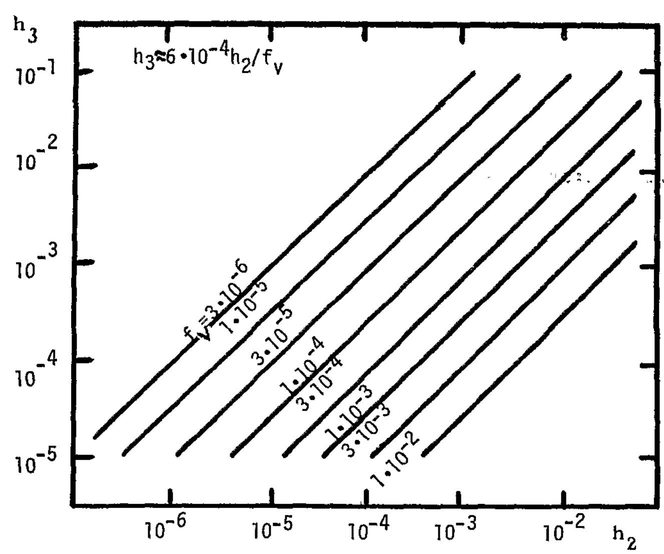


Figure 6. This chart gives the permissible values of the pre-Flood f_v, h_2, and h_3, assuming that present conditions are those after the Flood, i.e. $\Delta R_1 = 2.10^{-4}$ and that the net throughout the Flood was precisely zero.

In cases (b), (c) and (d) the law of cosines for the spherical triangle ABC will be solved for the limit on the first integration. For Figure 7(b)

$$H(\psi, \phi_o) = (\frac{1}{5}) \bullet 2\int_{\phi=0}^{\pi/2+\psi} 2\int_{\theta=0}^{\cos^{-1}(\cos\psi/\sin\phi)} \sin^3\phi d_s d\phi \tag{28}$$

$$= \frac{4}{5}\int_{\phi=0}^{\pi/2+\psi} \sin^3\phi \cos^{-1}(\cos\psi/\sin\phi)d\phi$$

For Figure 7(c)

$$H(\psi, \phi_o) = \frac{1}{5}\int_{\phi=\phi_o-\psi}^{\phi_o+\psi} \bullet 2\int_{\theta=0}^{\beta(\theta)} \sin^3\phi d\theta d\phi \tag{29}$$

$$= \frac{2}{5}\int_{\phi=\phi_o-\psi}^{\phi_o+\psi} \sin^3\phi \bullet \beta(\phi)d\phi$$

$$\beta(\phi) = \cos^{-1}[(\cos\psi - \cos\phi\cos\phi_o)/(\sin\phi\sin\phi_o)]$$

For Figure 7(d)

$$H(\psi, \phi_o) = \frac{1}{5}\int_{\phi=\psi-\phi_o}^{\psi+\phi_o} \bullet 2\int_{\phi=0}^{\theta(\phi)} \sin^3\phi d\theta d\phi + H(\psi - \phi_o, 0) \tag{30}$$

$$= \frac{2}{5}\int_{\phi=\psi-\phi_o}^{\psi+\phi_o} \sin^3\phi \bullet \beta(\phi)d\phi + H(\psi - \phi_o, 0)$$

Table 2 contains values for $H(\psi, \phi_0)$ obtained by numerical integration. The moment of inertia of a sphere is $I(0, \pi, R) = (8/15)\pi R^5$ for unit density.

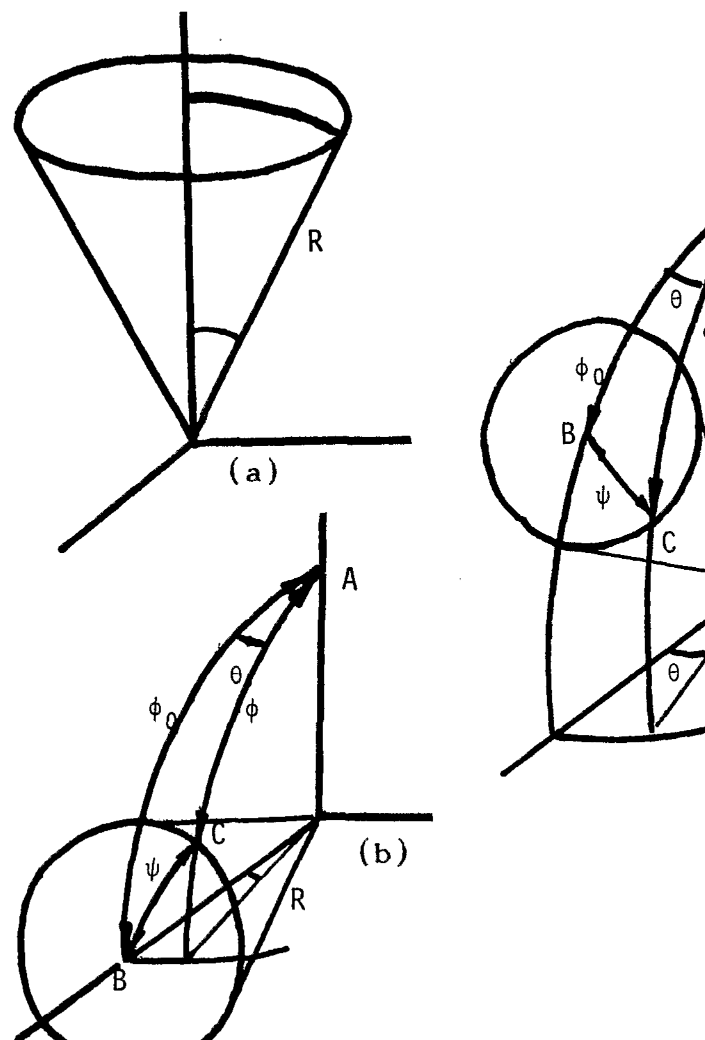
The value of $H(\psi, \phi_0)$ permits the computation of the moment of inertia for any Flood geometry by volumetric decomposition into spherical shells and spherical cones. A table in terms of R as well as ψ and ϕ_0 could be constructed for an assumed variation of σ with R.

A Flood Model

In this section a possible Flood model will be suggested predicated on present observations. Figure 8 shows this model. Figure 8(a) represents the pre-Flood geometry with the ocean subtending a central angle of 2ψ displaced by the angle ϕ_0 from the earth's axis of rotation and possessing a water volume of f_v.

Figure 8(b) occurs at the outset of the Flood at which time the pre-Flood ocean is pushed up above the land accompanied a fall of the land. Flood waters have been increased from f_v to f_v' while the ocean still subtends central angle 2ψ. Figure 8(c) shows the earth overspread by the fallen water of 8(b) to depth X_1 as it might had been throughout much of the Flood year. Figure 8(d) shows the present configuration where the volume of free water is now f_v''.

The moment of inertia of the earth about its axis of rotation can be computed in reference to Figure 8(a),



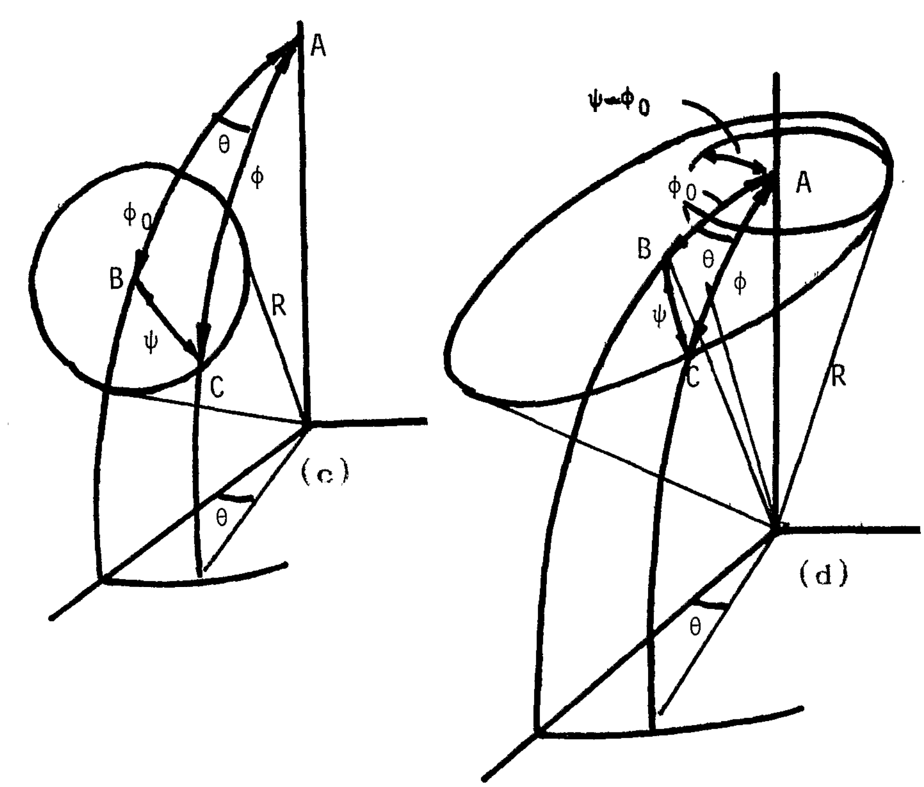


Figure 7 (in four parts). This shows the coordinates and geometry for determining the moment of inertia of a spherical cone about the vertical axis for arbitrary cone angle ψ, radius R, and cone axial angle ϕ_0. (a), $\phi_0 = 0, 0 \leq \psi \leq \pi$. (b), $\phi_0 = \pi/2, 0 \leq \psi \leq \pi$. [$\vartheta$], $\psi \leq \phi_0$. (d), $\psi > \phi_0$.

$$I_a = \frac{8}{15}\pi\sigma_e R^5 - \sigma_e[R^5 - (R - h_2 - h_3)^5]H(\psi, \phi_o)$$

$$+ \sigma_w[(R - h_3)^5 - (R - h_2 - h_3)^5]H(\psi, \phi_o) \quad (31)$$

where σ_e and σ_w are the densities of the dry earth and water. Similarly

$$I_b = \frac{8}{15}\pi\sigma_e R'^5 - \sigma_e[R'^5 - (R - h_2' - h_3')^5]H(\psi, \phi_o)$$

$$+ \sigma_w[(R' - h_3')^5 - (R' - h_2' - h_3')^5]H(\psi, \phi_o)$$

$$I_c = \frac{8}{15}\pi\sigma_e R'^5 + \sigma_e[R'^5 - (R' - h_2' - h_3')^5]H(\psi, \phi_o)$$

$$+ \frac{8}{15}\pi\sigma_w[(R' + X_1)^5 - R'^5]$$

$$+ \sigma_w(R'^5 - (R' - h_2' - h_3')^5]H(\psi, \phi_o)$$

$$I_d = \frac{8}{15}\pi\sigma_e(R'' - h_2'' - h_3'')^5 + \sigma_e[R''^5 - (R'' - h_2'' - h_3'')^5]$$

$$H(\psi, \phi_o) + \frac{8}{15}\pi\sigma_w[(R'' - h_3'')^5 - (R'' - h_2'' - h_3'')^5]$$

$$- \sigma_w[(R'' - h_3'')^5 - (R'' - h_2'' - h_3'')^5]H(\psi, \phi_o) \quad (32)$$

These expressions can be simplified by expanding the fifth powers and retaining only the first order term,

$$I_a \approx \frac{8}{15}\pi\sigma_e R^5 + 5R^4 H(\psi, \phi_o)[\sigma_w h_2 - \sigma_e(h_2 + h_3)]$$

$$\approx \frac{8}{15}\pi\sigma_e(1 + 5\delta R) + 5(1 + 4\delta R)H(\psi, \phi_o)$$

$$[\sigma_w h_3 - \sigma_e(h_2 + h_3)] \quad (33)$$

$$\approx \frac{8}{15}\pi\sigma_e + \delta R\{\frac{8}{3}\pi\sigma_e + 5H(\psi, \phi_o)[\sigma_w h_2 - \sigma_e(h_2 + h_3)]\}$$

Define $I_a \approx I_o + \Delta I_a$, with the interpretation

$$I_o = \frac{8}{15}\pi\sigma_e \quad (34)$$

$$\Delta Ia \approx \delta R(\frac{8}{15}\pi\sigma_e + 5H(\psi, \phi_o)[\sigma_w h_2 - \sigma_e(h_2 + h_3)]$$

Similarly

$$\Delta I_b \approx \delta R'\{\frac{8}{3}\pi\sigma_e + 5H(\psi, \phi_o)[\sigma_w h_2' - \sigma_e(h_2' + h_3')]\} \quad (35)$$

$$\Delta I_c \approx \delta R'[\frac{8}{3}\pi\sigma_e + 5H(\psi, \phi_o)(\sigma_w - \sigma_e)(h_2' + h_3')] + \frac{8}{3}\pi\sigma_w X_1$$

$$\Delta I_d \approx \delta R''\{\frac{8}{3}\pi - 5H(\psi, \phi_o)][\sigma_w h_2'' - \sigma_e(h_2'' + h_3'')]\}$$

Assuming angular momentum conserved as would be expected, and the axis of rotation unchanged, $I_d\omega_d = I_i\omega_i$, (i = a, b, c). (Strictly speaking the Euler equations of motion should be solved from which $h = I\omega$ is conserved where now ω is the angular velocity vector and I the inertia tensor and where the energies associated with the forces of the upheaval are considered). Define ω_d = 1 then

$$\omega_i = I_d/I_i \approx (I_o + \Delta I_d)/(I_o + \Delta I_i) \quad (36)$$

$$= (1 + \Delta I_d/I_o)/(1 + \Delta I_i/I_o]$$

$$\approx (1 + \Delta I_d/I_o)(1 - \Delta I_i/I_o)$$

$$\approx 1 + (\Delta I_d - \Delta I_i)/I_o$$

Hence define $\omega_i = 1 + \Delta\omega_i$ and $\Delta\omega_i = (\Delta I_d - \Delta I_i)/I_o$.

Table 3 contains a summary of a set of assumed values for this model and the resulting computed values. The beforementioned approximations $\psi = 73F_v^{1/2}h_2^{-1/2}$, and $\delta R \approx 0 \cdot 335 f_v h_2^{-1} h_3$ will be used, Let ϕ_o = 20 in all four epochs. As before, the present values $f_v = 1.2 \cdot 10^{-3}$, $h_2 = 5 \cdot 10^{-4}$, $h_3 = 2.5 \cdot 10^{-4}$ will be adopted from which ψ = 107 and $\delta R = +7.37 \cdot 10^{-4}$. This establishes ψ = 180 − 107 = 73 for epochs (a), (b) and (c). At epoch (b) the assumed values of ψ and h_2 give

	ϕ = 0	10	20	30	40	50	60	70	80	90
ψ = 5	0.00002	0.00016	0.00057	0.00121	0.00198	0.00281	0.00358	0.00422	0.00463	0.00477
10	0.00029	0.00085	0.00247	0.00495	0.00800	0.01124	0.01428	0.01677	0.01839	0.01895
15	0.00144	0.00267	0.00620	0.01161	0.01824	0.02530	0.03194	0.03734	0.04087	0.04210
20	0.00448	0.00656	0.01256	0.02175	0.03302	0.04501	0.05628	0.06547	0.07147	0.07355
25	0.01069	0.01375	0.02259	0.03612	0.05271	0.07037	0.08697	0.10050	0.10933	0.11240
30	0.02155	0.02565	0.03746	0.05556	0.07776	0.10138	0.12358	0.14168	0.15349	0.15759
35	0.03862	0.04373	0.05843	0.08096	0.10859	0.13800	0.16563	0.18815	0.20285	0.20795
40	0.06342	0.06942	0.08668	0.11314	0.14560	0.18013	0.21258	0.23903	0.25630	0.26229
45	0.09728	0.10398	0.12327	0.15282	0.18907	0.22765	0.26390	0.29345	0.31273	0.31942
50	0.14125	0.14840	0.16898	0.20051	0.23919	0.28035	0.31902	0.35055	0.37112	0.37826
55	0.19602	0.20332	0.22432	0.25649	0.29595	0.33795	0.37741	0.40957	0.43056	0.43785
60	0.26180	0.26891	0.28937	0.32071	0.35916	0.40008	0.43853	0.46987	0.49032	0.49742
65	0.33830	0.34488	0.36382	0.39283	0.42843	0.46630	0.50189	0.53091	0.54984	0.55641
70	0.42472	0 43044	0.44692	0.47217	0.50314	0.53609	0.56705	0.59229	0.60876	0.61448
75	0.51978	0 52435	0.53753	0.55772	0.58248	0.60883	0.63358	0.65376	0.66693	0.67151
80	0.62174	0.62493	0.63412	0.64820	0.66547	0.68384	0.70111	0.71518	0.72437	0.72756
85	0.72851	0.73015	0.73487	0.74210	0.75097	0.76041	0.76928	0.77650	0.78122	0.78286
90	0.83776	0.83776	0.83776	0.83776	0.83776	0.83776	0.83776	0.83776	0.83776	0.83776

Table 2. This gives values of $H(\psi, \phi_0)$. A computer program for computing H is available from the author.

f_v = 10^{-4}. The resulting value of X_1 = $3.3 \cdot 10^{-5}$ for epoch (c) corresponds to an average global ocean depth throughout the Flood year of $3.3 \cdot 10^{-5} \cdot 4000$ = .33mi. An increase of f_v by a factor of 120 from epoch (a) to (d) has again been used. The specific densities σ_w = 1 and σ_e = 5 • 5 have been used.

This more detailed analysis of the earth's angular velocity agrees with the sense of the previous cruder analysis, i.e. the angular velocity, again, has increased, by $4 \cdot 34 \cdot 10^{-4}$, as compared with $1 \cdot 98 \cdot 10^{-4}$. The computed angular velocity changes would surely be smaller if total momentum was not conserved. I am of the opinion that to pursue this matter too deeply would be to inquire of secret things of the Lord (Deut 29:29); for He is not constrained by the conservation of energy or any other of man's perceptions of nature.

Possible Changes in the Earth's Axis of Rotation

Since the three principle moments of inertia of the earth are very nearly equal, then the raising and falling of both land and water during the Flood year will leave the spatial direction of the earth rotation axis essentially invariant but may very substantially alter the geographic location of the point on the earth's surface where the axis pierces it, i.e. great wandering of the pole could take place.[3,4]

The effect of Flood events would be to alter the principle moments of intertia and thus cause a displacement of the poles. In this way, through a succession of such events, a point near the pre-Flood equator might come to rest in a polar region after the Flood. This analysis is quite lengthy and will be presented in a later paper in which the Euler equations for a body-fixed set of axes are solved and the resulting angular velocity components transformed to an inertial reference.

A Possible Mechanism for the Formation of Ice

One of the motivations for this paper was to investigate conditions for the formation of global ice. One obvious means by which large areas of ice could have been formed would be the repeated evaporative cooling of the waters on the earth during the after Flood. When sufficient heat had been removed freezing would occur. Such freezing should not have occurred before the Flood, if the canopy model is correct.[1]

This process, though it started during the Flood year, did not form ice immediately after the Flood for Noah set foot on high and dry land (Gen 8:4, 13) when embarking from the Ark. Hence great build-ups of ice, by refrigeration, occurred during the years after the Flood and were followed quickly by metling; for by the time of Job, already, great melting[5] and formation of brackish ice water were common (Job 6:16, 24:19, 37:6, 7, 10, 36:28-30).

A second means by which ice could have been formed is by great pressure. This would form ice almost instant-

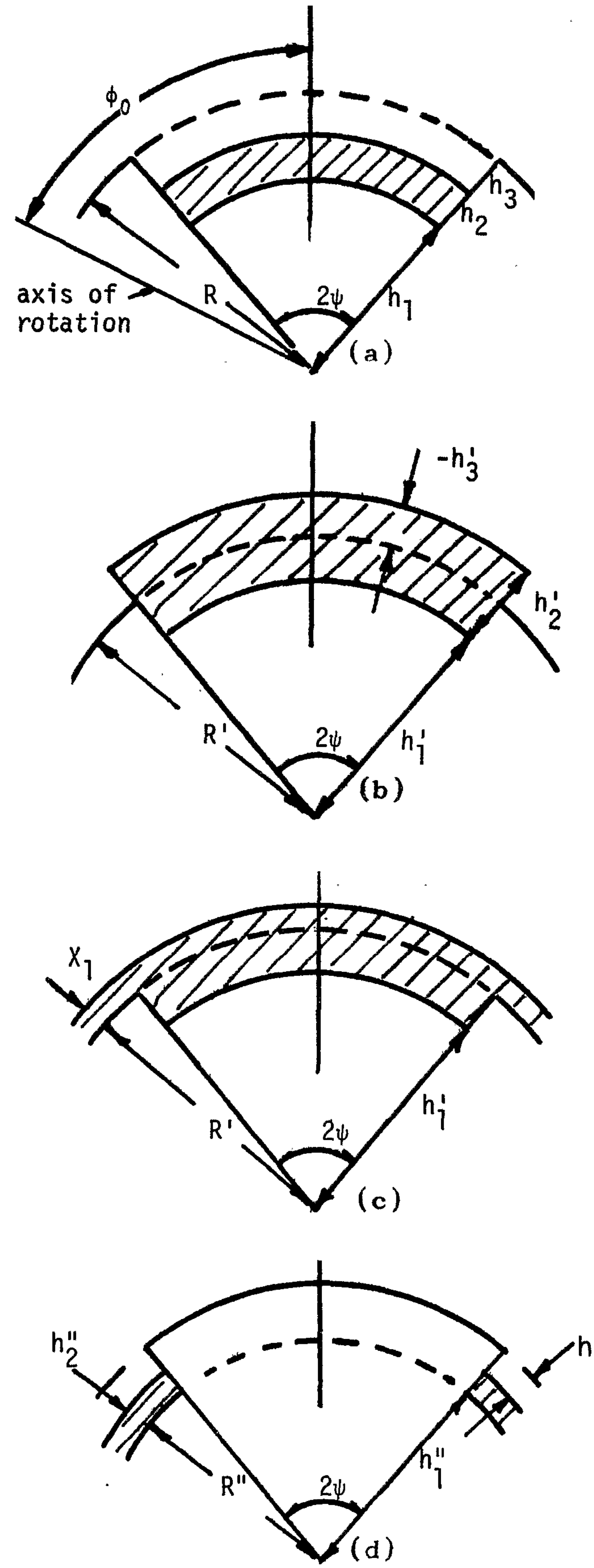


Figure 8. This shows the geometry of a Flood model in which the pre-Flood ocean bottom becomes the post-Flood dry land. Epochs (a)-(d) show, respectively, the pre-Flood geometry, the upwelling of Gen 7:11 and Ps 33:7, the Flood year during which the earth was covered, and the post-Flood conditions. (a), pre-Flood, $t = 0, f_v$. (b), upwelling, $t = t', f_v', h_2' > -h_3'$. (c) Flood year, $t = t_2', f_{v'}$. (d), post-Flood, $t = t'', f_{v''}$.

Epoch	f_v	h_2	h_3	ϕ_0	ψ	$10^6\delta R$	X_1	X_2	X_3	P_e	$10^4\Delta I$	$10^4\Delta\omega$
(a) Pre-Flood	$1.0\cdot10^{-5}$	$1.0\cdot10^{-5}$	$1.0\cdot10^{-5}$	20	73	3.35	-	-	-	-	-2.74	-2.17
(b) Upwelling	$1.0\cdot10^{-4}$	$1.0\cdot10^{-4}$	$-1.0\cdot10^{-4}$	20	73	-3.35	-	-	$3.3\cdot10^{-5}$	$1.2\cdot10^{21}$	+2.74	-2.50
(c) Flood year	$1.0\cdot10^{-4}$	-	-	20	73	-3.35	$3.3\cdot10^{-5}$	-	-	0	+2.45	-2.50
(d) Post-Flood	$1.2\cdot10^{-3}$	$5.0\cdot10^{-4}$	$2.5\cdot10^{-4}$	20	**107**	737.	-	-	-	-	-43.	0

Table 3. This gives a summary of the Flood model as pictured in Figure 8. The numbers enclosed in boxes are the assumed values from which all others on the same line were computed. The conditions in the post-Flood epoch have been assumed to be the same as at present.

ly and might provide a mechanism by which the mammoths of Siberia were so quickly frozen. In the case where h_3 is negative a great upswelling of water takes place followed by the release of potential energy P_e. The potential energy would give rise to the enormous kinetic energy of the waters rushing away radially from the location of the event. The antipodal point to the event would be the site of a heaping-up.

An enormous gradually decreasing wave, or waves, would travel back and forth until sufficient kinetic energy was dissipated through friction. At the first convergence of water at the antipodal point great pressures would result where a heightening circular wall of water converges to a point. It is suggested that potential energy of about 10^{20} ergs released by the Flood event would yield pressures on the order of 10^4 atmosphers near the antipodal point which would be sufficient to quick-freeze the water even if its temperature were 200 °F.[6]

Subsequent removal of heat from the ice through the geographical cooling mentioned above coupled with the great pressure of the just-formed ice and water above could possibly maintain the ice, i.e. keep it from all melting. As many such events must have occurred throughout the globe during the Flood it would seem reasonable to assume that sizeable amounts of ice were formed at antipodal points and at the interface of the colliding waves emanating from Flood events.

At impact points large amounts of debris accumulated by the moving waters were deposited. The resonance of such impact points and lines could account for continent-size land and ocean bottom formations. Similarly this action might account for the hollowing out of ocean basins whereby material was eroded and carried from one place to be dumped another when at impact the water was momentarily at rest. This picture might be suggested for understanding the lines of tectonic activity and rift lines throughout the earth, the rift lines being the locations of upwelling events and the tectonic mountain lines being the locations of the corresponding impacts.[7]

A Possible Explanation of the Frozen Mammoths

A mechanism for instantly freezing large warm masses might explain the freezing of the Siberian mammoths so quickly and thoroughly that some have been perfectly preserved through several thousand years. to appreciate the enigma of the mammoths and the many dilemmas that they present to evolutionary theory one need only read Hapgood's thorough treatise.[8] The present writer holds that ordinary convective or conductive cooling could not account for the mammoths' state of preservation, for too much decay would occur before freezing was completed and thereafter. Such freezing would not be thorough enough to provide such preservation for even a decade.[8,9]

This conjecture will be dealt with elsewhere in a detailed mathematical analysis of the thermodynamics and hydrodynamics associated with the ice formation by pressure and the possibility of the need to quick-freeze the mammoths.

Mammoth remains are found all over the world; however, they are only preserved in the flesh in arctic-like regions such as Siberia.[8,9] The mammoth was *not* a cold weather animal.[8,9] Since, amongst animals, the mammoth was comparatively highly mobile, he would have resisted the Flood longer by attaining high ground. To do this mammoths may have covered vast distances in order to congregate on remaining islands. Thus having congregated, they would be assembled for their mass burial. If great walls of water were to collide at their place of assembly then the mammoths would be as so much debris frozen into the water by the great pressure of impact.

The Meaning of Psalm 104:8

The King James Version translation of Ps 104:6-8 reads;

> :6 Thou coveredst it with the deep as with a garment: the waters stood above the mountains.
> :7 At thy rebuke they fled; at the voice of thy tunder they hastened away.
> :8 They go up by the mountains; they go down by the valleys unto the place which thou hast founded for them.

Verse 6, I suggest, describes the Flood which covered the earth. Verses 7 and 8 describe the releasing of water (i.e. an increase of f_v) for the Flood followed by the raising of water (i.e. negative h_3) and subsequent spreading forth of the heaped up waters, then eventually followed by some of the excess water once again being encapsulated (i.e. a decrease of f_v) as subterranean water.

It is suggested that the arguments of this paper provide a mathematical representation of Ps 104:6-8 which is compatible with Gen 7:11, 8:1-5, and other references such as Ps 33:7, Job 38:8, etc. Modern translations, e.g. the ASV, RSV and NASV, translate verse 8 with, "The mountains rose, the valleys sank," This translation and the King James Version marginal note ("The mountains ascend, the valley descend") are seen as corollarial to the King James Version text; in that the primal act of God in bringing forth the Flood was the breaking of fountains of the deep giving rise to heaping up of water which, in order to conserve total volume, would be followed by an overall land subsidence that would unleash associated up and down land motions. Furthermore, as already discussed, the spreading forth would carve out valleys and deposit mountains elsewhere at water impact regions. The rendering given by the modern translations seems to be favored by many creation scientists; for example see Whitcomb's discussion.[10]

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A PLEA FOR CAUTION ABOUT SKULL 1470

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The well known skull 1470, found by Richard Leakey, has been cited by many Creationists as evidence that man appears in the fossil record as early as other hominids, and that when he does appear he is fully a man. However, the skull has ape-like, as well as man-like, features. The author urges that Creationists be very cautious in using this skull as evidence; for if it should be decided later that it is not a human skull after all, they would have been leaning on a broken reed. It is suggested also that there is other evidence which Creationists should consider, and which they might find to be more conclusive and more helpful.

In 1973 Richard E. F. Leakey cautiously announced the astounding find of a human-like fossil skull that possessed features too advanced for its tremendous antiquity of 2.8 million years. KNM-ER 1470, better known simply as "Skull 1470", immediately became controversial. Most evolutionary anthropologists were at first unwilling to accept its antiquity. Gradually acceptance was gained as several prominent scientists attested to its genuineness. The find of the decade shocked the world of anthropology. The neat textbook scenario of human evolution that pictured primitive forms progressing to modern man was suddenly all wrong. Of the skull Leakey said, "it simply fits no previous models of human beginnings . . . leaves in ruins the notion that all early fossils can be arranged in an orderly sequence of evolutionary change."[1]

Skull 1470 is now regarded, tentatively at least, by some as genus *Homo*, species indeterminate. Marvin Harris assigns the skull to an advanced hominid series called "habilines" which includes the controversial Lothogam mandible fragment and the dubious *Homo habilis*.[2] According to Leakey and others favoring *Homo* status, the creature lived contemporaneously with the australopithecines, considered by most scientists through the decade of the 1960's to be the "missing link" between man (*Homo erectus*) and his earlier ape-like ancestor, *Ramapithecus*.

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But 1470 is more advanced than *Australopithecus*. *Australopithecus* cannot, therefore, be a human ancestor. But where did 1470 come from? No one knows. The fossil record, at this point, is not known to contain any ancestral forms for 1470. Even Harvard geologist Stephen Jay Gould is willing to admit that the form "appears suddenly" in the fossil record.[3]

Creationist Comment on Skull 1470

Creationists welcomed the find joyously, especially when evolutionists emphasized its "human" features and began to call it genus *Homo*. Jon Buell in an article for *Moody Monthly* commented: "(the) find of Skull 1470 is not at all disquieting to the creationist, but it is to the evolutionist".[4] Duane T. Gish in his little book *Evolution: The Fossils Say No!* wrote: "The latest reports of Richard Leakey are startling, and, if verified, will reduce to a shambles the presently held schemes of evolutionists concerning man's origins".[5] And even more recently Marvin Lubenow, in his essay on evolutionary reversals, asserted that fossil skull 1470 "is more 'modern' than either *Homo erectus* or the Neanderthalers, both of which, in evolutionary concepts, are supposed to have arisen much later".[6]

Features of the Skull

Before proceeding further with an interpretation of this "startling" fossil, it is well to pause for a moment to catalogue its "remarkable mixture of both primitive and advanced features".[7]